

MAGAZINE 2017 SAF-HOLLAND

# Engineer Build Connect



# Profile

10,000

**Spare Parts and Service Stations**  
Our reliable network of roughly 10,000 spare parts and service stations ensures that our end customers have fast access to our spare parts worldwide.

3,565

**Employees**  
More than 3,500 employees make SAF-HOLLAND one of the largest suppliers to the commercial vehicle industry.

EUR

1,138.9

**Million**  
With sales of EUR 1,138.9 million in 2017, we are one of the leading manufacturers of chassis-related modules and components for trailers, trucks, buses and recreational vehicles.

17

**Production Sites**  
The majority of our production sites have been traditionally located in North America and Europe.

6

**Continents**  
Following the merger of SAF in Europe and Holland in the US in 2006, SAF-HOLLAND is now operating on six continents.



SAF-HOLLAND is the largest independent listed commercial vehicle supplier in Europe. We develop solutions for the global truck, trailer and bus industries. With our innovative components and systems, we contribute to the worldwide success of our customers. In the original equipment business, we supply truck, trailer and bus manufacturers. And through our comprehensive, global spare parts and service network, we ensure the rapid supply of spare parts to our customers. As one of only a few suppliers in our industry, we are internationally well-positioned and present in almost all markets worldwide. With the innovation campaign SMART STEEL – ENGINEER BUILD CONNECT, SAF-HOLLAND combines mechanics with sensors and electronics and drives the digital networking of commercial vehicles and logistics chains.

**“Our SMART STEEL innovation campaign is a key component of our 2020 growth strategy. It combines mechanics with sensors and electronics and promotes the digital networking of commercial vehicles and logistics chains. With SMART STEEL, we are joining our customers on their way to tomorrow and beyond.”**

Detlef Borghardt, Chief Executive Officer (CEO)

# Contents



01



02



03

04





## 01 A Brand New World p. 4 — 7

Detlef Borghardt, CEO of SAF-HOLLAND, and Prof. Dr. Frank Straube from the Technical University of Berlin discuss today's trends and how the transportation world of tomorrow can be made more efficient and sustainable.

## 02 The Think Tank p. 8 — 15

A source of inspiration for innovative ideas: SAF-HOLLAND's digital team in Aschaffenburg, Germany, and Muskegon, Michigan, is a pioneer in the digitization of transportation.

## 03 Steel Smart p. 16 — 21

Step by step, steel is getting smarter. The goal is to combine mechanics with sensors and to automate work that was previously performed manually, thereby reducing the operating costs of freight forwarders.

## 04 The Year 2025 p. 22 — 27

Truck driver Hannah Meier is in a convoy of truck and trailer combinations on her way from Hamburg, Germany, to Turin, Italy. A look at the year 2025, when platooning and automated logistics yards will have become reality.

## 05 The Art of Simplicity p. 28 — 29

SAF-HOLLAND's new air suspension system combines the functions of the air spring and shock absorber, eliminating the need for hydraulic shock absorbers.

## 06 A Treasure Trove of Data p. 30 — 35

Data collected by sensors on the trailer and processed in the cloud provide valuable knowledge for a host of applications – such as better scheduling of maintenance intervals and minimizing downtimes.



# 06

# 05

DETLEF BORGHARDT

# A Brand New



Detlef Borghardt is the CEO of SAF-HOLLAND.

PROF. DR.-ING. FRANK STRAUBE

Prof. Dr. Frank Straube heads the Logistics Department at the Technical University of Berlin.



# World

Automation and digitization are not only changing commercial vehicles and trailers but also entire logistics chains. What are the trends and what can we do today to make tomorrow's world of transportation more efficient and sustainable? Prof. Dr. Frank Straube, Head of Logistics at TU Berlin, and Detlef Borghardt, CEO of SAF-HOLLAND, discuss at Kühne Logistics University in Hamburg.

DETLEF BORGHARDT

PROF. DR.-ING. FRANK STRAUBE

**We are standing here overlooking the Port of Hamburg. If we were to meet here again in ten years, what will have changed?**

**DB:**

Freight traffic will continue to increase but mainly in the regions where population and wealth continue to rise. Growth in transportation will primarily take place on the road and will not be inhibited by deliveries using drones or spare parts from 3D printers. Drones today can't deliver washing machines and they still won't be able to in ten years. As a supplier, we are contributing to lower CO<sub>2</sub> emissions by designing ever-lighter products, which is a central theme of our research and development.

**FS:**

There will be much more integration of the various modes of transportation, and not only at the Port of Hamburg. Modes of transportation will be interconnected with one another and the cargo being transported. Not only will there be an exchange of data, but we will also have networked business models. I see the potential for a 20-percent reduction in costs and 30 percent higher reliability in logistics chains worldwide. We should also see a dramatic fall in CO<sub>2</sub> emissions in the transportation sector.

**“We need to make our components smart enough to fit seamlessly into our customers’ digital solutions.”**

Detlef Borghardt, Chief Executive Officer (CEO)

**What opportunities do digitized logistics chains offer?**

**DB:**

I can certainly confirm this in terms of our own production. There is no such thing as a global universal axle for all customers, and I don't see the market accepting a standardized product range in the future. We want to satisfy our customers' individual needs, as long as they are willing to compensate us for the extra effort. The point is to intelligently manage the growing number of variants and provide delivery at all times. The production of only a single unit is nothing unusual at our plants – and we do this profitably.

**FS:**

In the case of international transportation, a container's content goes through the hands of 14 independent players on average before reaching the end customer. Until now, players have been independently optimizing their utilization. However, to truly achieve optimum utilization along the entire value chain, all of these players need to be linked together – a feat in a logistics world that is changing dramatically. In the future, it will no longer be a question of bringing large quantities of uniform goods to the consumer but of satisfying individual and flexible demand without increasing manufacturing or trade inventories.

**FS:**

I admire that. This type of flexibility in the physical world is essential for success in the digital world of tomorrow.

DETLEF BORGHARDT

**What role does autonomous driving play?  
And how soon can we expect it?**

DB:

Automation will come in three stages. The first stage can already be seen at international sea-ports, where ships with 15,000 containers are unloaded within just a few hours. This is only possible because most of today's processes are already automated. Because automation eliminates several opportunities for disruption, ports will be able to adapt very quickly. The next stage in automation will take place in the logistics yards. This will be especially beneficial when one considers how much damage occurs to vehicles and loading ramps simply because the driver was not paying attention. Over the next five to ten years, these hubs will be largely automated, and this will require solutions to automatically couple the tractor and trailer. I believe the stage where driverless trucks are actually on the road will come sometime in the years 2025 to 2030.

**“Supply chain management is  
an absolute priority.”**

Prof. Dr.-Ing. Frank Straube, Partner of Kühne Logistics University.

DB:

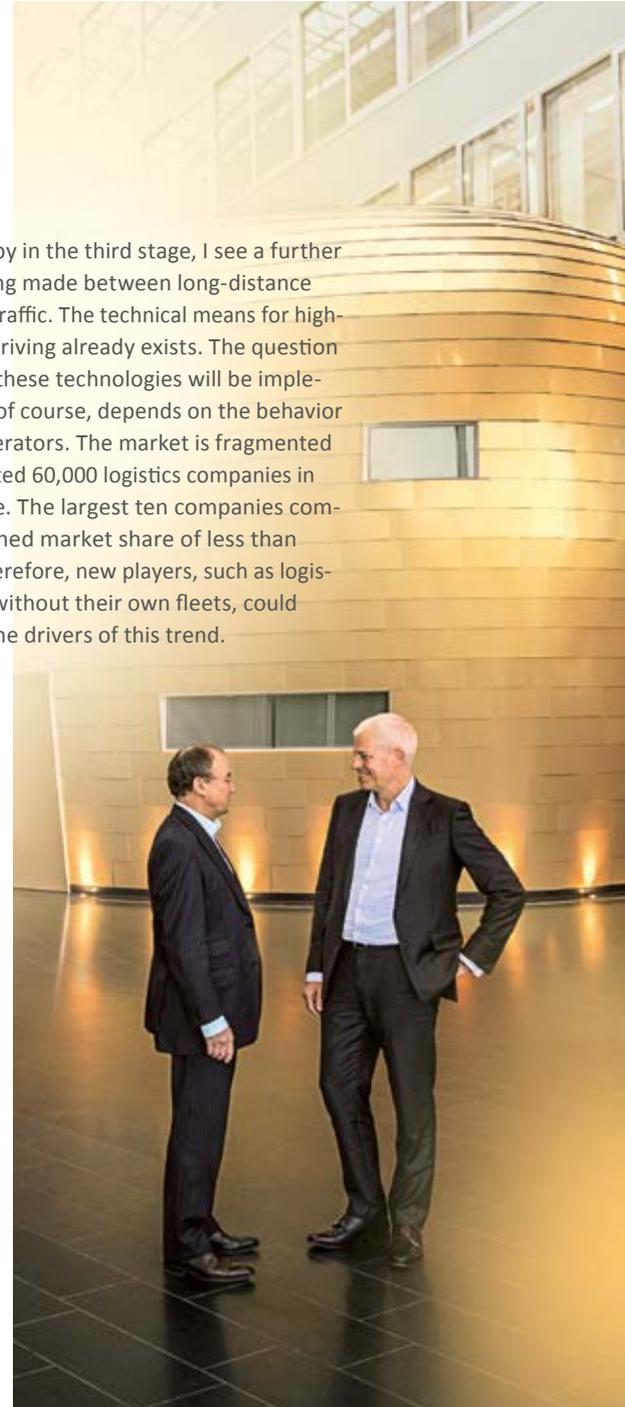
China could become a leading market for new technologies for commercial vehicles. In the past, it was all about costs, costs and even more costs. That has changed. During my last few visits, I found myself talking mainly about bits and bytes. Transportation volumes in China have exploded over the last ten years. Now the topic of security is becoming increasingly important – also to local authorities – and is having a direct effect on our current portfolio in the form of higher demand for our disc brake and air suspension systems. Over the long term, automated driving and its safety advantages will also play an interesting role in this market.

