The Sensor People

Leuze

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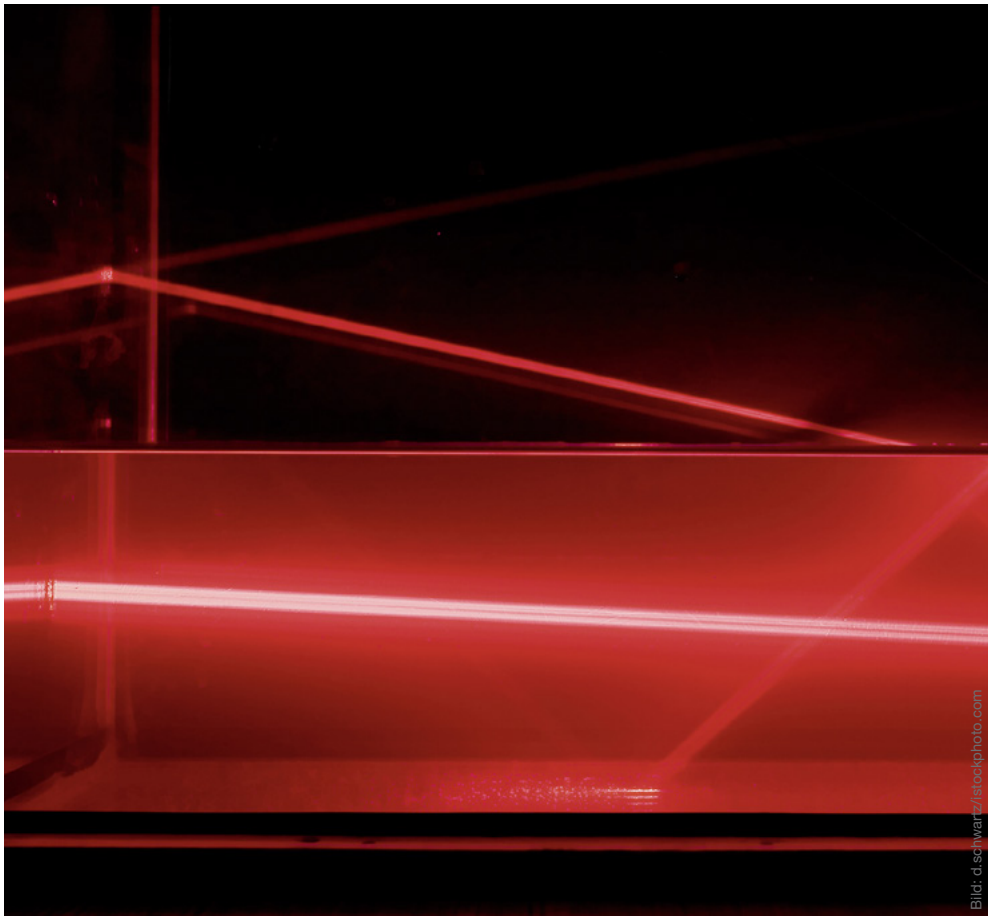

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International

Safety at Leuze

Smart factory

Innovations

Future

SENSOR

THE LEUZE MAGAZINE

Editorial

Ulrich Balbach
CEO of the
Leuze electronic group

Dear Reader

For all of us, last year was “special” in every way, with many new challenges, changes and restrictions – both in our professional and private lives.
And how 2021 will develop remains to be seen.

One thing is for sure: we – the Sensor People – have once again proven, not only from a technological perspective, that we are creative and innovative. We have also sought out our own path, which we have consistently and confidently followed. We look to the future with courage and considerable optimism, we pursue ambitious growth targets and assume our responsibility as global market leader in the sensor systems sector in an increasingly networked world.

SENSOR – The Leuze Magazine – is our new customer magazine. It is not only a cornerstone and expression of our new Leuze brand appearance. It reflects an increased focusing and differentiation of the entire company.

The continued success of our customers in an ever changing industry is what drives us. We shape future change and progress actively and jointly with you – with curiosity, passion and determination. This enables us to continuously set new technological milestones and standards in the market. This is what makes us – the Sensor People – so different.

We hope you enjoy reading our magazine.

Yours truly, Ulrich Balbach

Contents

Focused on the future

In 2020, “Leuze electronic” began operating under the brand name “Leuze”. SENSOR spoke about this with Ulrich Balbach.

Interview with Ulrich Balbach, CEO at Leuze

Mr. Balbach, as of last year Leuze no longer features the additional “electronic” in communications. Why this step?
When Leuze electronic was founded in 1963, the term electronic was virtually synonymous with innovation. 2021, however, it goes without saying that electronics are built into our sensors. Today, the clarity of the brand name already conveys the company’s outstanding innovative strength.

How do you see yourself today?
Thanks to our more than 50 years of experience, Leuze is a true expert in sensor applications in automation technology. Leuze is a high-tech company, a driver of

innovation. But we are innovative not only because we develop new technologies. For us, innovation means structuring technology so that a concrete benefit arises for our customers with respect to their specific application. This, paired together with our in-depth application know-how in our focus industries – that is our strength.

In concrete terms, what does this mean for the development of your sensors?
Our expertise and focus tell us how we need to build a sensor with respect to its performance, design and operation. Always with the objective of maximum user-friendliness and integration capability. We develop these innovations with a goal-oriented approach, always for the benefit of our customers. Consequently, we often set new technological standards that differentiate us on the market and sometimes lie at the limits of what is possible. We have registered well over 250 patents in the last 10 years alone.

Is this differentiation the secret to your success?
If it was a secret I probably wouldn't be revealing it here… but it can certainly be said that the entire Leuze company is systematically oriented towards a policy of differentiation and focus. Only in this way are we able to help our customers succeed for the long term in a constantly changing industry. For us that is company philosophy, the promise of the Leuze brand and our objective all at once.

You just spoke about focus… can you tell us what you are focusing on?
The best, most innovative technology is useless if it does not meet the needs of the customer. We are therefore concentrating on our focus industries in which we have acquired in-depth application know-how and many years of experience. When these technological competences are applied to the relevant industry segments in a targeted fashion, this results in specific applications in which we endeavor to achieve market leadership worldwide.

What are your focus industries?
For over 50 years, we have been involved in intralogistics and the packaging industry. And then there's the machine tools sector and the automotive industry. Laboratory automation is a somewhat "younger" focus industry, but no less important. Owing to the coronavirus pandemic, laboratory automation has grown massively: as we know, there has been a huge increase in the number of PCR tests, in which we too make a system-relevant contribution.

In your viewpoint, what uniquely distinguishes Leuze?
We are the Sensor People. And we stand for determination and passion. For technological progress and change. Together with our customers, we create the innovations of tomorrow to make them successful for the long term in a constantly changing industry. Your success is our motivation. That was true in the past and will be so in the future as well.

Thank you for the interview, Mr. Balbach.

"Leuze is oriented toward a proactive differentiation and focusing policy."

The success of our customers is what drives us.
And the Leuze brand is the promise by which we
convey our values, messages and emotions.

Yesterday. Today. Tomorrow.


312
Leuze
312

Short recog-nitions

30th anniversary of Leuze UK

In 2020, Leuze UK celebrated its 30th anniversary and its highest ever turnover. In 1990, the British Leuze subsidiary opened its first office in St. Neots, Cambridgeshire. As growth continued, the premises became too small and the sales company moved into new offices, but remained in St. Neots. The British subsidiary has ambitious plans for future growth and will add a Business Development Manager to its team.

New managing director at Leuze France

After decades, a change in management at the French Leuze subsidiary: In July 2020, Frédéric Gambiny took over from Jean-Pierre Ginoux as managing director of the sales company in Francilienne near Paris. He is an experienced managing director who knows the French market very well and brings with him extensive expertise in industrial automation.

Leuze is one of the fastest growing medium-sized companies in Germany

In the Handelsblatt ranking “Deutschlands wachstumsstärkste Mittelständler 2020” (Germany’s fastest-growing medium-sized companies), Leuze was once again rated a TOP 100 company. Every year, the German Handelsblatt magazine recognizes the fastest growing and top earning medium-sized businesses in Germany that stood out in recent years thanks to a successful business strategy. Handelsblatt tasked the consultancy company Munich Strategy to carry out the survey of 4,000 medium-sized companies. Their average growth in revenue as well as the EBIT quota from the last five years were evaluated.
This time, Leuze ranked 76th for the years 2015 to 2019, with a revenue growth of 21.6% and an EBIT margin of 7%. Of the companies listed, only four grew faster than Leuze in terms of revenue.

TOP 100

Top employer

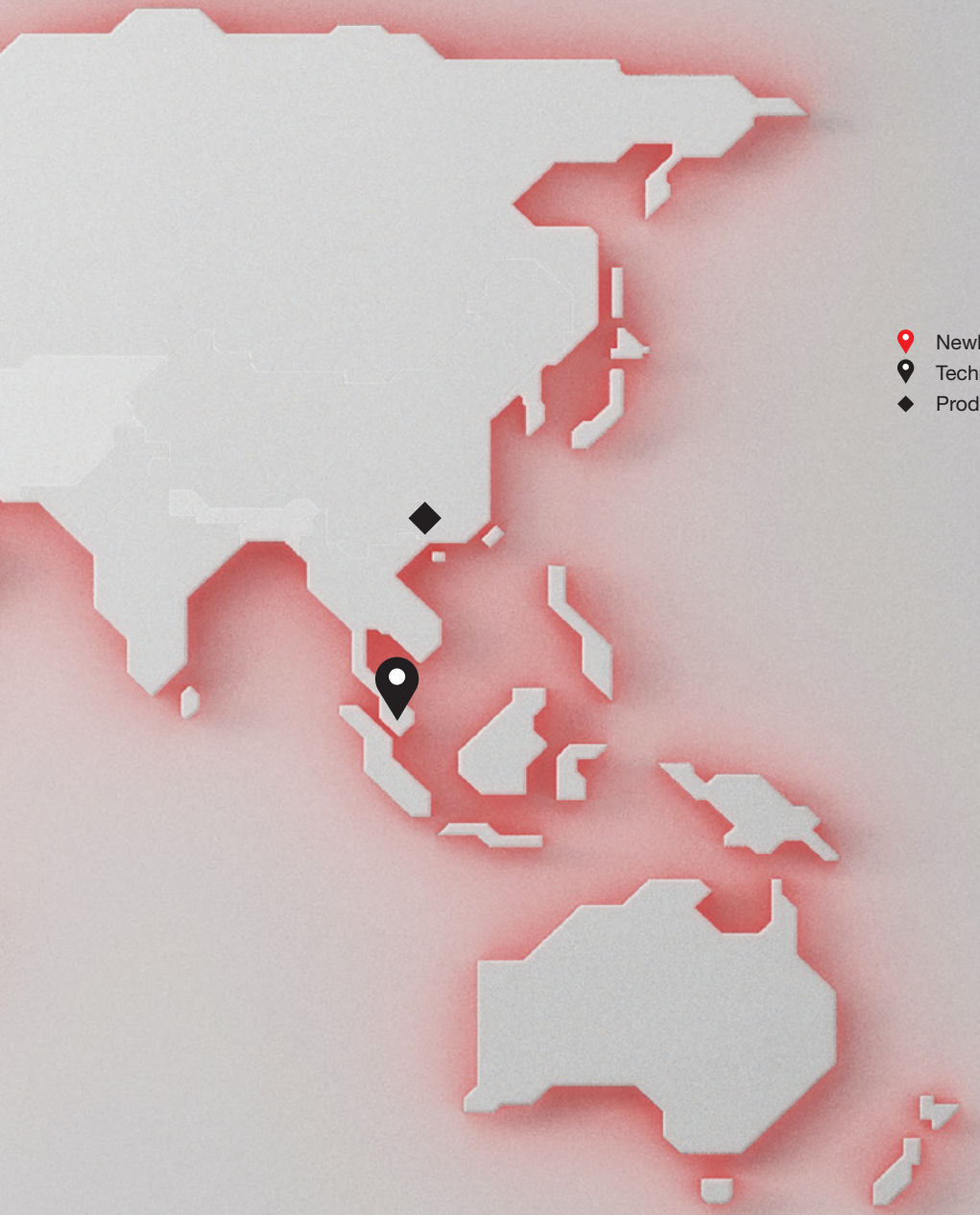
According to the cross-sector study commissioned annually by German newspaper “Die Welt”, Leuze counts among those employers that the general public considered as “extremely attractive”. More than 820,000 people took part in the multi-tiered, representative survey on over 4,000 companies. 881 of these companies received the top mark “extremely attractive”. As did Leuze.