**What role does the trailer play in  
this new world of transportation?**

PROF. DR.-ING. FRANK STRAUBE

FS:

I agree, whereby in the third stage, I see a further distinction being made between long-distance and inner-city traffic. The technical means for highly automated driving already exists. The question is how quickly these technologies will be implemented. That, of course, depends on the behavior of the fleet operators. The market is fragmented with an estimated 60,000 logistics companies in Germany alone. The largest ten companies command a combined market share of less than 20 percent. Therefore, new players, such as logistics platforms without their own fleets, could end up being the drivers of this trend.



FS:

Trailer manufacturers are going to follow the trends set by the market. This means they will need to provide the necessary automation and digitization technology with the expectation that they will contribute to higher efficiency. For example, in a typical freight yard, it takes 28 minutes from the time the driver clocks in until departure.

**DETLEF BORGHARDT**

**DB:**

It starts with the fact that the truck's driver must first locate his trailer. Once the trailer has been found, today's completely manual process of coupling begins. This alone can take between four and ten minutes' time. With the fifth wheel, we already have the key component for automating this process.

### What role will SAF-HOLLAND play in this new world?

**DB:**

Today, we provide data such as brake wear and the temperature in a wheel bearing. We deliberately link the sensors to our mechanical components and call it SMART STEEL. The next step will be to use this data for predictive maintenance and do this for systems that are not dependent on a specific trailer manufacturer.

**DB:**

Our first task, therefore, is to make our components so intelligent that they can seamlessly integrate into our customers' automated and digital solutions. The trailer market, however, is very fragmented with thousands of suppliers worldwide. The solutions we are developing as part of our SMART STEEL strategy can also be used to support medium-sized and smaller companies on the path to smart trailers.

### Where will you get the necessary software expertise?

**DB:**

Our expertise lies in developing high-security components for the commercial vehicles and trailers of the future. We can provide the necessary software through partnerships with traditional IT companies or specialized electronics suppliers. We are also in the process of significantly expanding our internal digital team.

**DB:**

Our themes over the next few years will be autonomous driving and the electrification and digitization of the process world. In our opinion, it is now more important than ever to listen carefully to what the market is asking for and maintain a dialogue with everyone involved. Thank you, Professor Straube, for the interview.

**PROF. DR.-ING. FRANK STRAUBE**

**FS:**

From now on, we all need to think not only in terms of products but also in terms of services and digital business models. This means asking why should a trailer simply be embedded in an innovative city logistics system without also serving as an intelligent, interconnected interim storage facility? This could also change the role of suppliers.

**FS:**

As long as goods are transported and not beamed, you will always need hardware. It's about networking expertise and not about everyone doing everything. We will see all-new alliances being forged between vehicle manufacturers, suppliers and software companies.



# The Think Tank

The SMART STEEL innovation campaign is SAF-HOLLAND's answer to the dawn of digitization in the transportation world. Launched in 2017, the cross-departmental digital team located in Aschaffenburg, Germany, and Muskegon, Michigan, is the catalyst for new ideas being implemented throughout the company worldwide.





Step by step into the world of digitization. This is what SAF-HOLLAND's SMART STEEL innovation campaign is all about. Industrial engineer Thomas Piroth has been a strong force in the campaign's development and now manages the commercial vehicle supplier's digital team. The team's task is to think ahead about each stage of digitization, initiate projects and partnerships and prepare the whole company for the new world of transportation. Formed as a startup within the Group, the team works closely with colleagues from the development, sales and IT departments. They take little notice, however, of the scare tactics from some of the prophets of the digital age. "Even over the next few years, a high proportion of our added value will still come from mechanical components and the associated know-how," says Piroth. "Nevertheless, we want to start preparing for the changes ahead, which are certain to open up some interesting opportunities for SAF-HOLLAND."

Mechanical expertise is the starting point for SAF-HOLLAND's digital strategy. During the first stage, all of the components and systems responsible for SAF-HOLLAND's success in the global market will simply get smarter. Equipped with sensors and electronic intelligence, the axles and fifth wheel couplings will be designed to meet the requirements of an increasingly automated and digitized chain of transportation. "We always ask ourselves the same questions," explains Piroth. "What contribution can we make to our customers? What can we do to meet our customers' future expectations? And what is the customer willing to pay for?" The answers to these questions are complex because there is no such thing as a typical customer. Whereas the global market for tractors is heavily concentrated and shaped by just a dozen or so manufacturers, the trailer market – which in terms of sales is more relevant for SAF-HOLLAND – is highly fragmented. Although it too has only a few large manufacturers, they only serve a small percentage of the market. Thousands of highly specialized companies have developed transportation solutions for everything from transporting milk to the dairy to bringing the blades of wind turbines to the North Sea. The market for transportation services is even more opaque. Nobody knows how many forwarding companies there are worldwide. According to the German Federal Association of Transportation Companies, there are about 40,000 forwarders in Germany alone. This is also an interesting market segment given that around a quarter of SAF-HOLLAND's sales are generated with after-market products. "All of our customers are affected by digitization in one way or another," says Piroth.



Recognizing and evaluating new trends: Thomas Piroth (middle) with colleagues from the Aschaffenburg digital team

## SMART STEEL – Business Model:

How do we bring intelligence to our products and create added value for our customers?



## SMART STEEL – Business Model:

How do we bring intelligence to our products and create added value for our customers?



**Product Models**

**Operational Focus**

New Growth Drivers

4

- Autonomous docking systems
- Components and systems for autonomous driving

- Leveraging stable business cash flows to invest in the technologies of the future



3

- Automated coupling system
- E-landing gear
- Wheel suspension
- Forced steering systems

- New adjacent market expansion
- Stand-alone derivatives from new product development



Strong Volume Business

2

- Lube Tronic fifth wheel
- SAF TIRE PILOT

- Upselling based on modular concept
- Product optimization and enhancement features – value engineering



1

- Entry-level landing gear
- Entry-level fifth wheel
- Entry-level towing hitch
- Entry-level axles
- Entry-level chassis

- Branded quality entry level systems
- Cost and operational efficiency (e.g. plant consolidation)



# “The real added value comes from the interpretation of data and the functionality based on it.”

Thomas Piroth, Head of the digital team at SAF-HOLLAND

Intelligent products, such as disc brakes that measure the wear and tear of the disc and lining, provide nonstop information. However, before this information can be processed in a higher-level IT system or used to control an autonomous vehicle, it must first be converted into bits and bytes. That is why stage two of SMART STEEL deals with the transition of the analog to the digital world. This is fairly advanced in some areas such as tire pressure monitoring, trailer door locking mechanisms and brake pad wear indicators. “Some of the solutions are already available ready-made on the shelf,” says Piroth. “Over time, we expect this to become the standard.” The digital team is also discussing other ideas with SAF-HOLLAND’s development departments. “Our job is not to develop these products on our own,” he says. “We need the help of engineers throughout the company.”

Piroth predicts that, in the eyes of the customer, the ability to provide data will increasingly become a minimum requirement. “Still, it is likely to be difficult to generate additional sales through delivering data alone,” he says. “The real added value comes from the data’s interpretation and the functionality achieved based on this data. This is where we bring in our invaluable expertise.” It’s also the reason stage three of SMART STEEL is dedicated to the topic of “integration and connection.” Though it is still unclear which data will be processed where in the future world of transportation, what is certain is that the data directly relevant for driving the truck will be used by the tractor, even when it comes from the trailer. This is not only true for the highly automated vehicles of the future, but is already a reality today. “Our goal is to provide the driver with

information such as tire pressure in easy-to-understand terms.” Since this also involves prioritizing the data and forwarding only the relevant information, it may be necessary to equip the trailer with its own decentralized intelligence – something only a few major international manufacturers are willing to do themselves. Still, Piroth does not want to exclude the possibility of SAF-HOLLAND taking on this task for smaller customers as well. “Basically, all our systems are designed open enough to process the data in other control units and IT systems,” he assures.

While the first three stages of SMART STEEL are all about digitally upgrading the existing portfolio, the fourth stage is where the digital team focuses on new digital services. Piroth sees strong leverage from expanding the existing service business: “Whatever we can do to minimize downtime will be broadly welcomed in the fiercely competitive market for transportation services.” For example, until now, repair shops have been checking the wear of brake discs and brake pads separately. This can make it necessary to make two visits to the repair shop instead of one. With predictive maintenance based on the correlation of specific vehicle and field data, the optimal time that makes the most economic sense can be calculated for the simultaneous exchange of both the brake disc and brake pad.



The digital team in Muskegon develops apps for the new service world and tests them on actual modules.