World market leader in optical sensors

Since 2016, Leuze has been listed as a growth champion in the optical sensors sector on the 2021 World Market Leader Index of the Henri B. Meier School for Entrepreneurs of the University of St. Gallen and the Academy of German World Market Leaders (ADWM). And this won’t change in 2021. This cross-sector award was received by a total of 458 globally active and successful businesses from the DACH region that are synonymous with leading technologies offering products and services of exceptional quality.

Since August 2020, Leuze has been selling its sensor solutions on the Polish market via its newly founded subsidiary in Katowice in southern Poland. Poland is a large, growing market with emerging industries – particularly in intralogistics, the packaging industry, the machine tools sector and the automotive industry.

For Leuze, this is an important step toward developing the market in Eastern Europe and being even closer to its customers. Managing director of the new Leuze sales company is Tadeusz Cybulski. He has many years of experience in automation technology as well as a wide local network.



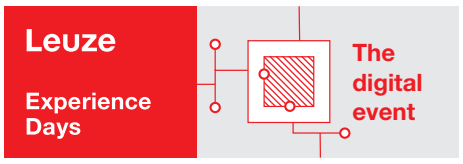
Leuze establishes its own subsidiary in Poland

First virtual trade fair

Leuze Experience Days

“Ready for tomorrow”: That was the motto of the first virtual “Leuze Experience Days” in November 2020. But it wasn’t just the motto of the trade fair: Leuze as a company is also fit and ready for the future. As a partner to their customers, the Sensor People have made it their goal to ready themselves for the change in the industry and to actively shape this change jointly with their customers. Social-distancing rules barring personal exchange call for new solutions and formats. This is what separates the wheat from the chaff: who is able to adapt quickly and flexibly to the new requirements? Who has creative ideas and is able to make a virtue out of necessity? Here too, the Sensor People have once again demonstrated their agility and in just a short time have made enormous strides in digitization. They practically reinvented themselves, presenting themselves virtually to their customers while still remaining close. Over three days, customers could put together their own event program from a huge array of free webinars on a wide variety of topics ranging from machine safety and OPC UA to specific sensor solutions, e.g. for packaging machinery. And: they were even able to go on an exclusive personal tour of the new virtual Leuze platform with their sales consultant. The feedback from customers was entirely positive. The Sensor People will be sticking to this format in 2021.

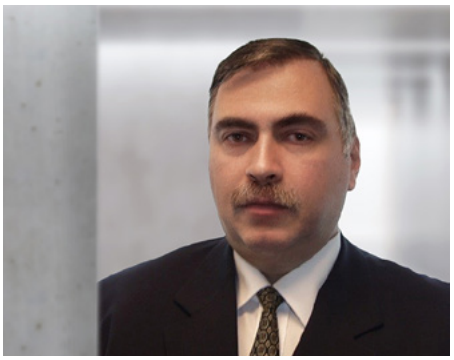
Stay up to date – Leuze Experience Days



www.leuze.com/en/events

Leuze and SCHMACHTL celebrate 50-year partnership

In 2021, Leuze and its longstanding partner and distributor SCHMACHTL, Linz (Austria), can look back on a joint success story. January 12, 1971, was an important date and historic milestone in the corporate collaboration between Leuze and SCHMACHTL: It marked the first day of what has now become a 50-year trusted partnership and cooperation.
The family-owned company, which was founded by Franz Schmachtl in 1936, has been distributing Leuze sensors ever since. Initially only in Austria, and later also in the Czech Republic and Slovakia. Today, SCHMACHTL is Leuze's largest international distributor.



30th anniversary of Leuze Belgium

For the Sensor People in Belgium, the 30th anniversary marks an important milestone and is a reason to celebrate. The Belgian sales company was founded in Machelen in 1991 with Philippe Meeus as the managing director, who until last year was a member of the Belgian team. He brought many years of experience and a high level of commitment to the further development of the sales company. Today, the team led by the Dutchman Rob Vrijburg focuses primarily on the area of safety.

40th anniversary of Leuze Switzerland

Leuze Switzerland is the group's oldest subsidiary and sales company outside of Germany. Its founding was the first step toward internationalization of the Leuze electronic group. In May 2021, the subsidiary based in Flurlingen near Schaffhausen (Switzerland) will celebrate its 40th anniversary.

15th anniversary of Leuze China

In June, the Chinese Sensor People will celebrate their 15th anniversary.
Leuze China with its 110 employees is the largest international subsidiary and also the largest and most important production site worldwide, second only to the main production site at the headquarters in Owen in southern Germany.

Virtual and yet so close

Creating transformation – this was the topic of Leuze's first virtual press conference at the beginning of January. The media response was huge: Our invitation was taken up by over 80 journalists from the local, business and trade press.

For us it was important that, despite the digital format, the media representatives were able to direct their questions personally to our CEO Ulrich Balbach using Microsoft Teams. And Mr. Balbach didn't just look back on the "special" year 2020, but also looked forward with excitement and great optimism.

Bringing about lasting change in the future requires clear ideas – and the Sensor People have these in abundance. Just as important is the willingness to take on responsibility, to seek your own path both creatively and confidently and to follow this path consistently.
Leuze has ambitious growth targets. Ulrich Balbach announced his goal of doubling sales again by 2025. And also to consolidate the market position of the Sensor People.

"For the Sensor People, 2021 will be a key year in paving the way for future growth"

In all areas, the Sensor People will assess and perfect their processes. Furthermore, they will focus completely on their growth projects and fully unlock the latent growth potential in their base and key business.

"The Sensor People see an opportunity in every challenge"

“Addressing problems instead of giving in to them”

Diana Seitz, Executive Management Advisor and Leuze Coronavirus Officer

Your “side job” at Leuze is corona officer? A challenging task …
Definitely. And often not just a “side job” but sometimes a full-time occupation. It’s definitely a task where you need to be completely up-to-date and extremely agile and flexible. What applies today can be very different tomorrow.

I can imagine … And this was basically the case for the whole of business year 2020. When did you personally become involved with coronavirus?
Quite early on – we already had the first lockdowns in Asia at the end of January, starting with China. We gained our first experiences together with colleagues at our Asian subsidiaries and went on to jointly develop Leuze’s own safety system – well before the virus reached the Brenner Pass on February 22.

You can still recall the exact date?
Yes, and not only that date … March 13 is also etched on our minds because this was when shops and schools in Germany closed and panic buying began. By that time, we had already put our concept into action systematically and very successfully at Leuze.

Could you explain the Leuze concept?
For us, the health and protection of our employees was and still is the top priority. While politicians were still discussing how to deal with coronavirus, how to reorganize everything and how to set up digital structures, Leuze had already at the end of February 2020 very quickly and proactively implemented an alternating rotating shift system with various phases in conjunction with a worldwide digitization offensive.

How was the rotating shift realized?
We split our company into two teams, A and B, and isolated the shifts in production and logistics in such a way that the individual teams and shifts never came into contact with each other at any time.
In May 2020, our concept was even given an official name: "alternating quarantine". This was coined by the Israeli virologist Dr. Baruch Barzel.

And what does this mean in concrete terms?
Basically exactly how we had been doing things at Leuze since the end of February. Mathematically, the separation of teams/shifts that we implemented at Leuze results in a reduction in contact of over 70%. Coupled with our extremely strict social-distancing and mask-wearing rules within our organization, there is practically a 100% reduction.

This means you haven't had any cases of coronavirus at Leuze?
In the first wave, we didn't have a single positive case at the company. In the fall and winter during the second wave, isolated cases then began to emerge after vacations or weekends. But thanks to our professional system and the high level of discipline practiced by all employees – both at work and privately – the number of SARS-CoV-2 infections at our sites around the world has been extremely low.

What specific measures did you take in the event of a positive test?
For us it was important to be able to fully trace back the chain of infection at any point in time so that we could completely isolate "cases". The necessary measures such as rapid tests, quarantining, etc. could then always be taken immediately. In this way, we were able to completely prevent any internal infection or further spreading within the company.

That sounds pretty good …
It helped that we played the whole of 2020 by ear. This allowed us to adapt the concept quickly and flexibly at any time to the local conditions. Relax restrictions where possible, but quickly toughen measures again when necessary. It was clear to us that the coronavirus – regardless of which mutation and strain – was a virus that preferred the dark and cold time of year and that the number of cases would rapidly increase again in a second wave in the fall at the latest. This is why we tightened our rules again in September rather than wait until the new lockdown in November.

We have talked a lot about how Leuze has organized itself internally.
What have been the benefits for your customers?
Our top priority was to safeguard our supply chains and to send our suppliers clear signals.
To protect and support them so that they were able to continue operations. It was then necessary to safeguard freight capacities after almost all passenger aircraft had been grounded.

What do passenger aircraft have to do with Leuze sensors?
More than you think … At least 60% of all freight is transported in the hold of passenger aircraft – so-called "belly freight". And after these aircraft were grounded, transport logistics became a real challenge.

Interesting … How did your international sales companies manage during the lockdowns, which were in some cases much stricter than in Germany …?
Despite the lockdowns in Europe, many of our European sales companies continued running the business quite literally from home. This allowed us to counter the effects of the slowly decreasing demand in German mechanical engineering quite well.
More problematic was the fact that our customers were no longer able to go to their construction sites to use their machines and systems. The machines that were ready for delivery then started to stack up in our customers' outbound logistics departments. As a result, they stopped placing orders.

That surely had a huge impact on order volume?
Yes, of course. And we actively demanded politicians to provide a solution to this problem back in early summer 2020. A kind of "green lane" or at least a distinction between necessary business trips and tourist travel. As soon as the borders reopened, orders began coming in again. Slowly at first, but steadily. And that is still continuing. Even though the topic of border closures keeps coming up.
But at least today there is the possibility of combining the freedom of traveling for business purposes with negative rapid tests.

For all of us, 2020 was a very "different" year. What is your personal take on last year?
Basically, every challenge presents an opportunity. Don't get me wrong: Coronavirus is in no way a positive experience for humanity and the whole

world. But, presumably, we would otherwise never have made such an enormous leap forward in digitization in such a short time. In particular, the world of work at companies, not just at Leuze, has changed irreversibly at a result. Although more than a year has passed since the beginning of the pandemic, authorities and schools could certainly still learn a thing or two from companies.

And what about the Sensor People?
We – the Sensor People – are not standing idly by and we won't let ourselves be thrown off course. Not even by a virus. This year, we have once again demonstrated how inventive we are, and not just when it comes to developing new technologies. And this is why we look ahead with great excitement and also with optimism.

Thank you very much for the interview, Ms. Seitz.

"Striking the right balance between personal and digital communication is key"

From weaving loom to a global player and pioneer in optical sensors

1963

The story of the global player and leading innovator in optical sensors, Leuze electronic, began in 1963 in the factory section of the weaving mill Leuze textil. The first product produced was made for in-house use: the “cono-pack”, an electro-mechanical packaging machine. This device was used to automate the packaging process of textiles on-site.

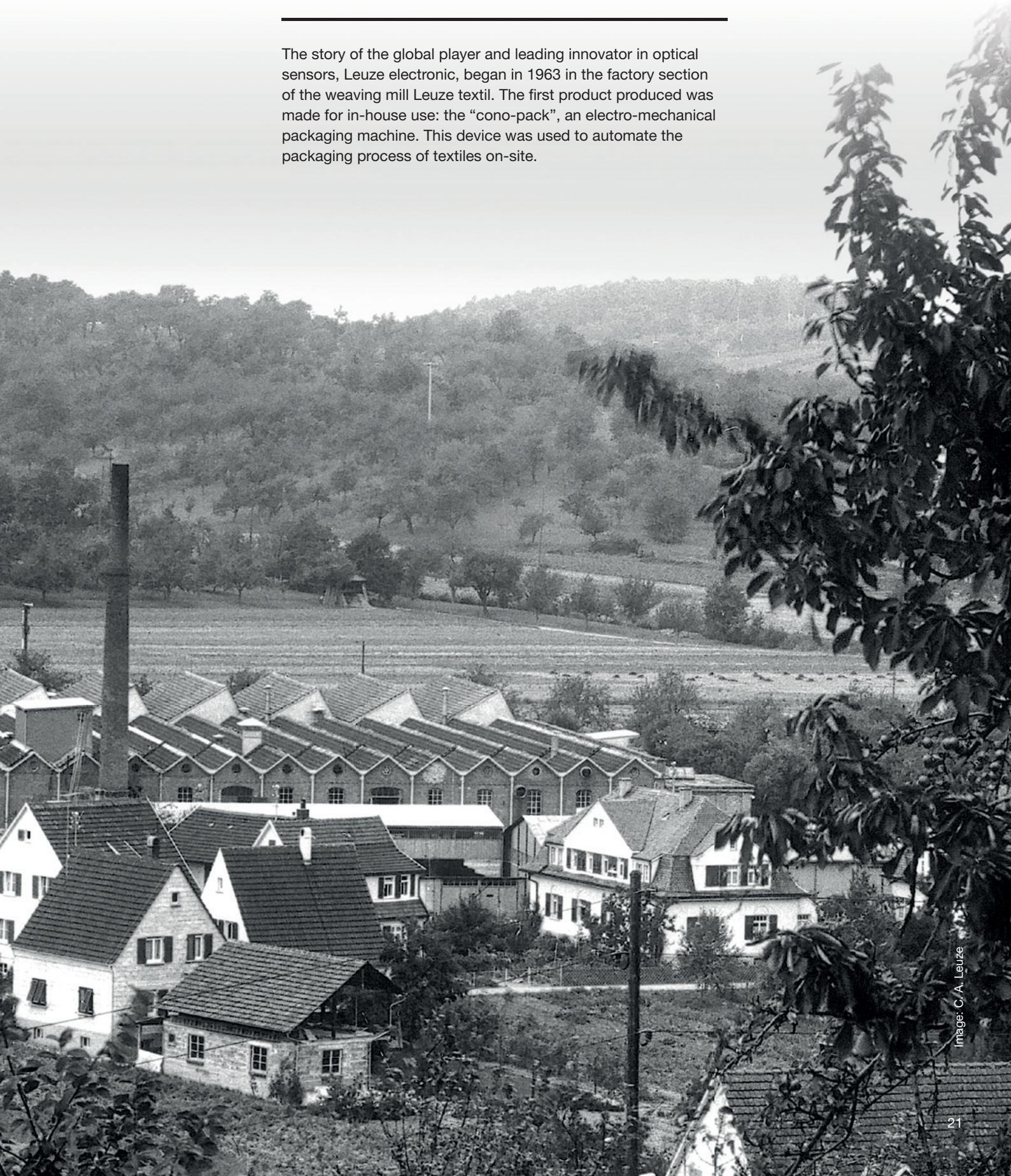


Image: C. A. Leuze

Leuze in numbers

With curiosity and determination, we – the Sensor People – have been creating innovations and setting technological milestones in industrial automation for more than 50 years.

Your success is our motivation.

We therefore place great value on always being personally, quickly, and easily accessible to you. We produce on four continents to reduce distances and offer you reliable product availability.

Production locations	6 **Germany, China, USA/Canada, Brazil, Malaysia**
Subsidiaries	21
Distributors	> 40
Foundation	1963
Family-owned company	100 %
Employees	>1200

To meet the enormous demand in the Asian markets, Leuze is currently constructing a new plant in Malacca, Malaysia. It is scheduled for completion in the first quarter of 2022.

New Leuze plant construction in Malaysia

To tap into the Southeast Asian market, Leuze had already established a subsidiary in China in 2006. Another followed in Singapore in 2015. Due to the high demand from the Asian markets, another international Leuze production location, which supports the multi-location production strategy of the company, is being constructed along the New Silk Road in Malacca, Malaysia.

Focus and differentiation as success factor

"The construction of a new plant in Malaysia in Southeast Asia represents for us a strategically important component in our global growth strategy," explains Matthias Höhl, Vice President Asia at Leuze. "Asia is a rapidly growing market in the area of electronics and promises significant undeveloped potential. For example in the area of laboratory automation, one of our focus industries," he mentions, in justification of this step. The entire Leuze company is oriented toward a proactive differentiation and focusing policy. This means designing the technology in such a way that it provides a tangible benefit and added value to Leuze customers with respect to their specific applications. This, paired with the in-depth application know-how acquired over decades and the Sensor People's many years of experience in their focus industries, is the strength of Leuze – and simultaneously how the company differentiates itself on the market. "One of our focus industries is laboratory automation. We are especially strong in this market segment in Asia and are an important partner for many Asian customers. We want to be located in their vicinity to supply them even faster and better," explains Höhl.

New production plant creates workplaces

The new production location operates as Leuze electronic assembly Malaysia Sdn. Bhd. and is a wholly-owned subsidiary of Leuze electronic GmbH + Co. KG. The plant is being constructed on a site area spanning over 17,000 square meters. Completion is scheduled for the first quarter of 2022. In an initial expansion phase, approximately 4,500 square meters will be prepared for production and warehouse logistics operations as well as 1,000 square meters for administration. The total usable floor space will be just under 7,000 square meters – of which approximately 2,000 square meters will be used for production. Growth potential exists for a doubling in a second construction phase. Following the initial expansion phase, up to 200 new employees will work in the new Leuze plant in Malacca. The essential features of the Leuze factories duplicate those of our main production facilities at the headquarters in Owen in southern Germany. "Our production facilities have the same layout worldwide: work islands are constructed, tested and duplicated in Germany and can be used anywhere in the world," reports Sebastian Raible, Director Global Projects Operations and project manager of the construction project in Malaysia.

Production for the local market

With the new production location, Leuze's continental structure in Asia will be expanded further. "By producing our sensor solutions at multiple locations around the world, our logistics flows can be optimized and the delivery capability further improved," says Jochen Wimmer, COO at Leuze. Production currently already takes place in Germany, in the USA, in Brazil and in China. In Malacca, Leuze will primarily produce sensors for the local Asian market.

"A multiple-location production strategy contributes to the optimization of our production strategy worldwide. During the coronavirus pandemic, for example, transfers and compensations are possible that positively influence our global capability to act and deliver with respect to our international customers. This allows us to significantly minimize risk. Particularly since we make a system-relevant contribution, for example, in intralogistics and in laboratory automation with the use of our sensors," explains Jochen Wimmer.

New international distribution center

In 2020, Leuze set a new milestone in its company history: after just 12 months of construction time, the Sensor People put the new international Leuze distribution center into operation in Unterlenningen, near the Leuze headquarters. A clear commitment to the company’s roots and the location. At the same time a clear statement regarding growth targets and the company’s forward-looking approach.

Daniel Stauch

“Our new distribution center is the ideal show-room for our own sensor systems. We have installed over 1000 Leuze sensors there.”

Perfectly dimensioned

The new Leuze distribution center has three different storage areas: the floor pallet warehouse, the high-bay warehouse and the distribution center’s key area: the automatic small-parts warehouse. Together with GEBHARDT Intralogistics Group, Leuze implemented a complete in-house conveyor and storage system in its new distribution center.

Requirements

The entire intralogistics process had to be automated and customized to the needs of the company. Most importantly, the particularities of various order-picking tasks had to be taken into consideration and a solution that could cope optimally with workload peaks. Key requirement: It had to be possible to adapt the solution flexibly and scalably for additional growth. Apart from the small-parts warehouse, GEBHARDT also provided the conveyor system with simple, perfectly matched system solutions, the multifunctional, ergonomic order-picking workstations as well as the warehouse management software GEBHARDT StoreWare®.

Automatic small-parts warehouse

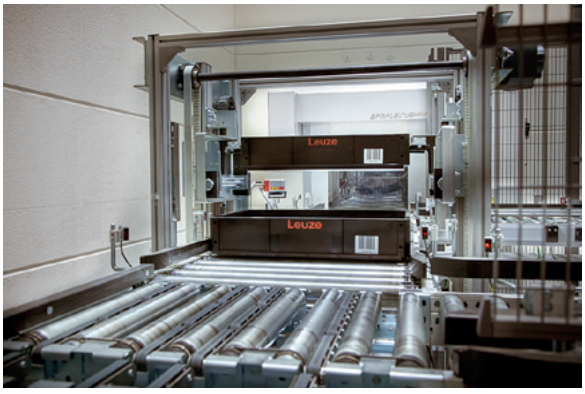
The small-parts warehouse is located inside a 16 meter high, 66 meter long and 10 meter wide enclosed structure. The containers are carried by the conveyor system through two locks, fitted with high-speed doors, into the storage area – and back out again. The small-parts warehouse was designed as a 2-aisle shuttle warehouse, with 38 levels and five GEBHARDT StoreBiter® one-level shuttles (OLS) in each aisle. “We deliberately chose the one-level shuttles with capacitor technology from GEBHARDT. The special feature of this technology is its high degree of flexibility and scalability. And it requires far less maintenance than conventional slow-action contact systems. They are also more durable. This reduces our maintenance processes and increases profitability”, says Ibrahim Zuva, Director of Logistics at Leuze, explaining the decision to opt for this shuttle variant. Charging is necessary after 20 minutes of operation and takes place via conductor tracks installed at the front end of the aisle.
The charging process itself takes just as few seconds. The shuttle does not need to be fully charged. When working at high capacity, the shuttles continue to operate even with a partial charge. A lifter is provided at the front end of each aisle. This means that the containers in the Leuze warehouse are not transferred at the current level, but instead the shuttles move onto a vertical lift which transports the shuttles together with the containers to the lowest position. There the containers are transferred to the conveyor system. These lifters are also used when items enter storage. The lift can transport a weight of 150 kg including shuttle and travels at four meters per second. To further increase depositing and retrieval capacity, in addition to increasing the number of shuttles it is also possible to integrate a further lift at the end of the aisle. If the current solution achieves 130 double cycles, adding a second lifter will increase performance to 200 double cycles. The warehouse uses two different containers. A large container measuring 600 x 400 x 220 mm and a smaller container measuring 600 x 400 x 125 mm. Based on the large containers, the warehouse achieves a capacity of 33,000 storage spaces. By stacking two small containers on top of each other, the capacity can be increased to up to 40,000 storage spaces.