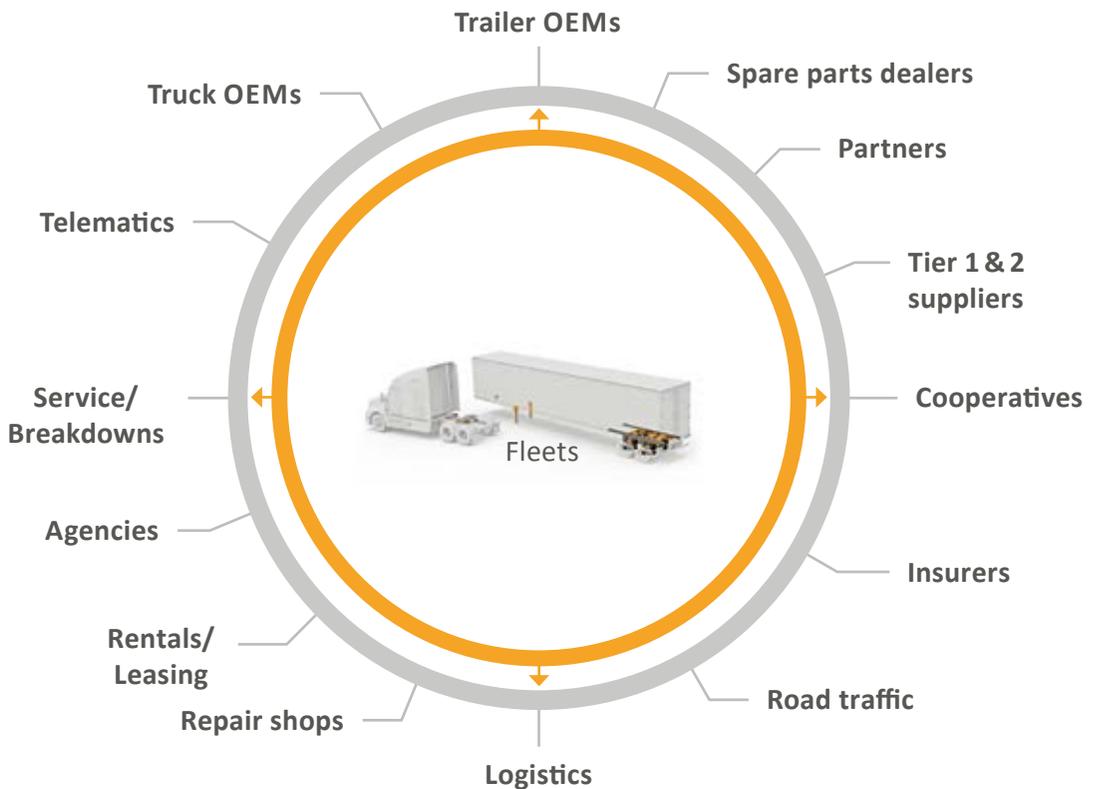


New business models already in development can also trigger advancements in the first three stages that may be able to achieve market maturity much faster than in the past using agile methods. This process is supported by digital team members in the small town of Muskegon on the shores of Lake Michigan where the apps for the new service world are not only developed but also tested.

Even so, the digital team never loses sight of the traditional world of transportation. The office of the German team members is located right next to the logistics center that serves the Bessenbach production site. Every minute, a 40-ton truck rolls up. The fact that there is a red dot on the wheel hub – which is found on most SAF-HOLLAND axles – is no surprise.

## The digital vision of SAF-HOLLAND

Our vision is a 360° linked customer – and only one click away...





Interview with CFO Dr. Matthias Heiden

# THREE QUESTIONS FOR DR. HEIDEN

## 1 What does the digital revolution in the logistics industry mean for SAF-HOLLAND?

MH — Digitization is taking place on several levels in the transportation industry. In the physical world, the more automation progresses, the more important security becomes as a business case. To accomplish this, we are combining our mechanical know-how with sensors and new electronic solutions. This allows us to offer fifth wheels and axle systems that continuously monitor their own status. The next step will be to use the data to enable new features such as predictive maintenance – not only in our own IT systems but also in those of our customers. We are also analyzing how digitization is changing business models in the logistics industry and how these changes open up new opportunities for SAF-HOLLAND.

## 2 What are you doing specifically to prepare SAF-HOLLAND for the digital world?

MH — My task at SAF-HOLLAND in relation to IT is to create an infrastructure that allows us to position intelligent products in the market and digitize processes. Our digital team represents the organizational nucleus from which our global activities are coordinated across all departments. With the introduction of SAP HANA in the first quarter of 2018, we are now launching a new IT platform that will enable us to run future applications – many of which are already under development in several business areas.

## 3 To what extent is SAF-HOLLAND a digital company today?

MH — SAF-HOLLAND is currently in the process of digitizing all of its business processes. This not only increases efficiency and quality, but also enhances our appeal as an employer for young professionals and executives. In production, digitization helps us deal even better with the high number of variants, for example, by increasing transparency for our employees. Instead of using a slip of paper, axles now travel through assembly with a digital twin that clearly shows the next steps and remaining processing time on a screen.



# Steel Smart

Step by step, steel is getting smarter. That's because SAF-HOLLAND equips mechanical components such as fifth wheels with more and more sensors and electronics. The goal is to automate work that was previously performed manually, thereby reducing the operating costs for freight forwarders.



SAF-HOLLAND employees in a conversation with MAN: Gerhard Herberg (left) heads sales to bus and truck manufacturers. Michael Riesterer (second from right) is the Deputy Engineering Director at SAF-HOLLAND.

Even the Hittites of ancient Asia Minor appreciated the advantages of iron materials. After mastering the smelting of iron ore, they produced the first heat-treatable steel in the first millennium B.C. Gradually, iron displaced copper materials due to its superior hardness and strength. Since the Industrial Revolution, steel has become the most important material for capital goods. In addition to iron and carbon, other elements are also added to the alloy to selectively influence steel's properties.

For several years, not only chemical substances like chromium and nickel are being added to steel components but also an ever-increasing number of sensors and electronic components. These additions are not making steel harder or firmer, but smarter. Linking mechanics with sensors and electronics can make life much easier for users. For example, the drivers of heavy trucks from the Volkswagen brand MAN: Since the beginning of 2017, MAN has been equipping all of its heavy trucks with SAF-HOLLAND's RECOLUBE automated lubrication pump.



With the RECOLUBE automated lubrication pump, it is no longer necessary to lubricate fifth wheels manually.



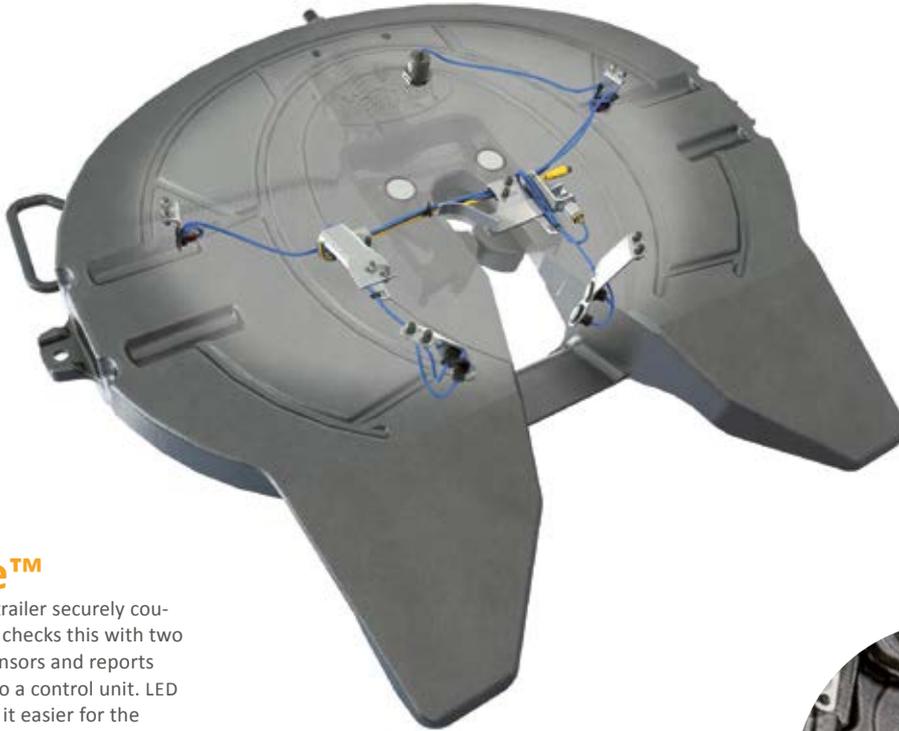
## RECOLUBE

The system consists of a multi-part pump, a refillable tank containing the high-performance lubricant RECOLUBE Power SKX 372 and a distributor system of hoses that brings the lubricant directly to the lubrication points.

**“The on-board computer has a lubrication plan that is precisely tailored to the respective requirements. The RECOLUBE system continually applies the lubrication according to this plan.”**

Michael Riesterer, Deputy Engineering Director

RECOLUBE eliminates the need for drivers and repair shops to lubricate a tractor’s fifth wheel manually. “At MAN, our strategy is centered on low-maintenance vehicles,” reports Stefan Marx, Team Leader Equipment Systems at MAN Truck & Bus. “The automation of manual activities not only increases the ease of maintenance and operation but also protects the environment.” Because only the required amount of lubricant is automatically applied precisely to the right places, only the amount of lubricant actually needed is used, meaning excess oil and grease don’t end up on the road. “The commercial vehicle manufacturer MAN is using our fifth wheel together with our new, controlled lubrication pump as a standard component for the first time,” says Gerhard Herberg, who heads sales to bus and truck manufacturers at SAF-HOLLAND. “Height-adjustable fifth wheel couplings are also equipped with this system.”



## ELI-te™

Is the semi-trailer securely coupled? ELI-te checks this with two inductive sensors and reports the results to a control unit. LED lamps make it easier for the driver to do a visual inspection and flash a red warning light in the event of a faulty connection.

The pump is connected to the tractor's central on-board computer via a standard interface. Five independent pump elements deliver the grease to the cap and four other points on the fifth wheel where lubrication grooves distribute the grease. "The on-board computer has a lubrication plan that is precisely tailored to the respective requirements," says Michael Riesterer, Deputy Engineering Director at SAF-HOLLAND. "The system continually applies the lubrication according to this plan, which under normal driving conditions is about every one and a half hours." The grease supply is sufficient enough for about a year of operation, or roughly 100,000 kilometers. "You have to refill the tank," says Riesterer. "But apart from that, the RECOLUBE system is completely maintenance-free." The display in the truck's cab shows when the lubricant's supply has been exhausted, allowing the driver to monitor the process directly from the cab.



### 1. Initiation of the coupling process

When coupling, the kingpin of the semi-trailer is pushed towards the lock.