The path through the warehouse

In the case of items entering the warehouse, Leuze makes a distinction between items from external suppliers, which supplement Leuze's own product range, and items that come from Leuze's own production facility. The external items arrive at the incoming goods department in parcels. There, they are unpacked by incoming goods employees, who identify and check quantity. If identity and quantity are correct, the items are packed in one of the two container variants and married to the container. In this way, the ERP system knows which items are contained in which container. The process step in which the internal items are assigned to a specific container takes place at the production site. The individual containers are transported to a loading point where they enter the conveyor system. The Leuze sensors and the warehouse management software (LVS) from GEBHARDT do the rest. "Our sensors read the bar codes to determine which container is at which position in the conveyor system, and the LVS deposits the containers chaotically in the small-parts warehouse", explains Zuva. The LVS is familiar with the order pool. In other words, it knows which order must be retrieved for delivery and when. Algorithms stored in the LVS control which container is retrieved first from the small-parts warehouse and fed to one of the three order-picking stations.
The containers are transported out of the warehouse in the shuttles, and the vertical lift moves them to the lowest level where they are handed over to the conveyor system.

"Today, fast response and delivery times as well as functioning logistics chains are critical."

After the container is handed over to the conveyor system, it travels (controlled by Leuze sensors and the GEBHARDT StoreWare® software) to one of the three multifunctional order-picking workstations, which are each equipped with a height-adjustable pedestal to ensure optimum ergonomics. Multifunctional workstation means that three different order-picking functions can be carried out at each workstation. The first function is defined as the basic function and deals with orders that are supplied to European end customers via the usual parcel delivery services. The containers are transported by the conveyor system. When they arrive at the workstation, SAP tells the order picker how many items need to be picked for the order. The order picker places the items in the shipping box. The shipping box is then packed, the delivery slip and service provider label are attached, and the parcel is again transported on the conveyor system to the outgoing goods department. When the parcel arrives at the removal point, the parcel is loaded into a pallet and received by the shipping provider. The second function is responsible for sending deliveries to non-European subsidiaries. They receive grouped consignments, i.e. weekly bulk shipments. The third function is the so-called consolidation function. The conveyor system and order-picking workstations can be easily retrofitted so large pallet boxes can then be handled and filled. "Our consolidation orders consist of items from the small-parts warehouse and other items from the two other storage areas. To merge the items from the different areas, an additional conveyor belt can be pushed to the order-picking workstation," says Ibrahim Zuva summing up the retrofit.



Images: GEBHARDT

Creating transformation.
Yesterday. Today. Tomorrow.

The Sensor People have years of experience and extensive safety expertise.

Safety products
Safety services
Safety solutions

Safety at Leuze

Leuze is focused on yellow

Advancing industrial automation places ever increasing demands on safety concepts. On the one hand, automation gives rise to new requirements aimed at ensuring the safety of persons. On the other hand, the importance of smooth processes is growing constantly due to the increase in networking.
To find out about these demands and how Leuze is meeting them, SENSOR spoke to Dr. Albrecht von Pfeil, Director Business Area Safety Sensors & Solutions.

We have noticed that Leuze's brand image is becoming more and more "yellow" …
We are making increased use of the color yellow and the term "Safety at Leuze" in our public image and communications to show the wide range of products and services in the area of safety at work to our customers and the market.

You have established a separate division for Safety at Leuze – what was the reasoning behind this?
Our driving force is the desire to provide our customers with gapless safety, efficient material flow and maximum availability at all times. We have bundled our safety expertise in this division in order to align our product range even better with these requirements.

What does your safety product range include?
As a reliable partner for efficient sensor solutions, we offer our customers safety products, safety services and safety solutions – and this throughout the machine's entire lifecycle.

What do you mean by safety solutions?
At the heart of every safety solution are the safety concepts qualified by us. The many years of experience in the use of safety-related applications and extensive knowledge of standards serve as the basis for our safety solutions. For every safety solution, the requirements are gathered by our professional safety consultants and the solution individually tailored to the given system layout. We accompany the projects all the way through to the safety-related approval of the safety solution on-site.

What is your latest development in the area of safety products?
With "Smart Process Gating", we have developed a space-saving access guarding system for conveyor lines that is based on our MLC safety light curtains. It doesn't need signal-emitting sensors. We have won several awards for this innovative method, e.g. the GIT SECURITY AWARD 2019. Basically, Leuze convinced right from the start in the area of safety at work thanks to pioneering inventions such as the very first protective sensor.

When can we expect to see the next "safety at Leuze" innovation?
The next one is already in the pipeline – or rather the next two. We will be presenting both of them in 2021. You can certainly look forward to it!

That all sounds very promising. Many thanks for the interview.

Interview with
Dr. Albrecht von Pfeil,
Director Business Area
Safety Sensors & Solutions

Safety

Safety products

Space-saving access guarding on conveyor lines

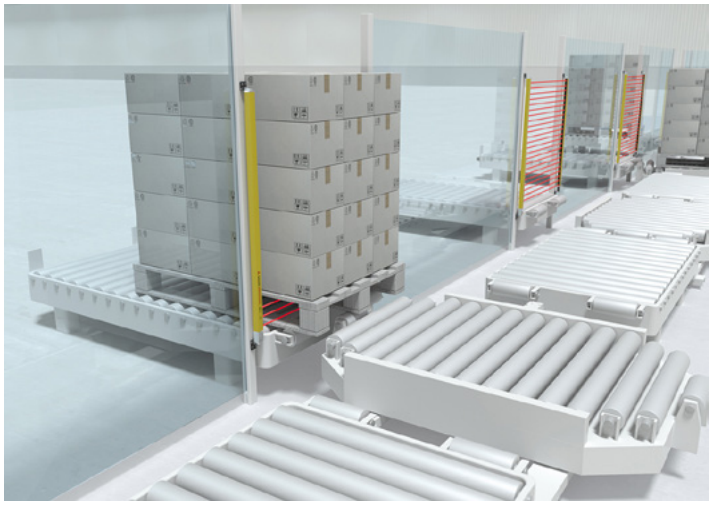
Smart Process Gating

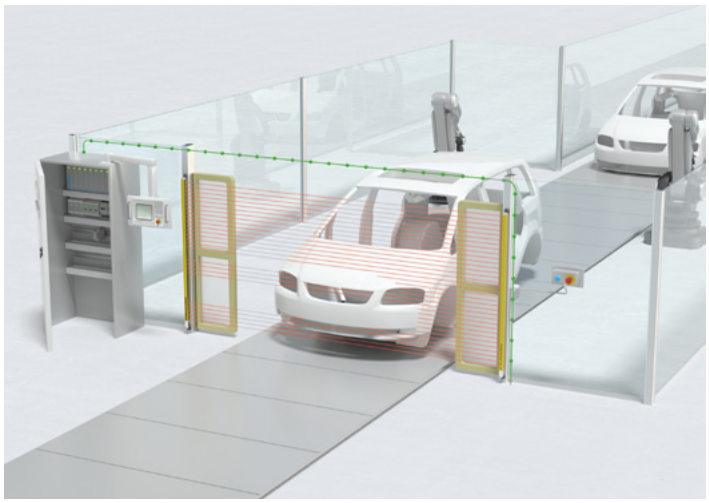
Muting reinvented

The MLC 530 safety light curtains with Smart Process Gating offer a space-saving alternative for access guarding on conveyor lines. With this innovative technology, process control takes place in combination with the system control. This solution requires no muting sensors and operates exceptionally reliably.

Advantages for you

— Space-saving
— reliable
— optimally protected





Link to video
https://youtu.be/1FJrwcfa8sk

Efficient material flow with gapless safety

Innovative strength, a down-to-earth culture and strong commitment are the values that have made WITRON – based in the Upper Palatinate region of Germany – the company that it is today: worldwide one of the market leaders in the planning and realization of highly dynamic warehouse and order picking systems in the field of intralogistics.

WITRON is constantly working on developing even better, more cost-efficient logistics solutions for its customers, to make them even more successful. It goes without saying that the company also collaborates with a technology leader for automation and optimization of warehouse logistics. Leuze is not only a leading manufacturer of optical sensors – it is also an absolute safety expert with decades of profound expertise in intralogistics. Like WITRON, the Sensor People's primary goal is to provide its customers with support in a continuously changing industry, to actively shape progress and in so doing to ensure the success of our customers.

Top priority: Safety first

When man and machine meet in a technical environment, it must be possible to stop machine and system parts immediately within a fraction of a second. "The safety of all persons who work in one of the many logistics centers of our customers around the world – whether in industry, retail or service – is the asset most worthy of protection," explains Stephan Schmid, experienced project engineer in the area of development and control technology at WITRON. This means: Appropriate areas are equipped by WITRON with safety devices or fencing that meets the applicable standards and norms so as to eliminate accident risk before it can even occur. But because in a networked, mechanized system it is not possible to completely fence off all areas in which man and machine meet, intelligent solutions that reliably meet these requirements are needed.

The scenario:
A typical safety solution

Particularly on conveyor lines, like those typically used in intralogistics or the packaging and automotive industry, it is necessary to reliably detect the approach of transported goods toward a protective field and then to bridge this protective field at just the right moment to allow the goods to pass through. Previously, signal-emitting muting sensors in addition to the safety light curtains were installed for this purpose. They enabled pallets and transported goods to enter and exit safely and without interruption. This did, however, increase the amount of space required. The systems were therefore not particularly compact in design. And then there were the additional installation and service costs for set-up, alignment and adjustment. "This led WITRON to search for a reliable, compact solution that combines process reliability, system availability and easy operation," explains Schmid.

The idea: Efficient access guarding without muting sensors

At that time, Leuze did not yet have a concrete practical solution for this requirement, but did already have a project idea with the name: “Smart Process Gating”. This development is based on the Leuze safety light curtain MLC 530. Specifically, this is a method that does without additional signal-emitting sensors. Leuze presented this to WITRON at a very early development phase. WITRON was quickly convinced of this idea and accompanied the creative Leuze development in numerous practical tests. “Smart Process Gating” was then put through its paces at and by WITRON on its test tracks in its company headquarters in Parkstein in the Upper Palatinate region where it was optimized together in detail. “The result was a clever solution that combines the requirements for safety at work with high process reliability and system availability,” explains Josef Apfelbeck, key account manager and intralogistics expert at Leuze.

Nothing comes from nothing

Leuze and WITRON are linked by a long-standing customer-supplier relationship. “Many hours of hard development work, joint project planning, discussions, testing on the material locks of test conveyor lines with WITRON as a strong partner at our side have led to an impressive result”, declares Apfelbeck with pride. Schmid explains: “Attractive for WITRON are, above all, the stability and high availability of the safety device – all with less work. This is confirmed by our on-site teams and by our customers alike.” WITRON has been using this new technology ever since it reached market maturity, and now uses it as standard in all of its projects worldwide. “We only recommend solutions to our customers if these solutions have proven themselves in practical tests – that’s our philosophy,” says Schmid, adding: “The Smart Process Gating principle also had to undergo numerous demanding tests. Today, it convinces us on all counts and is used as a standard solution in projects with material flow – in both the retail sector as well as in industry and the service field.” Systems designed by WITRON with MLC 530 SPG as safety devices can now be found in France, Norway and the USA.

WINNER
BI
BEST OF INDUSTRY AWARD

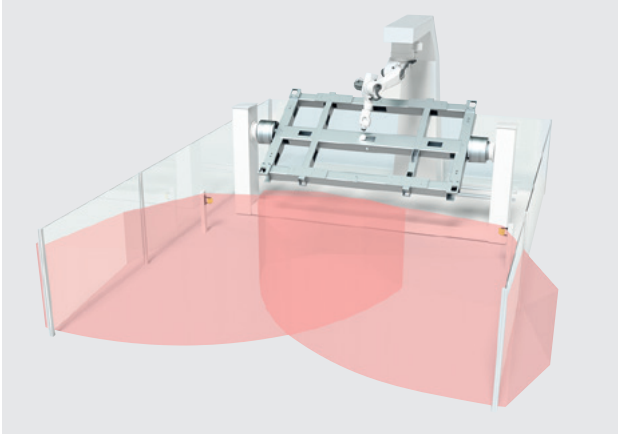
GIT SECURITY AWARD 2019 WINNER

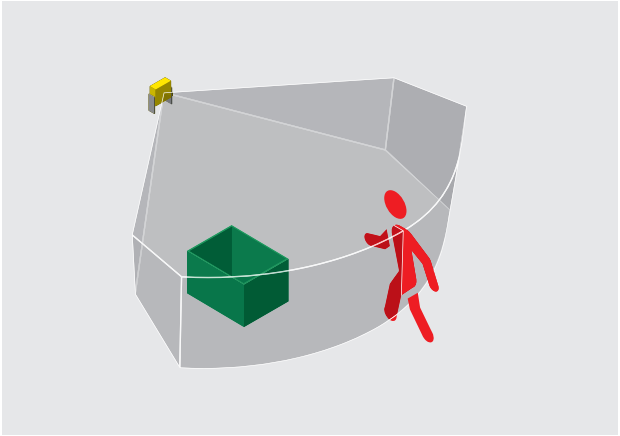
More safety in harsh environments

With the LBK radar system, Leuze expands its safety offerings for its customers: The 3D safety system reliably monitors danger zones – even with sparks, dirt and dust.

Safe radar system LBK

Safety has top priority in industrial environments. Leuze is now offering its customers a new possibility in this area: the LBK safety radar system – the world's first 3D solution for use in environments with dirt, welding sparks, sawdust, smoke or humidity. Developed by Italian manufacturer Inxpect S.p.A. and distributed by Leuze, the system safeguards danger zones near machines and systems – even in harsh environments. "The big advantage of the LBK safety radar system is that it is resistant to environmental influences and is yet very sensitive and reliably detects movements," says Jörg Packeiser, Marketing Manager Safety at Leuze. In addition, the LBK radar technology monitors a three-dimensional space and not just a two-dimensional surface.





Sensors register movements

The LBK radar system responds to movements and generates a switching signal as soon as a person enters the monitored area. The Sensor People thereby protect both employees as well as operating processes. This is because the 3D solution interrupts operating processes only if someone actually remains in the danger zone. The system thereby avoids unnecessary shutdowns and, at the same time, increases the availability of the machine or system. As soon as all persons have again left the danger zone, the machines can start up again. The used radar technology can reliably differentiate between people and static objects because it reliably detects even stationary persons located in the protected area. In contrast, static objects, such as pallets or material containers, can be left in the protected area. They do not result in a system interruption.

Flexible in use, easy to install

The LBK safety radar system is used primarily in restart protection and for monitoring hidden areas. Users can adapt it to their individual requirements: with the number and position of the sensors, with the adjustable operating range as well as with the selectable opening angle. The system also uses its 3D radar technology to monitor areas on steps or pedestals and behind non-metallic shadowing.
To safeguard larger areas, up to six radar sensors can be connected together via a controller. In this way, the system offers a maximum monitoring area of 15 by 4 meters. The individual sensors can be connected to form groups. If necessary, these groups can be switched off, thereby allowing the system to adapt to dynamic processes. Another advantage of the LBK safety radar system: users can use the easy-to-operate configuration software to easily define the system parameters. Should the customer desire, certified safety experts from Leuze can perform configuration and commissioning.

Safe position detection

Machine safety is an important part of machine design. Apart from the normative demands on functional safety and the protection of operating personnel, the topic of machine safety is also invariably a question of cost effectiveness for manufacturers and operating companies.

The objective of every Leuze safety development is therefore to ensure reliable personnel and process protection compliant with internationally applicable safety standards. And at the same time to take into account the aspect of cost effectiveness through efficient production processes.

Relevant standards and requirements regarding machine safety

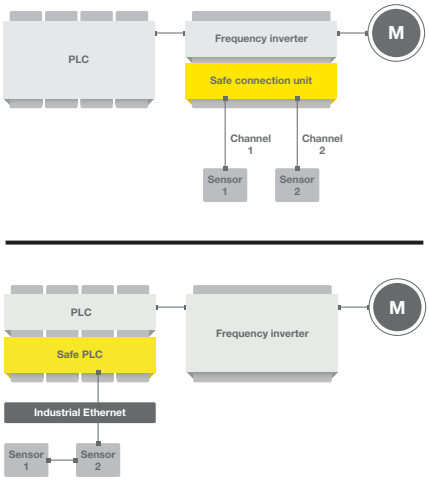
The standard **ISO 12100 "Safety of machinery"** describes how manufacturers achieve the required safety level for machinery and systems by means of risk reduction. A risk assessment is an integral part of this. It identifies and evaluates hazards. If machinery and systems are to be put on the market inside the European Economic Area, the machinery directive 2006/42/EG makes this procedure mandatory for manufacturers.
As a rule, control-technology-based safety devices are used for risk reduction on automatically moving system parts, e.g. high-bay storage devices or transverse side-tracking skates.
Either the required **performance level PLr** to **ISO 13849-1** or the required **safety integrity level SIL** to **IEC 62061** must be determined for these safety devices. Both are internationally recognized standards. The European standard **EN 528** 'High-bay storage devices – Safety requirements' provides additional benefits for manufacturers.In this harmonized standard, the standardization body identified and evaluated the hazards that typically exist at high-bay storage devices. By complying with the standard, the manufacturer can significantly reduce the expense and effort associated with risk assessment. Moreover, this approach provides legal certainty. In terms of travel motion, **EN 528** usually stipulates **performance level PL d**.

Can you give application examples for safe position detection?
One example are high-bay storage devices. According to the normative requirements with respect to the stipulated performance level, positions and speeds must be reliably detected in such applications. This applies both to the position values themselves and to the subsequent processing of these values. Speed values are calculated by means of safe connection units of the frequency inverters or in safety controls. Position and speed monitoring is used at the travel and lifting axis, at the ends of the transportation paths, during servicing and fault rectification as well as on systems with a manned car.

How can safe position detection be implemented from a safety-related standpoint?
In addition to implementing the stipulated performance level, integration of the used sensors into the overall system must also be taken into consideration. High-bay storage devices are optimized for speed and efficiency. The safety system must be designed with an equally high level of performance. To this end, the position information must be generated quickly by the sensors and processed by safe connection units or control systems with short reaction times. To meet these requirements, non-safe positioning sensor systems are usually used today. According to ISO 13849-1, it is possible to use these sensor systems in safety applications. However, to achieve performance level c or d, a redundant set-up with two independent channels – i.e. two sensors – needs to be used. Moreover, the used sensors must be available in diverse technologies.

Interview with Martin Tippmann, Product manager for positioning systems and optical data transmission

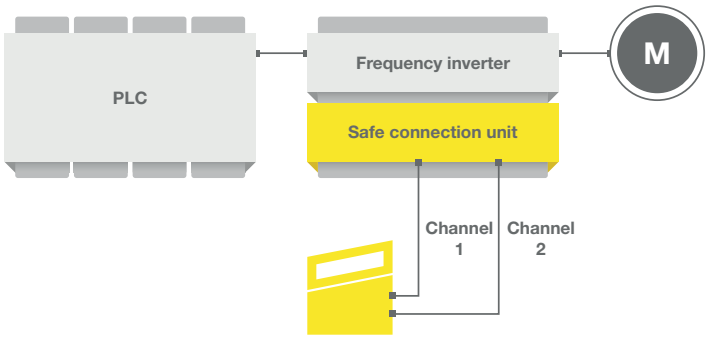
How are signals evaluated today and how is this evaluation integrated in the safety circuit?
There are basically two technological approaches that the manufacturer can choose from. Safe evaluation of the signals takes place either in the safe connection unit of the frequency inverter or in the safe part of the control system. From a safety perspective, both approaches should be considered as equivalent.



What motivates us to develop new solutions?
The safety concepts presented here are widely used. However, space requirements, the cost of installation and cabling as well as the sometimes complex troubleshooting required when faults are signaled are often regarded as intrinsic disadvantages that are accepted because no alternative exists. More cost-efficient concepts that simplify handling and integration are a key consideration of our customers.

How could safe position detection look in the future?
In close contact with our customers, we have defined the requirements for a new safe positioning sensor. The objective of the project is to provide safe position detection using just one sensor. Use on high-bay storage devices with their fast and highly dynamic movements is also supported. To this end, we are using the very latest processor technologies that can achieve the necessary short reaction times. Bar code positioning technology that has been used successfully for many years forms the basis of the new devices. The main advantages of the new concept are the low space requirements and the simple integration of the devices. Diagnosis too is significantly easier.

The sensors will be certified as safety devices with performance level PL e to ISO 13849-1 and SIL 3 to IEC 61508. This means that they will also be ready for future safety-related requirements. We will present the first variant of the new safety sensor by the end of the year. Something you can certainly look forward to.



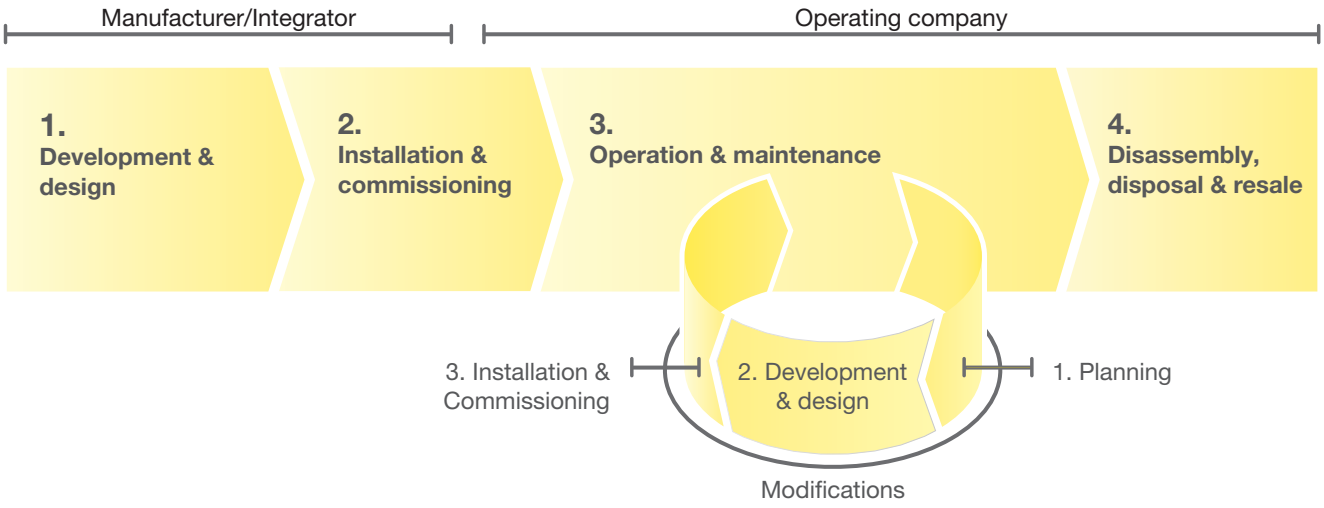
Services for machine safety

Safety services

Stages of a machine life cycle

Sustainable machine safety begins with professional planning of the safety systems and spans the entire lifecycle of a machine. Each phase of the machine life cycle places specific requirements on machine safety.