### 2. Successful coupling process

When the kingpin is securely connected to the lock, four white LEDs will brightly light up.

In automated coupling, the semi-trailer connects to the tractor autonomously by moving towards each other on their own until the kingpin of the semi-trailer can be securely locked to the fifth wheel. Also important is the connection of the pneumatic and electrical outputs, which was previously done manually.

● **More safety and efficiency in loading logistics**

Automated coupling helps processes run faster and more reliably. This allows for better use of existing infrastructure and saves costs.

● **Easing the burden of the driver**

Automated yard logistics can ease the burden of the driver, allowing the driver to take a break, which is counted as a rest period.

● **The prerequisite for autonomous logistics chains**

In a fully networked logistics chain, the tractor and semi-trailer need to find their way everywhere autonomously – even in logistics yards.



To learn more about ELI-te™: [tinyurl.com/yapergcv](https://tinyurl.com/yapergcv)

**“At MAN, our strategy is centered on low-maintenance vehicles. The automation of manual activities not only increases the ease of maintenance and operation but also protects the environment.”**

Stefan Marx, Team Leader Equipment Systems at MAN Truck & Bus



Michael Riesterer and Stefan Marx: More and more processes will be automated in the future while operating a truck.

As with automated lubrication, more and more processes while operating a truck will be automated in the future. The primary aim is not only to have commercial vehicles drive autonomously on the highway but to have all other processes, like coupling, run automatically too. One step in this direction is the ELI-te system (“Electronic Lock Indicator – tech-enhanced”), designed by SAF-HOLLAND. It ensures that the semi-trailer is securely connected to the tractor. When the driver controls the process directly from the fifth wheel prior to departure, four white LEDs light up to confirm a secure connection and facilitate visual inspection. If the connection is not secure, for example, because a component is frozen solid and the kingpin has slipped over the lock, a red flashing light sends a warning that can also be clearly seen from the side of the cab. “We have been successfully selling this system in North America since late 2016,” says product manager Bryan Redeker. “Now we are assessing the need for this system in other markets worldwide.”

### Autonomous driving means automated coupling

To validate the connection, ELI-te uses two inductive sensors, one to sense the kingpin and the other to sense the lock. With a dynamic magnetic field, the sensors check the correct position of the kingpin and lock and report the result to a small computer mounted to the bottom of the fifth wheel. Redeker intends to leverage this intelligence for other applications in the future. “The next step in automation is fully automated coupling at, for example, loading terminals and logistics centers,” says Redeker. Today it is still necessary for the driver to leave the truck and connect the pneumatic and electrical connectors by hand. Redeker, together with project teams in the US and Germany, is currently assessing the market demand for automated coupling. An important question is when the market will demand fully autonomous or will partial automation be sufficient enough to make operating procedures more efficient. However, one thing is already certain: Steel will become even smarter in the future and contribute to greater efficiency in transportation and logistics.

**“The commercial vehicle manufacturer MAN is using our fifth wheel together with our new, controlled lubrication pump as a standard component for the first time.”**

Gerhard Herberg, Director OEM Truck & Bus Sales



# The Year 2025

A Future Scenario: Truck driver Hannah Meier is on her way from Hamburg to Turin in a convoy of truck and trailer combinations. As long as she is in the platoon, she no longer has to drive herself. Because in 2025, not only will the technical means be there, but lawmakers will have finally put a basic legal framework in place. Hannah also benefits. During the journey, she's working on her distance learning course, and when she arrives at her destination, she can leave her vehicle at the entrance to the logistics yard.

Like a string of pearls, a dozen trucks move south on the A7. The logo of a Hamburg freight forwarder emblazoned on their trailers. And something else stands out: The trucks are only 15 meters apart but in a continuous line because they are connected electronically.

Sitting in the truck's cab, Hannah Meier is in fourth place. She's become accustomed to driving in a tight line of trucks. Depending on the route, her truck may use seven to ten percent less fuel thanks to the benefits of aerodynamics. Not only that, she is able to do other tasks during her journey because her truck and trailer combination automatically follows the lead vehicle. She only controlled the driving from the Port of Hamburg to the A1. The electronics will take over the driving until she reaches Milan where she will leave the group to deliver her cargo in Turin.

Lawmakers have made an exception on the freeways for this system, called "platooning." About ten years ago, a mobility study said: "The issue of liability when it comes to platooning is still unclear. No one has even considered the underlying legal framework that is necessary." But past pilot projects have shown how much everyone involved benefits from traveling in a convoy with an electronic tow-bar. Not only do you save fuel, but the limited road space

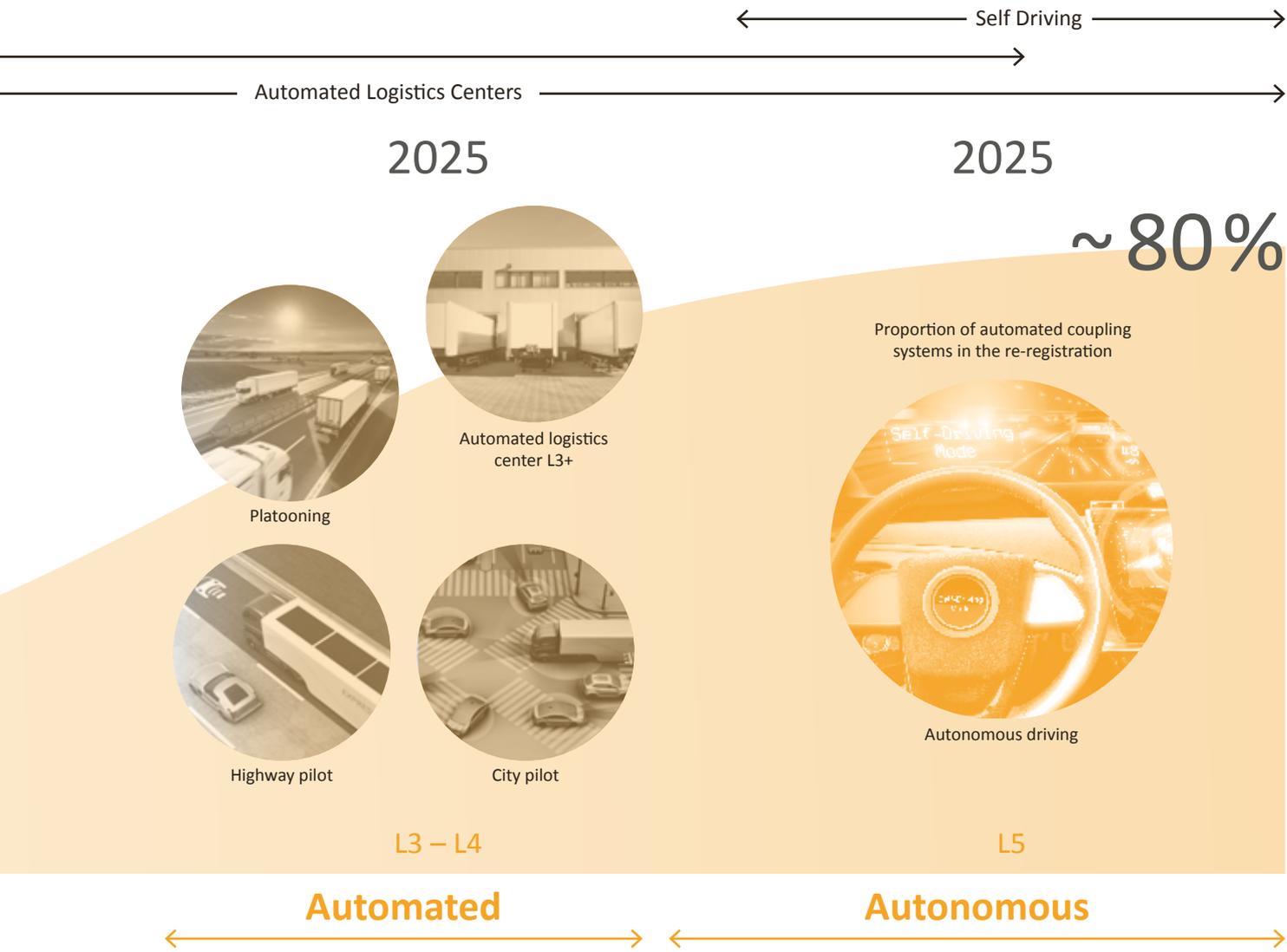
is used more efficiently. Even devastating accidents with inattentive or fatigued truck drivers crashing into traffic jams no longer occur.

Because these arguments have forced a public debate, the truck and trailer combinations of freight forwarders today are at least allowed to travel in groups on freeways. Preparations for the next level of automation are now in full swing. In Western countries, nearly one in three new vehicles is delivered with Level 4 automation technology, where drivers are still on board, but like Hannah Meier, can opt to hand over control of the vehicle for most of the journey.

On her trip to Turin, Meier is doing her homework for her distance learning course in logistics. She describes the way in which automated driving has taken hold in the field of freight transportation. Naturally, it all began with research. The first road tests took place on the A81 between the cities of Stuttgart and Singen in the 1990s. Twenty years later, commercial vehicle manufacturers and startups in the United States took advantage of the latitude offered by local laws, which allowed self-certification but at the cost of much greater risks in product liability. Once automation technology had shown what it could do in a research environment, manufacturers took this knowledge to the public roads.







the trailer automatically releases itself, travels across the yard with an electric axle drive and automatically couples with the new tractor.

SAF-HOLLAND has been one of the technological pioneers in this area. Under the guiding principle of SMART STEEL, the company has been systematically developing solutions combining hardware and software. Projects in ports and logistics yards, in particular, have contributed to the advance in interfaces for the automated coupling of trucks and trailers. SAF-HOLLAND and its partners initially developed solutions for trucks that couple and uncouple hundreds of trailers a day in port facilities and loading yards. To save the need for constant maneuvering and disembarking, sensors

in the fifth wheel check the mechanical, pneumatic and electrical connections during coupling. The sensors' information is sent directly to a screen in the cab. These types of stand-alone solutions have now also been approved for public roads after legislators were won over by the practical evidence of their functional safety.