Our services offer tailored support for manufacturers, integrators and operating companies for the respective required measures. Our teams of experienced and certified experts offer the appropriate support here.



An excerpt from our service offerings

Inspection of protective devices

Within the scope of the initial or regular inspection, we check the condition, mounting and correct function of the protective device as well as the correct integration in the safe part of the machine control.

We summarize the results of the tests in a detailed report. If necessary, this includes practically oriented suggestions on how deviations can be corrected.

Status check 'safety technology on machines and systems'

Our experts analyze the safety-related condition of your machinery and check whether the current safety-related requirements are satisfied in accordance with the current state of the art.

In the event of deviations, we provide recommendations on what corrections can be performed so as to comply with legal requirements.

Our complete range of services:
www.leuze.com

Solutions for machine safety

Safety solutions

Maximum safety with maximum efficiency

With increasing automation, classic safety concepts such as muting are often pushed to their limits. Today there is a need for new safety concepts that meet the extended requirements. Concepts that also offer gapless safety for automatic processes – and at the same time guarantee an efficient material flow as well as high system availability.

Your partner for efficient safety solutions

Innovative ideas emerge when experience and know-how come together. And this is the case with the Sensor People. For over 30 years, our wide range of safety products has provided solutions for safety-related applications in a variety of industries. Our safety experts have comprehensive knowledge of the latest norms and standards and extensive experience in designing safety concepts. This allows us to develop efficient, innovative and reliable safety solutions for use in automated environments.
Our professional project teams accompany you through the entire process – from determination of your specific requirements to safety acceptance. Our safety experts make sure that the safety solution meets your needs, and ensure that your project runs smoothly.

Advantages for you

— The pre-designed safety solutions are individually tailored to your application. This saves time and money and guarantees optimum safety.

— The innovative, intelligent safety concepts offer gapless safety and smooth-running processes even in areas where classic concepts are pushed to their limits.

— Our project team with certified safety experts accompany you from the gathering of the requirements to the safety acceptance.

Tailored to your needs

Our safety solutions are based on qualified safety concepts which, if necessary, can also be individually extended or created new. Every solution is individually tailored to your specific system layout and includes

- All necessary hardware and software components
- Engineering services, such as control programming and configuration according to project requirements
- Start-up support
- Validation of the safety function
- Full documentation

The path to your solution

Gather requirements

Examine layout and danger zones, clarify processes

Check risk assessment, define protective goals

Clarify timing

1

Selection of the safety concept

Evaluation of the requirements by our safety experts

Selection of the appropriate safety concept and the required components

2

Configuration & parameterization

Configuration of the safety system

Programming and parameterization according to requirements

Project-specific documentation

3

Installation & commissioning

Provision of the mounting and installation instructions

Mounting and installation of the system components

Support during commissioning and the integration in the control

4

Safety inspection & acceptance

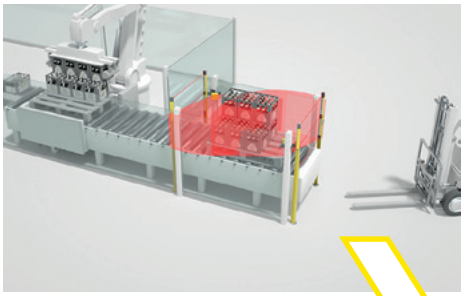
Validation of the safety function

Initial inspection of the safety devices

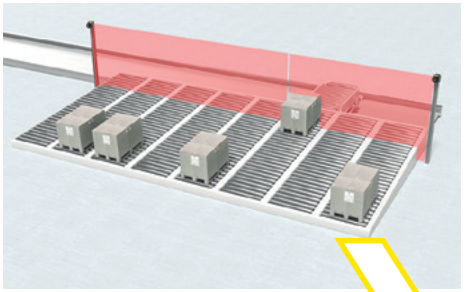
Creation of the acceptance documentation

5

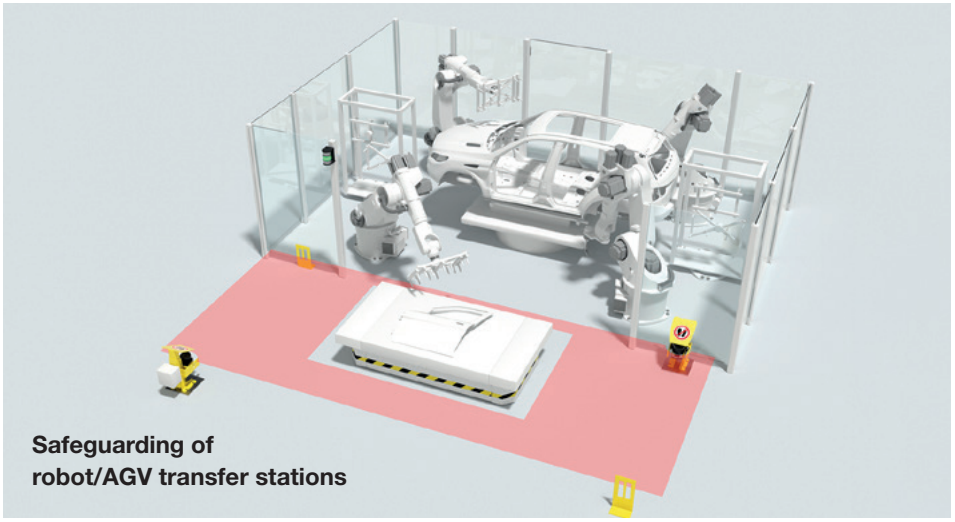
Safety solutions – examples



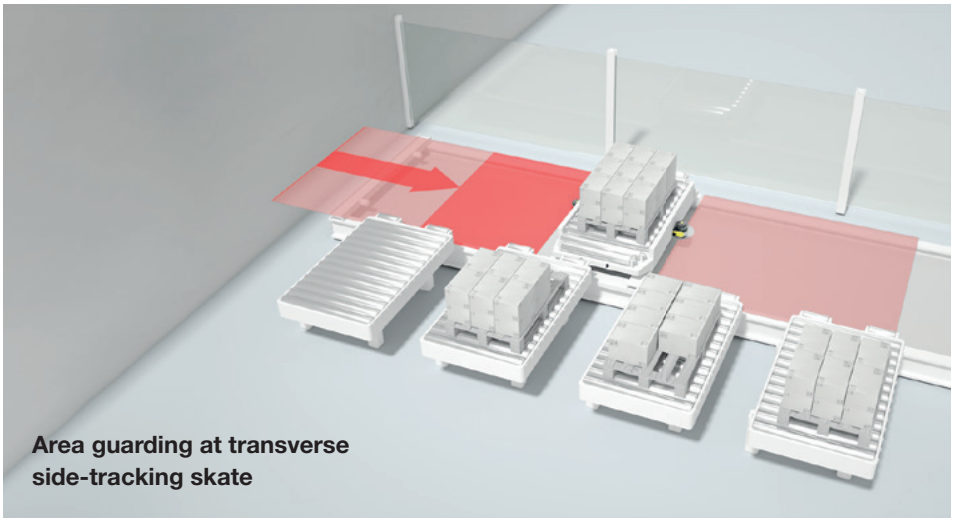
Access monitoring
at material transfer stations
(page 48)



Access guarding on multi-track
transport systems
(page 50)



Safeguarding of
robot/AGV transfer stations



Area guarding at transverse
side-tracking skate

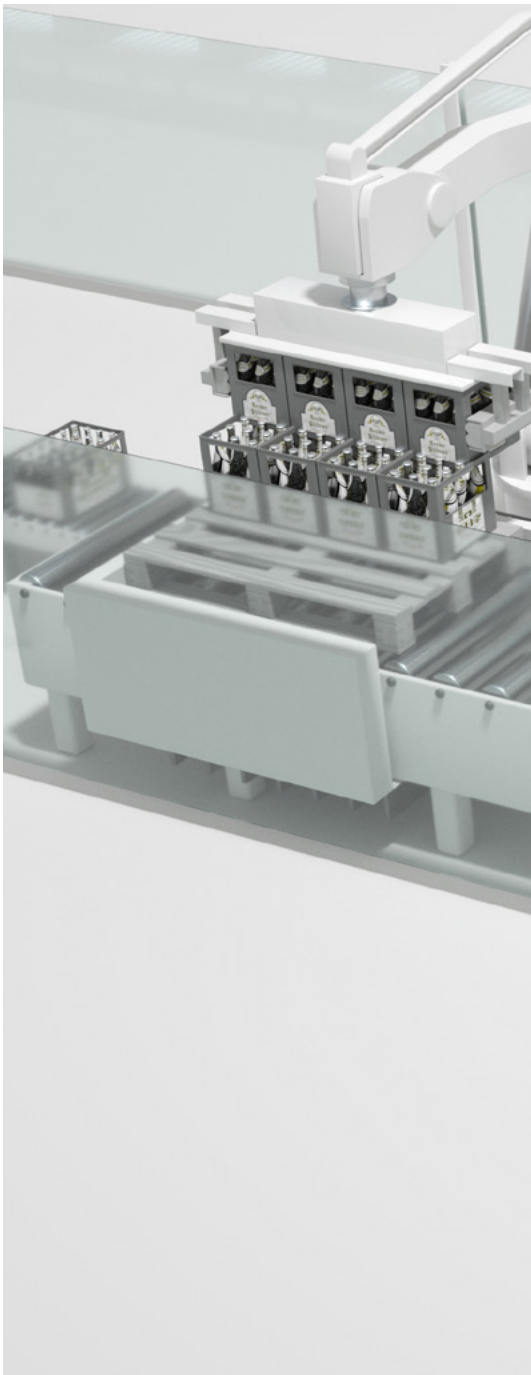
Access monitoring at material transfer stations

Your requirement

At an automatically loaded robot cell, the material is placed on the conveyor line by, for example, forklift trucks and then transported into the cell. To ensure that the robot cell is utilized to optimum capacity, the safety concept must both safeguard the access point to the cell and enable interruption-free operation of the cell during loading.

The solution

The loading area of the conveyor line is guarded at both the entry and exit side by multiple light beam safety devices. The area inbetween is monitored for the presence of persons by means of safety radar sensors.



Your advantages

Higher capacity utilization of the system through interruption-free operation of the robot cell, even during loading

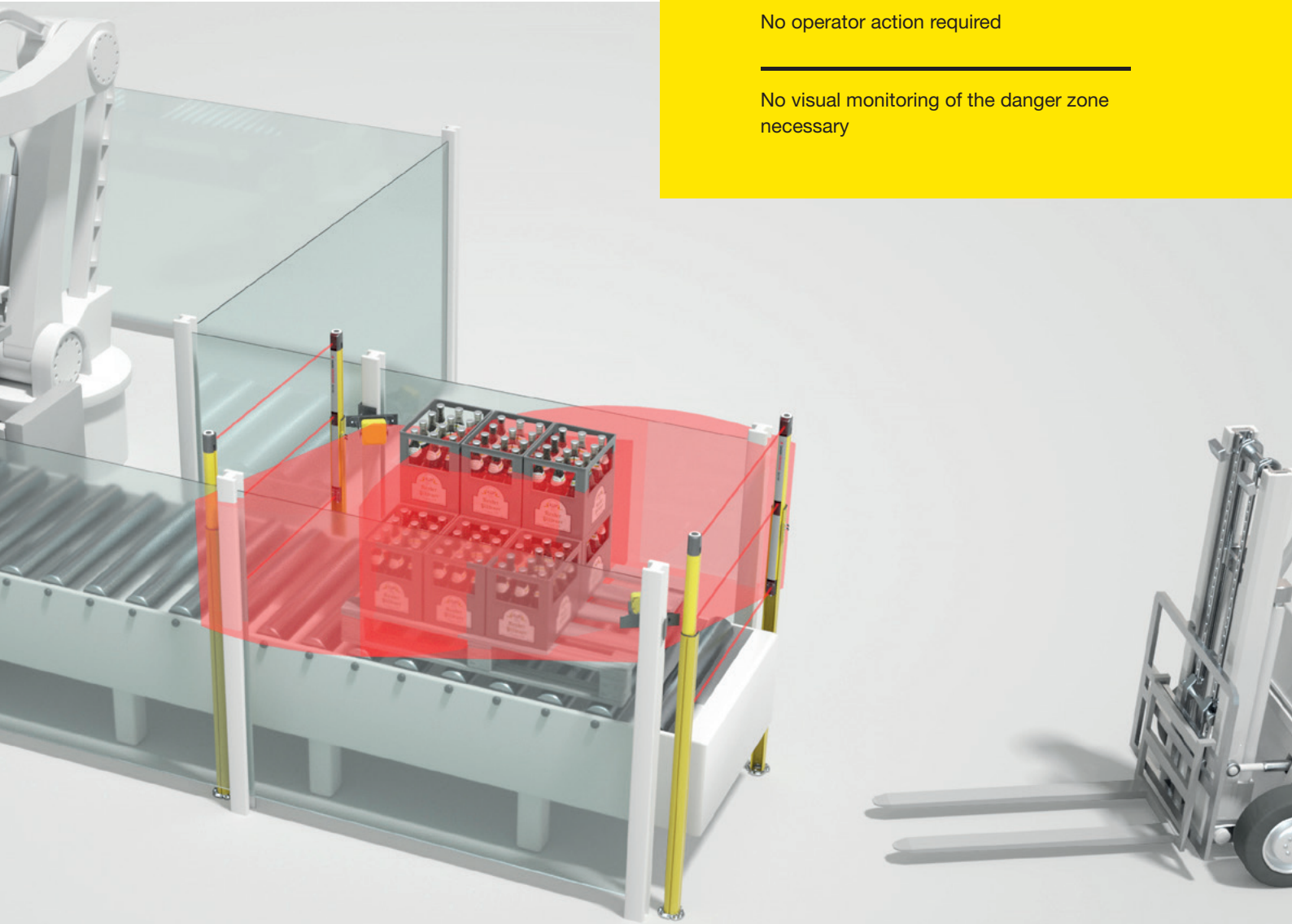
Infeed of transported goods of any shape or size thanks to an optimized safety concept

Safe and reliable even under demanding conditions, e.g. with fully loaded or empty pallets

Supports automatic starting of the conveyor line to improve efficiency and safety

No operator action required

No visual monitoring of the danger zone necessary



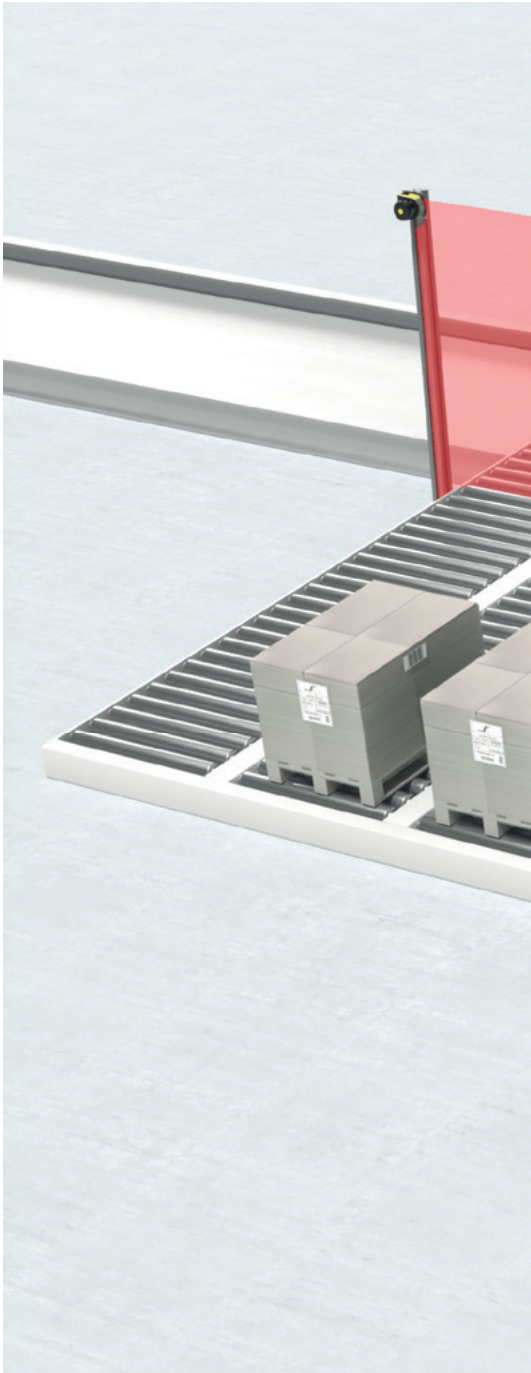
Access guarding on multi-track transport systems

Your requirement

If pallets are output on individual lines, they are usually fed via a cross conveyor. The cross conveyor as well as the area located behind it are to be safeguarded against entry by persons. In addition, the protective device should only release the line on which the pallet is output.

The solution

Access guarding takes place via two vertically oriented safety laser scanners. From the system control, the safety system receives the information about the track onto which the pallet is output and adapts the protective field for the passage of the pallet accordingly. In this way, the entire process is monitored for safety.



Your advantages

Continuous monitoring of the entire transfer area for up to 10 tracks and width of up to 9 m

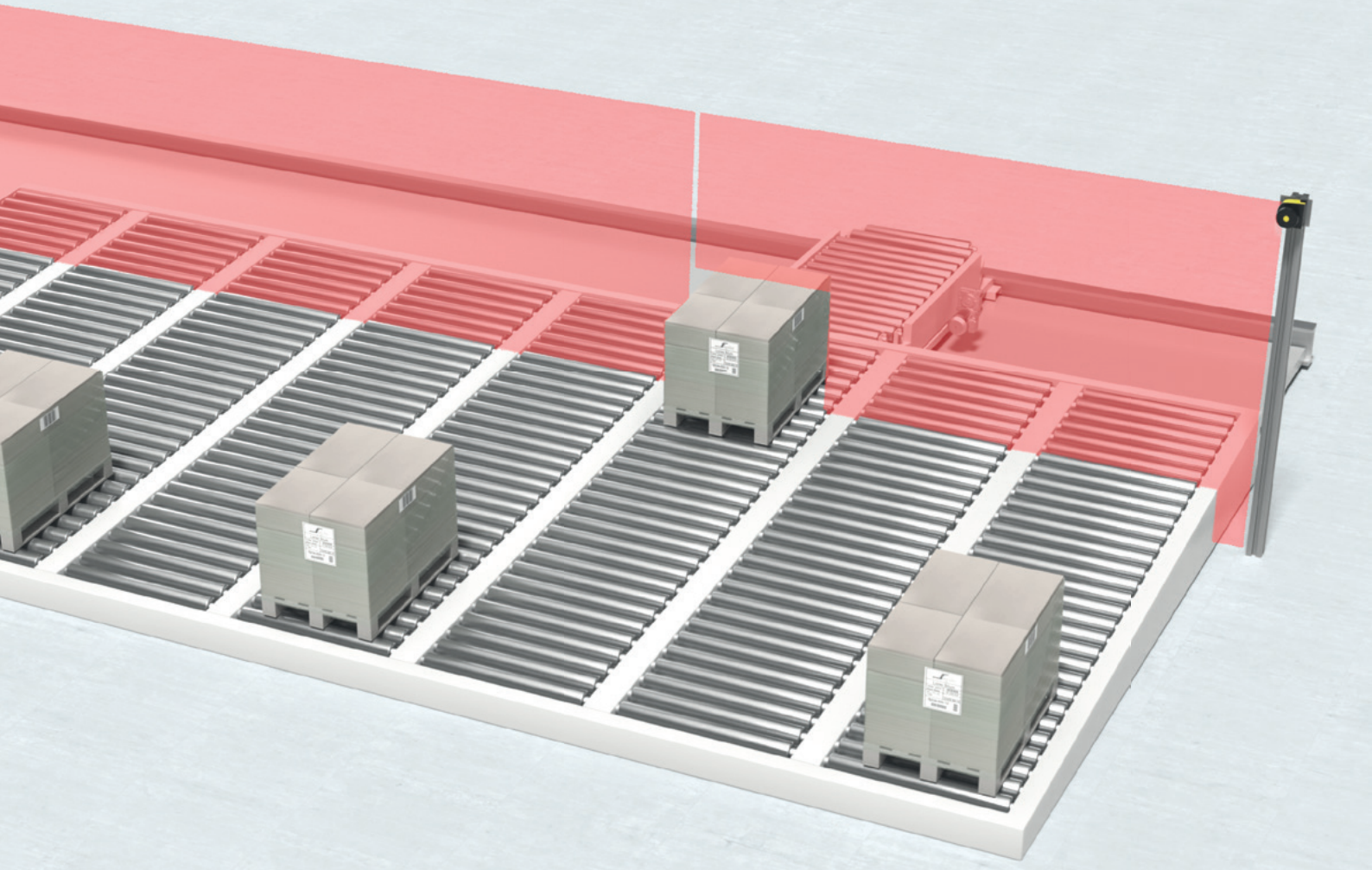
Gapless safety during the transport cycles