These types of intelligent solutions are necessary to ensure that trucks will be able to do entirely without drivers in the future. The logistics industry will then reap the full benefits of automation – and save another 40 percent in operating costs compared to semi-automated driving. Capacity utilization is also rising because, aside from refueling and maintenance stops, autonomous trucks are able to drive around the clock.

Hannah Meier takes this development seriously, which is the reason she is pursuing her part-time studies. In the future, she hopes to play a part in the planning of automated, digitally networked logistics chains.

The road to the autonomous truck, however, is still a long way off. The interfaces are not yet unified between the trucks and different trailers of the still nearly four hundred manufacturers in Europe. There remains a huge variety of control devices and software. Small and medium-sized trailer manufacturers in particular have been calling for further standardization. Proof of functional safety is even more challenging for autonomous trucks that do not require drivers. When there is no driver to inspect the tension belts and tires or to detect noises during braking and acceleration, sensor systems need to perform these tasks safely and reliably at all times. With its predictive maintenance solutions for axle and chassis systems, SAF-HOLLAND makes a key contribution to the all-around monitoring of the vehicle.

Proof of functional safety is not only necessary for the individual systems but also for the coordination and interaction of autonomous trucks with other road users. There are still questions such as how to ensure safe continued operation in the event of faults in the LTE and 5G networks and in what way insurance companies will reward the declining risk of accidents. Also still unanswered is the question of how the industry will be impacted from the fact that only a few large players have started making the appropriate investments to realize the cost advantages of platooning on freeways. The only exception applies to groups where identical trucks from the same manufacturer are traveling and pulling trailers with a comparable loading weight. This restriction is intended to prevent chain reactions during emergency braking, so that different braking paths resulting from differing payloads and vehicle conditions do not lead to a crash in the group.

Still, in spite of all the unanswered questions, the efficiency of freight transportation on the road has risen significantly, even with the automated partial solutions. Fleet managers are registering increasing revenue per vehicle. One reason is that drivers who need to assume only sporadic responsibility require fewer breaks. Another reason is that fleet managers can optimize their payload based on real-time vehicle data. In addition, unplanned breakdowns almost never occur thanks to predictive maintenance. In the year 2025, even acci-

dents and follow-up costs will be the exception. Fuel consumption on long-haul routes will have fallen by a tenth. Overall operating costs will be almost one euro per kilometer lower than a decade earlier. As a result, there will be a short payback period on any additional investments per vehicle because of additional sensor systems, software and communication technology.

Automated transportation on the road has proven to be a revenue driver for truck and trailer manufacturers and their system suppliers. Not only can they sell additional sensor and electronic components and integrate them into their systems, but they can also develop new business models for data-driven services. This is a sensible investment for logistics service providers: Driverless truck and trailer combinations promise significantly lower operating costs and can stay on the road around the clock because there are no longer any driving or rest time requirements to comply with.

The benefits are also clear to Hannah Meier. Although her profession will change, she is certain there will be plenty of truck and trailer combinations on the road in the future. This is the reason why SAF-HOLLAND continues to further develop its steel core components for trailers. Steel will always be needed for transporting goods and “smart” is a new, innovative feature. After all, times are changing, and with them the transport industry.

What is the biggest benefit of digital networking in the eyes of freight forwarders and transportation companies?

**“Above all, digital tools can help save time. Be it on the street, at the loading ramp or at the rest area.”**



We have to reserve a time slot at the unloading ramp several days in advance because our recipients have limited capacity. When there are delays due to traffic jams or snow, waiting times can stretch for several hours. Digital tools can be used to avoid delays by suggesting better alternate routes. If a delay can't be avoided, the recipient's access to the GPS system of the arriving vehicles could help with the disposition. These types of systems would also be useful for crowded rest areas.

**Georg Wittwer, Managing Director at Spedition Wittwer, Garmisch-Partenkirchen**

**“Digital networking creates transparency and helps us make important decisions more efficiently.”**

Meanwhile, the transportation industry has recognized the potential of digital networking, which offers more transparency, for example, when it comes to driving quality and fuel consumption. This enables us to make decisions more efficiently, reduce transportation costs and meet environmental goals. The prerequisite for this is flexible IT systems that we tailor to our needs and continue to develop. These systems process and manage our extensive fleet data so that we can put it to good use.



**Siegfried Hegelmann, CEO Hegelmann-Express GmbH, Karlsdorf-Neuthard**

**“Digitization offers tremendous potential, especially in the area of agriculture, merely as a result of being able to find the right unloading point.”**

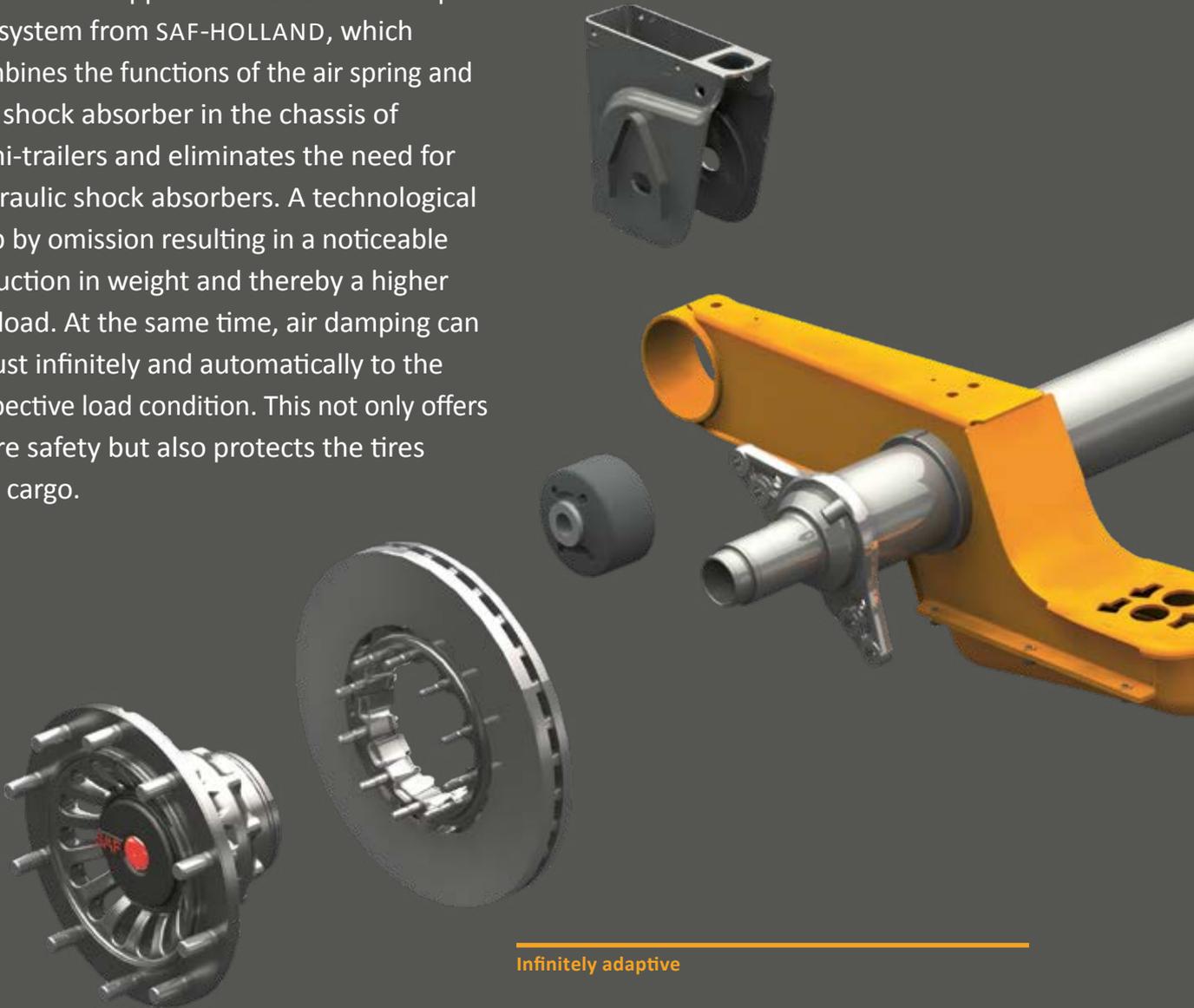


We are already using SAF-HOLLAND's air springs today to measure the weight of our tank semi-trailers to ensure they are not overloaded with liquid fertilizer. We transport this fertilizer from the biogas plants to the fields between Lake Zurich and Lake Constance. Digitization offers tremendous potential, especially in the area of agriculture. The right unloading point can be found using special GPS systems alone. These systems also divide the field into virtual lanes allowing the tractor to move autonomously and apply the exact amount of fertilizer required.

**Peter Briner, Managing Director at Peter Briner AG, Hagenbuch (Switzerland)**

# The Art of Simplicity

“Smart” also applies to the new air damping system from SAF-HOLLAND, which combines the functions of the air spring and the shock absorber in the chassis of semi-trailers and eliminates the need for hydraulic shock absorbers. A technological leap by omission resulting in a noticeable reduction in weight and thereby a higher payload. At the same time, air damping can adjust infinitely and automatically to the respective load condition. This not only offers more safety but also protects the tires and cargo.

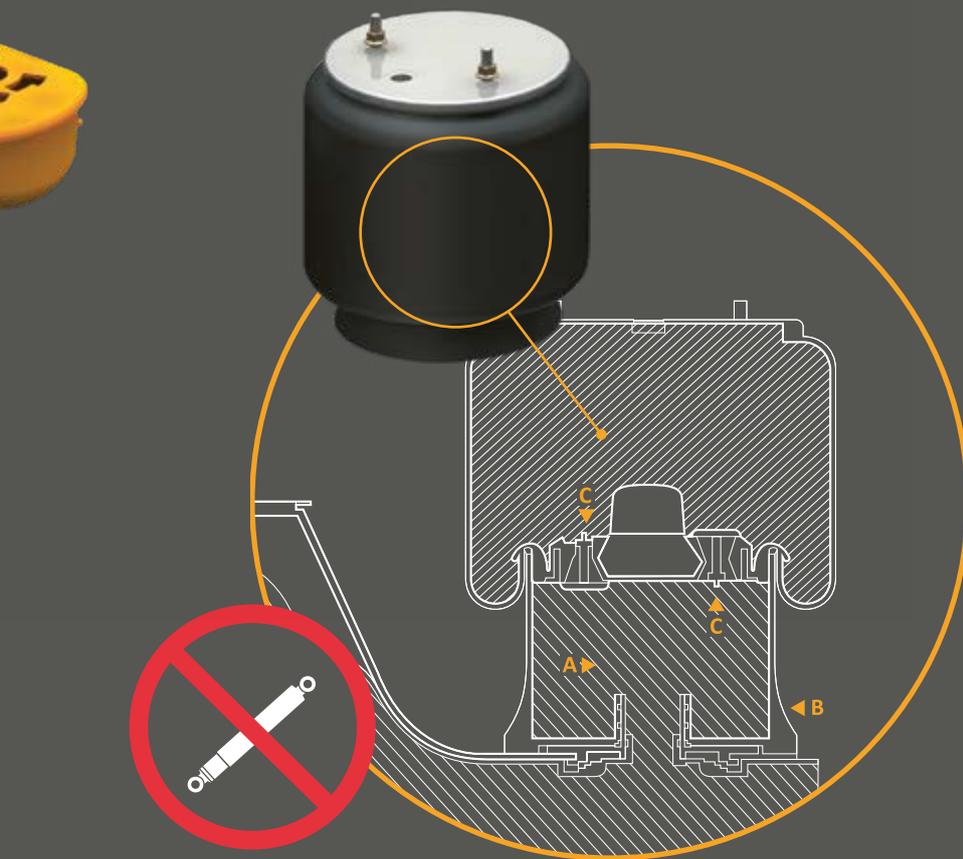


---

## Infinitely adaptive

Shock absorbers ensure the contact between the road and the tire. If shock absorbers are designed too stiffly for empty runs, then the semi-trailer “hops” across the road. Infinitely adaptive air damping prevents this from happening. When there is little cargo on board, fewer air molecules flow through the valve and damping is softer. The higher the axle load, the more air that is needed. This creates additional valve friction and damping increases.

---



A

Below the two air springs in both ends of the axle stub is another air chamber that provides a second, separate volume of air together with a hollow plunger.



B

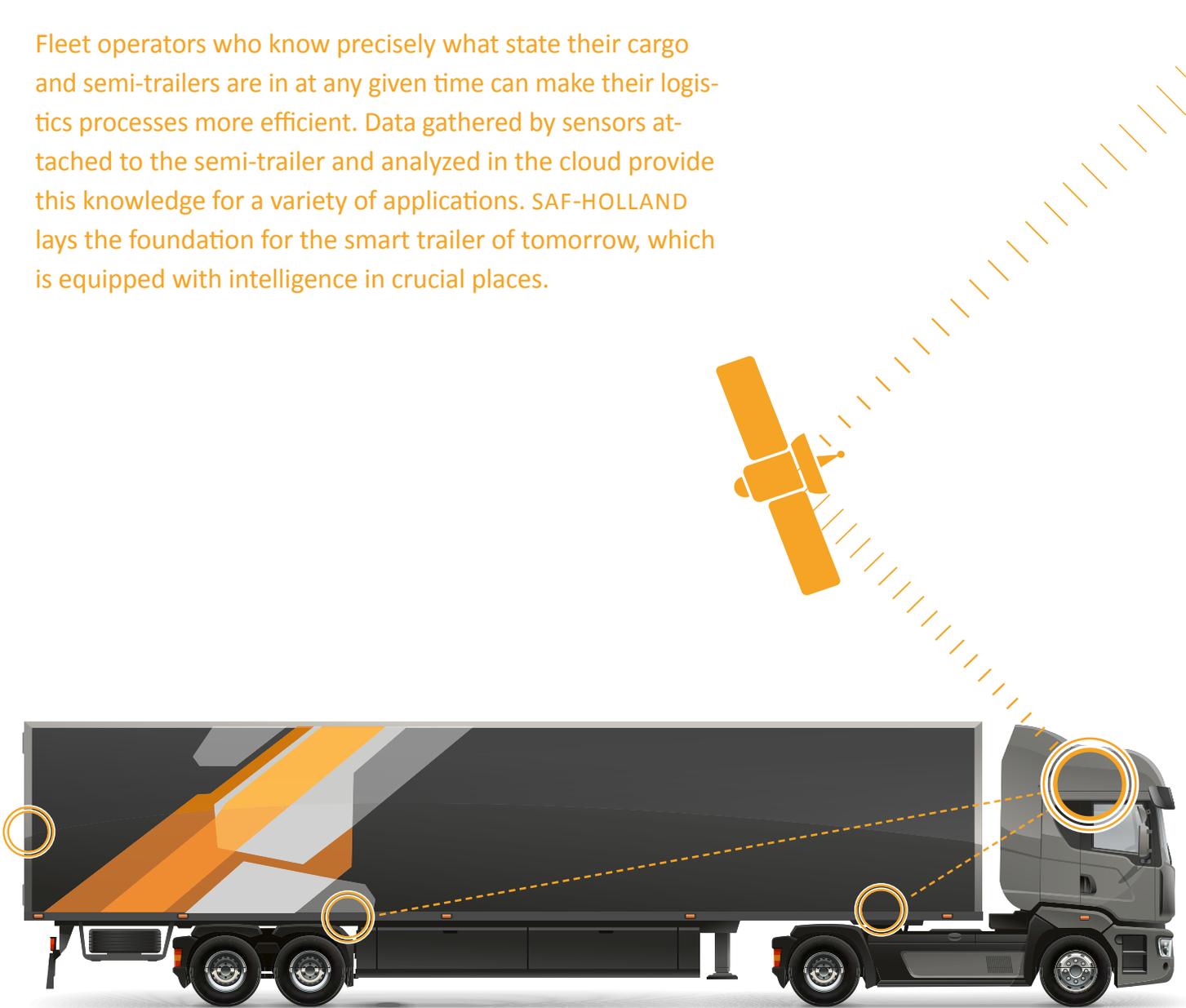
During compression, the plunger pushes upwards and opens a valve. For pressure equalization, air flows into the second volume of air. When rebounding, it flows back through a second valve.

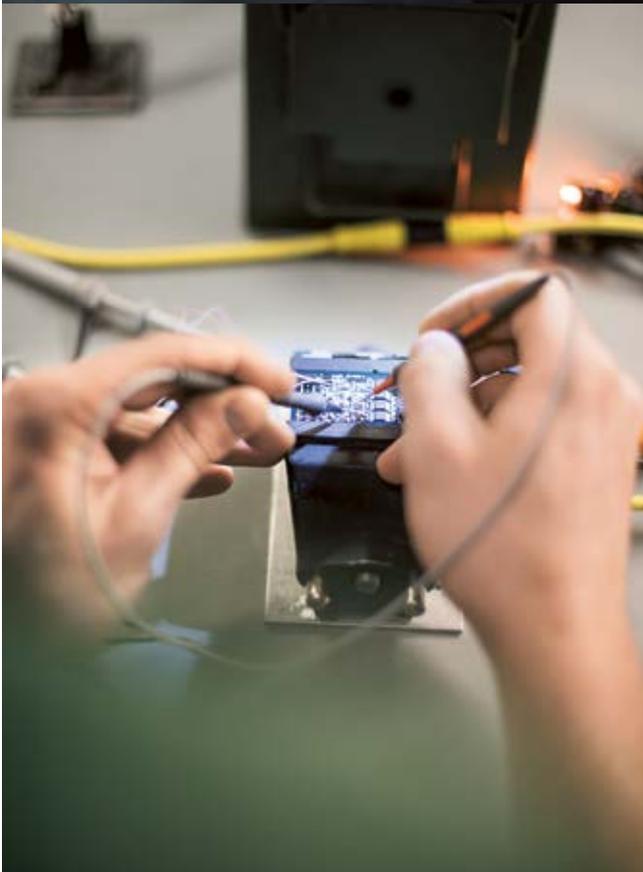
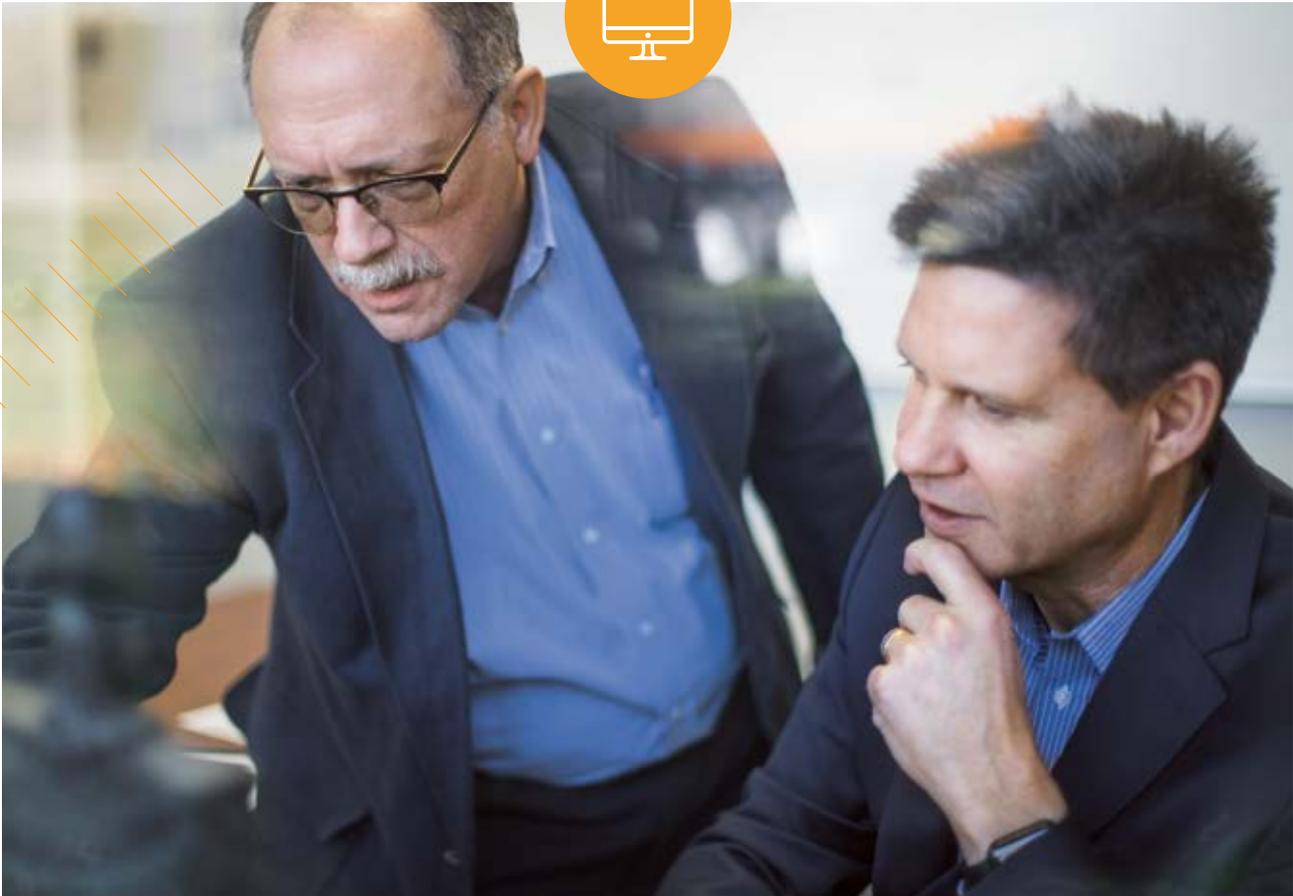
C

The flow of air through the narrow valve creates friction. The mechanical energy introduced to the chassis through shocks and bumps is converted into heat and thereby damped.

# A Treasure Trove of Data

Fleet operators who know precisely what state their cargo and semi-trailers are in at any given time can make their logistics processes more efficient. Data gathered by sensors attached to the semi-trailer and analyzed in the cloud provide this knowledge for a variety of applications. SAF-HOLLAND lays the foundation for the smart trailer of tomorrow, which is equipped with intelligence in crucial places.





The digitization of the entire logistics chain from the shipping agent to the carrier to the consignee fundamentally changes freight transportation because vehicle components and goods now leave digital traces everywhere. When these traces are systematically collected and processed, transportation companies can use them to their benefit and optimize their processes. The semi-trailers in which the goods are stored play a central role because a fully networked logistics chain is only possible when the trailer gets “smarter” at the same time. “The trailer contains a number of components that can provide important data for networked transportation,” says Mark Molitor, who is responsible for the product development of the North American market at SAF-HOLLAND. “While OEMs provide the trailer structure, SAF-HOLLAND provides several major components such as suspensions, axles, wheelends, landing legs, and the kingpin that connects the trailer to the tractor. The kingpin is likely to connect to a fifth wheel that was designed and developed by SAF-HOLLAND.” SAF-HOLLAND is looking to enrich all of these components with intelligence.

To achieve this, Molitor and his team are working on smart trailers. This is a tremendous opportunity for logistics companies because having the appropriate data means they can check the technical condition of the trailer and its cargo in real time, monitor compliance with highway load limits and prevent theft. Most importantly, data extracted from the trailer can be incorporated into transportation management systems to optimize cargo loading in addition to providing route and service planning in a predictive and efficient manner. Ultimately, this data also allows transportation companies – who are always under severe cost pressure – to reduce their running costs and generate more revenue with better vehicle utilization. “Together with our customers, we are currently evaluating which applications can add the most value,” adds Molitor. “It’s not just about getting the right data; it’s also about understanding what this data is telling you and making it usable and available over digital networks.”

## “The semi-trailer contains several components that can provide important data for networked transportation.”

Mark Molitor, Vice President Product Engineering

The possibilities and approaches with the smart trailer are many. For example, SAF-HOLLAND already offers systems that tell the driver when brake pads are in need of service. “In the future, it will be possible to send this data to a cloud system for feedback telling us when the pads need to be replaced,” described Molitor. Having this data allows fleet managers to automatically upload maintenance intervals via their logistics systems and minimize downtimes. Another example of future development are sensors that are mounted around the wheel hubs to measure the temperature while driving. Bearing damage and brake system malfunctions can cause overheating – the temperature sensors would detect this and alarm the driver to prevent major damage.

Smart trailers can also help prevent unforeseen stops along the way, starting with the tires, which are continuously monitored by the European “SAF TIRE PILOT.” If the air pressure drops below the setpoint, the tractor’s compressor supplies the tires with more air. In the future, air springs or weight sensors on the axles can determine the correct load and send a warning when the semi-trailer is overloaded or the load distribution is no longer optimal due to cargo slippage. Should an accident still occur, position sensors can detect when the semi-trailer or trailer is overturned and send an automatic message to emergency services and fleet operators.



Mark Molitor: Smart trailers can also help prevent unforeseen stops along the way.



Sensors can detect the technical condition of the semi-trailer and cargo.

“Cargo theft is another problem our customers are facing,” says Molitor. To prevent theft, sensors could be installed on the smart trailer’s doors to detect whether they are open or closed. The system could warn the fleet manager of possible theft if the doors are opened at a location that differs from the scheduled loading points. In order to do this, however, the system needs to know the trailer’s precise location. This is accomplished by GPS sensors, which report the trailer’s GPS coordinates to the fleet manager at regular intervals via the cloud. A smart trailer offers even more options. In the end, one thing is certain: The automation and digitization of processes that previously went unrecorded or required a great deal of manual effort to record opens up tremendous potential for transportation companies to achieve higher efficiency in the future.



“Fleet managers want to carefully plan their resources and, above all, avoid downtimes because they cause the highest costs.”

Alexandre Charpiot, Vice President Sales OEM & Aftermarket Europe



**Alexandre Charpiot**  
Vice President Sales OEM & Aftermarket Europe at SAF-HOLLAND. Together with his specialized teams, he takes care of a variety of customers ranging from truck and trailer manufacturers and fleet customers to wholesalers and repair shops.

What do freight forwarders and commercial vehicle manufacturers expect from the new digital technologies emerging in transportation? And what solutions are being developed by SAF-HOLLAND? Spare parts and sales meets research and development: A revealing dialogue between Olaf Drewes, Director Advanced Research & Technology, and Alexandre Charpiot, Vice President Sales OEM & Aftermarket Europe.

**Alexandre Charpiot:** Our customers are already seeing the benefits of predictive systems today. For example, with brake pads, which are usually the first part of the trailer that needs to be replaced – although shock absorbers also belong to this category. Fleet managers want to carefully plan their resources and, above all, avoid downtimes because they cause the highest costs.

**Olaf Drewes:** This is where sensors can help by alerting you to which components need to be changed before a trip, so you can avoid a standstill 1,000 kilometers down the road.

**Alexandre Charpiot:** Our customers also want to bring down the time they spend at the repair shop. Predictive systems can help the fleet manager schedule repair shop visits by showing precisely when an individual vehicle needs maintenance and then directing it to the nearest shop in the service network via an app.



**Olaf Drewes:** In the case of brake pads, SAF-HOLLAND has been offering wear detection for a long time. The so-called contact wear indicator signals when a pad needs to be replaced. We have also developed a continuous wear sensing system that monitors the pads from the very start. This allows us to predict when the pads' wear limit has been reached – which is the first step towards predictive maintenance.

**Olaf Drewes**

Manages SAF-HOLLAND's advanced development activities in Europe and, with his team of engineers, focuses on future-oriented areas such as the intelligent networking of axles and chassis, electromobility and lightweight construction.

**Alexandre Charpiot:** But there's also another way: Our new SAF Air Damping system eliminates the need for a shock absorber – another component that can wear out. Air damping is a good example of how regular communication between the sales and development departments can flow into new solutions for customers.

**Olaf Drewes:** In any case, our common goal is to help fleet operators use digital methods to increase safety and efficiency. If you know when specific maintenance needs to take place, you can then move on to the next stage and automate the processes – all the way from the repair shop appointment to the automatic ordering of spare parts.

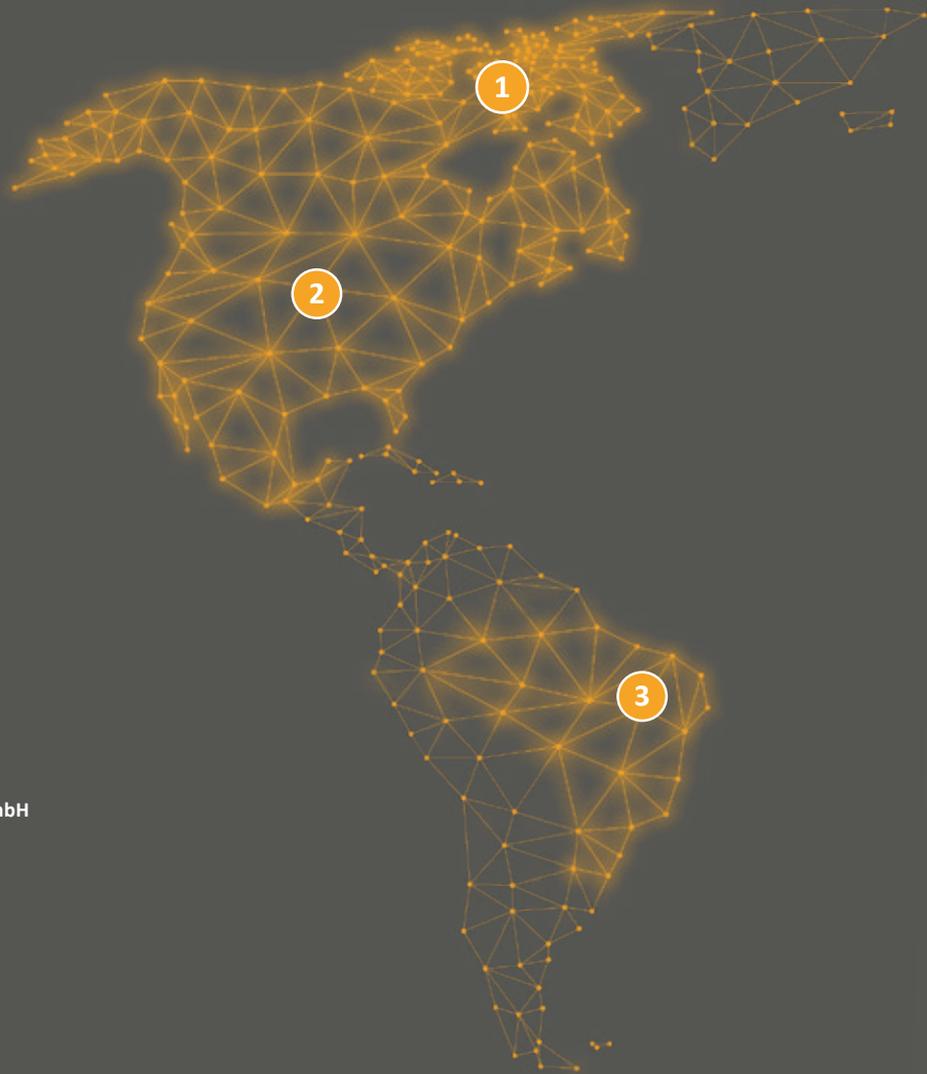
**Alexandre Charpiot:** But I miss the personal interaction. Even our spare parts business lives from competent advice. The two need not be mutually exclusive.

**Olaf Drewes:** IT-based systems can also help us provide consulting. The treasure trove of data we are able to gather using intelligently networked sensors will allow us to develop new products in an even more targeted manner based on customer requirements and areas of application.

**“The treasure trove of data we are able to gather using intelligently networked sensors will allow us to develop new products in an even more targeted manner based on customer requirements and areas of application.”**

Olaf Drewes, Director of Advanced Research & Technology

# Imprint



## Published by

SAF-HOLLAND S.A.  
68- 70 Boulevard de la Pétrusse  
L-2320 Luxembourg  
Luxembourg

## Editorial office

Stephan Haas, SAF-HOLLAND GmbH  
Alexander Pöschl, SAF-HOLLAND GmbH  
Nicole Kügler, SAF-HOLLAND GmbH  
Redaktionsbüro delta eta –  
Paschek & Winterhagen GbR

## Concept and Design

3st kommunikation GmbH

## Digital

3st digital GmbH

## Video/Digital

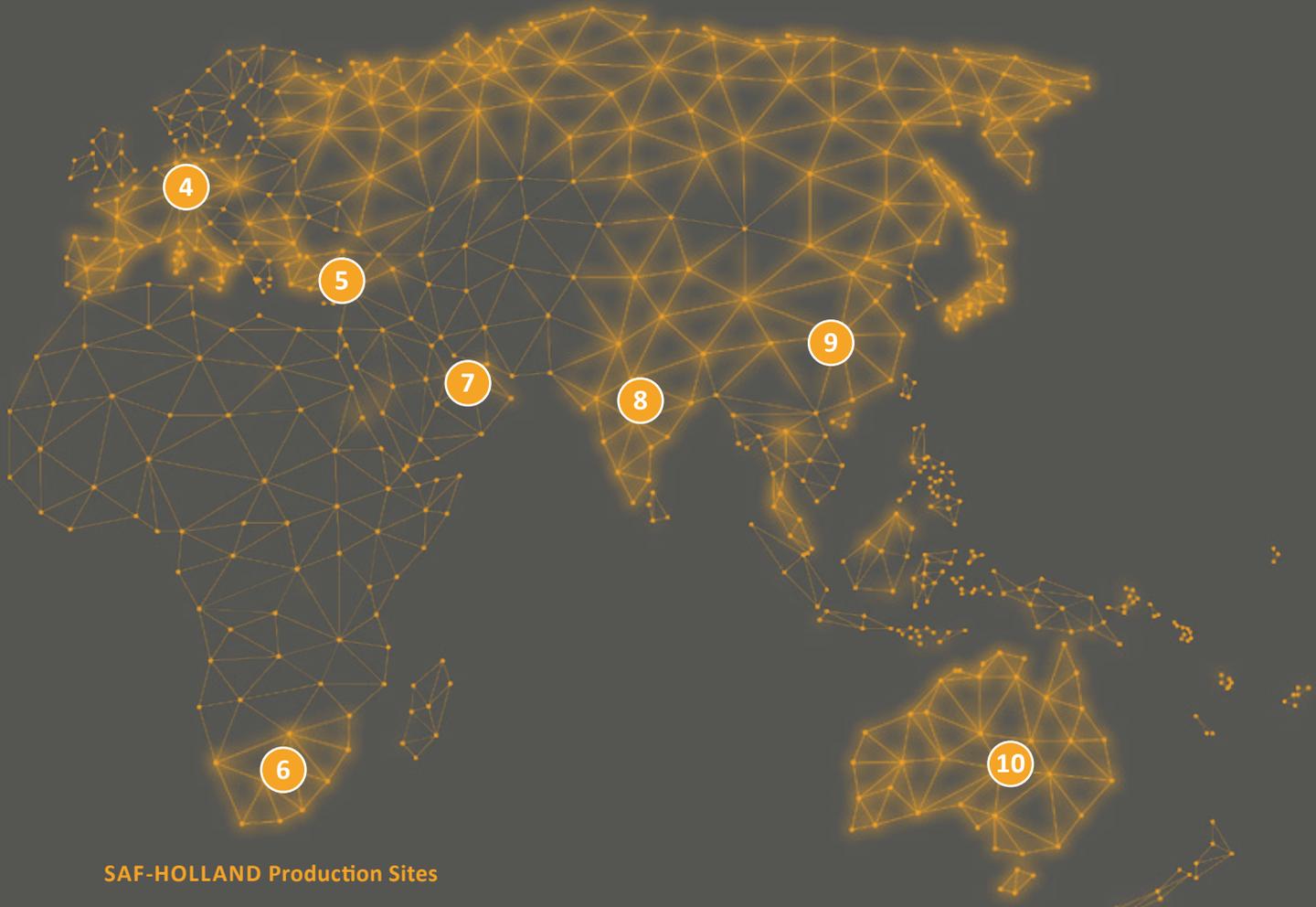
Content4Marketing

## Images

Matthias Haslauer, Hamburg

This report is available in German and English. Both versions are also available on the Internet at [gb2017.corporate.safholland.com](http://gb2017.corporate.safholland.com) (German) and [ar2017.corporate.safholland.com](http://ar2017.corporate.safholland.com) (English).

# SAF-HOLLAND Production Sites & Subsidiaries



## SAF-HOLLAND Production Sites

- 1 CANADA**  
Woodstock
- 2 USA**  
Cincinnati, OH  
Dumas, AR  
Warrenton North, MO  
Warrenton South, MO  
Wylie, TX
- 3 BRAZIL**  
Alvorada
- 4 GERMANY**  
Bessenbach/  
Frauengrund  
Bessenbach/  
Keilberg  
Singen
- 5 TURKEY**  
Düzce
- 6 SOUTH AFRICA**  
Johannesburg
- 7 UNITED ARAB EMIRATES**  
Dubai
- 8 INDIA**  
Chennai
- 9 CHINA**  
Baotou  
Xiamen
- 10 AUSTRALIA**  
Melton

## SAF-HOLLAND Subsidiaries

- |  |                              |                                 |                                  |                                     |                                      |
|--|------------------------------|---------------------------------|----------------------------------|-------------------------------------|--------------------------------------|
| <b>AUSTRALIA</b><br>Melton                     | <b>GERMANY</b><br>Bessenbach | <b>JAPAN</b><br>Tokyo           | <b>POLAND</b><br>Piła            | <b>SOUTH AFRICA</b><br>Johannesburg | <b>USA</b><br>Muskegon               |
| <b>BRAZIL</b><br>Jaguariúna<br>Alvorada        | <b>FRANCE</b><br>Ablis       | <b>CANADA</b><br>Woodstock      | <b>ROMANIA</b><br>Ghimrav-Brasov | <b>THAILAND</b><br>Bangkok          | <b>UNITED ARAB EMIRATES</b><br>Dubai |
| <b>BULGARIA</b><br>Sofia                       | <b>INDIA</b><br>Chennai      | <b>MALAYSIA</b><br>Kuala Lumpur | <b>RUSSIA</b><br>Moscow          | <b>CZECH REPUBLIC</b><br>Napajedla  |                                      |
| <b>CHINA</b><br>Hong Kong<br>Beijing<br>Xiamen | <b>ITALY</b><br>Verona       | <b>MEXICO</b><br>Mexico City    | <b>SPAIN</b><br>Barcelona        | <b>TURKEY</b><br>Düzce              |                                      |