High reliability and availability

Optimum protection against manipulation

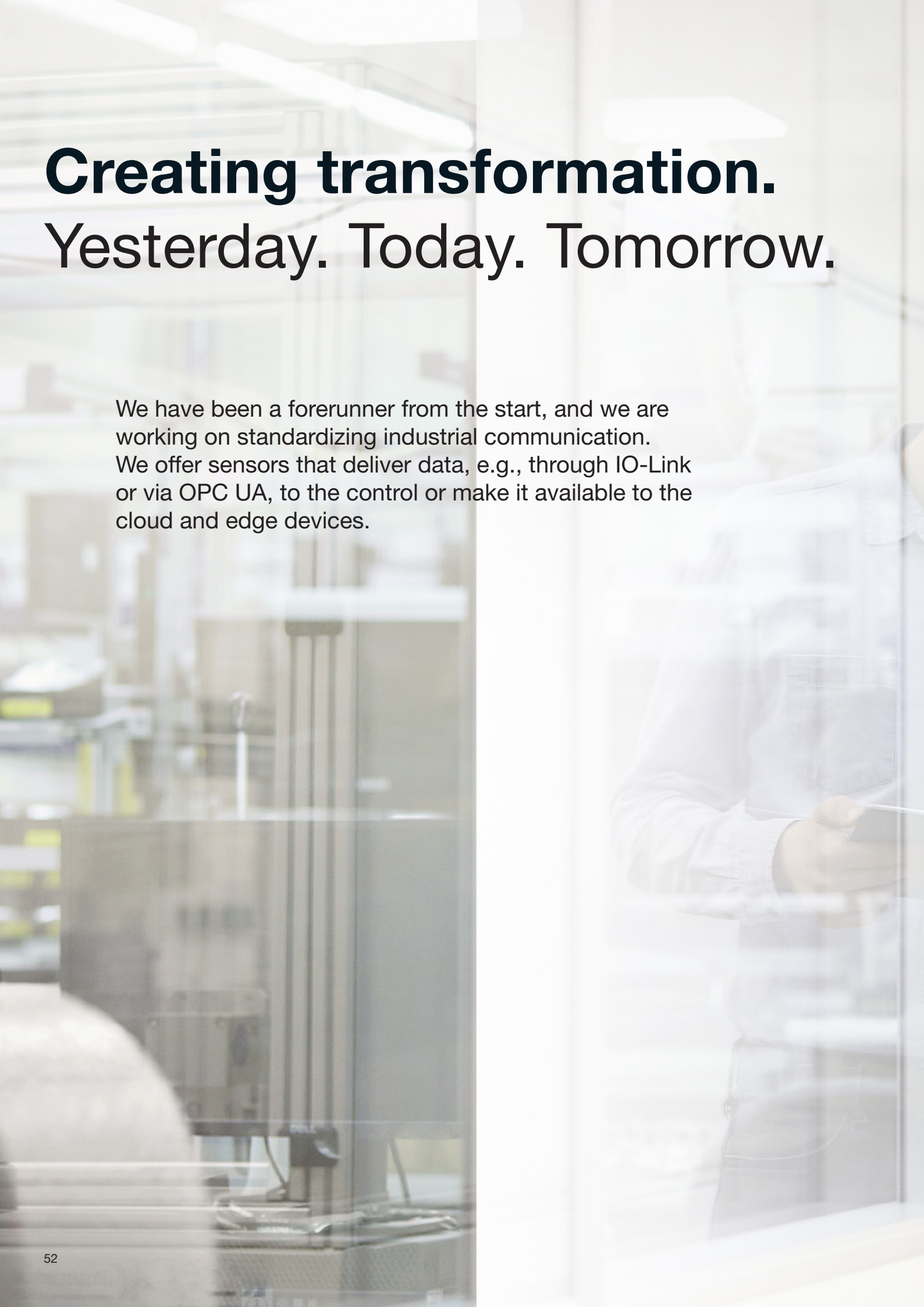
No additional trigger sensors necessary

Easily retrofittable



Creating transformation.
Yesterday. Today. Tomorrow.

We have been a forerunner from the start, and we are working on standardizing industrial communication. We offer sensors that deliver data, e.g., through IO-Link or via OPC UA, to the control or make it available to the cloud and edge devices.



What matters in the end is that it works

Interview with Dr. Henning Grönzin, CTO at Leuze

For some time, Industry 4.0 has been the cause of much excitement throughout the world of automation. But the idea of combining the IT and OT worlds is actually quite simple and nothing new. In an interview with SENSOR, Dr. Henning Grönzin talks about his experience with the hype surrounding Industry 4.0.

Since the hype surrounding Industry 4.0 started, more and more automation companies are repositioning themselves… Leuze too?
For many companies this is more about marketing than a real change in direction. Leuze is an agile company. We have never tried to avoid change, but instead have always regarded it as a challenge and an opportunity. Ever since the establishment of our company in 1963, we have at our core defined ourselves through innovations. Such as the invention of the retro-reflective photoelectric sensor, the ASI bus system, or as a founding member of the IO-Link consortium. We were also one of the first companies to write sensor data to the cloud. And, as a sensor manufacturer, we were the first paying member of the OPC Foundation. And we were the first sensor manufacturer to have its sensors certified by the OPC Foundation. Furthermore, we have been working with Microsoft for around five years now. In the latest chapter in our rich history, we have made significant strides in further developing our technology. This is reflected in our sharpened brand image.

You just mentioned working with Microsoft. How did that come about?
We were looking for ways to transfer data from our sensors directly to the cloud because we were aware that, in addition to the path through the control system, another approach would be necessary. Microsoft, on the other hand, was interested in working together with sensor manufacturers because the sensors are the source of data in the industrial environment. So we began to bring our developers from the real-time world or OT world together with our colleagues in the IT world. As a result of these strategic discussions, we determined that both teams arrived at the same point, but from completely different directions.
There were quite a few “aha” experiences. And this is exactly what our industry needs to break the mold. Our collaboration with Microsoft made clear just how many of the IT trends had by this time already made their mark on the automation sector. And, as the project progressed, the people from Microsoft got a better understanding of what machine builders do.

The fear back then was that IT giants would shake up the industrial supplier market and push out medium sized businesses. Was that your experience as well?
No, not at all. Right from the start, the focus was on various key areas. Whereas the big players in the IT world concentrated on building the infrastructure for OT platforms, our focus was always on understanding and providing solutions for the applications of our customers. Both worlds have complemented each other.

The amount of software in machinery is increasing, and the software industry without service business is hard to imagine. An opportunity for Leuze?
We see this in a very different way. In some areas, e.g. our safety products, service is already very important.
The degree to which this will apply to automation technology will become clear over the next two to three years. These types of developments don’t take place over night, they have to be developed gradually. The same is true for the new business models that everyone is talking about. Changes in this area don’t need to be feared, but it’s good to have a healthy dose of respect. This is where many mistakes happen. By tradition, we approach these issues in terms of technology. It doesn’t matter whether the solution is ultimately labeled automation technology or IT.

Have you identified any IIoT or IoT business models in the automation industry that look profitable? How do you position Leuze in this regard?
Our access through technology makes it easier for us to get involved in these matters. In the end, these types of solutions always require a technological basis, i.e., sensors. And that’s where we are a forerunner. Especially since our R&D department pursues ideas that will also be useful in the future. This also allows us to react flexibly to new trends and developments in the future.

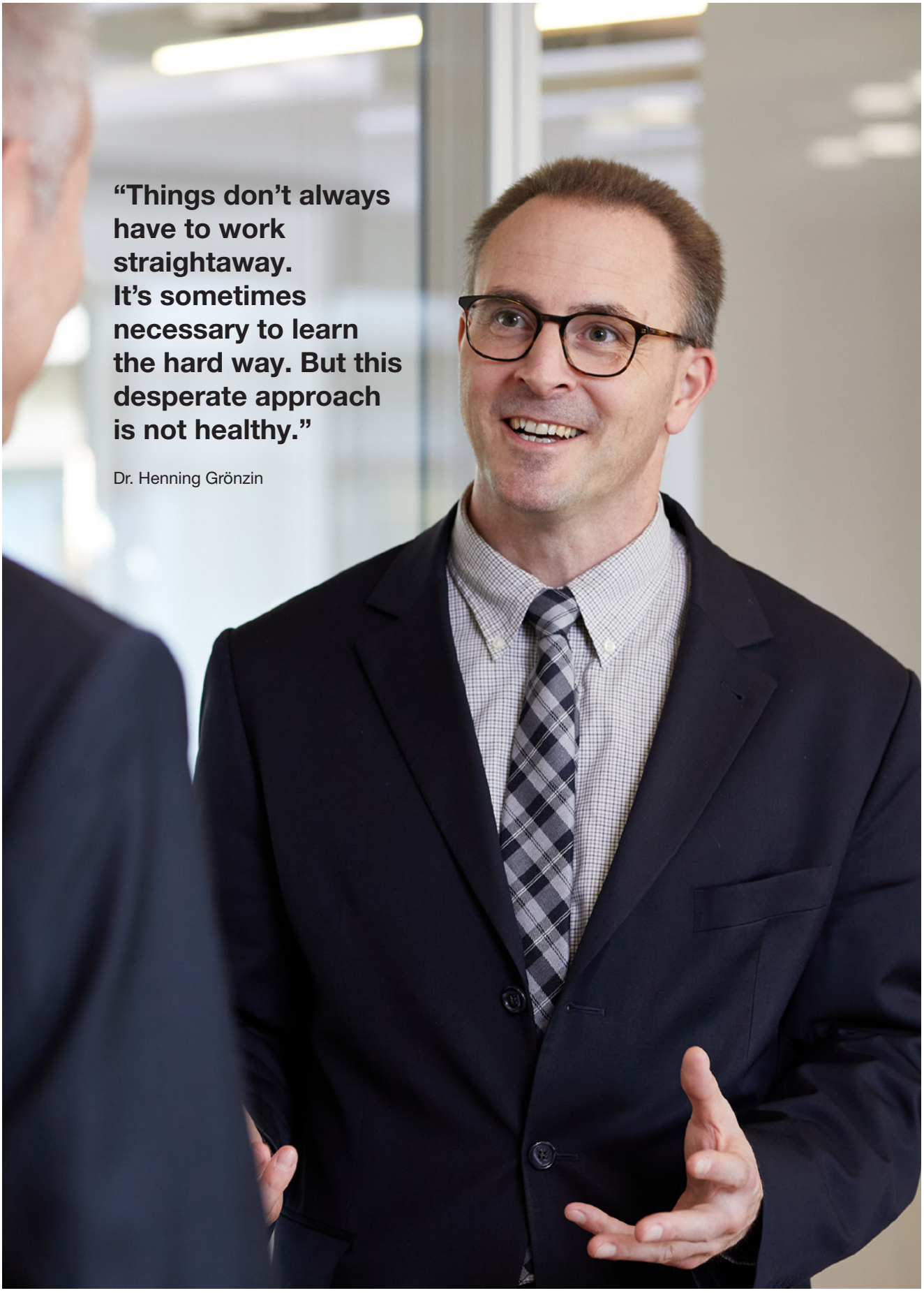
Consulting agencies in particular are warning that digitization within a company has to be accompanied by a change in corporate culture. Otherwise the integrated technology would be ineffective or product innovation would be hampered. Is Leuze on track internally in order to benefit from the current trends in technology?
Many of the technology methodologies and processes are not as new as proclaimed. OPC UA, for example, is based on the OPC standards that were originally defined in 1996. The concept of TSN is also ancient – printing machines have been using it for decades. Of course, the respective applications develop over time. This evolution makes it important to keep pace with any changes and also to recognize when which standard begins to assert itself. The same applies to central data storage and processing. Ultimately, edge computing could significantly outperform cloud computing in terms of its importance for the industry, particularly with respect to differentiation. Conversations with customers have repeatedly made clear that they simply want to retain access to their data. And it often simply makes sense to shift data processing closer to the application. Even if certain basic structures are only just beginning to take root in the cloud. In the end, they will form the backbone and be treated as if they had always been there. That may be different in the US, but German companies have to evaluate which innovations work for them. Companies don't turn into Google just because they start using colorful chairs. Nevertheless, companies must sometimes take a different perspective in order to develop further. This change in perspective and the associated further development often prove difficult for industries with a strong commitment to investment goods. And it's not enough to simply buy out a few startups, preferably with a Silicon Valley address. The key areas of a company should never allow themselves to become tired of dealing with the constant change and evolution. In this respect, Leuze has never stood still. The first big startups and spin-offs that were founded during the Industry 4.0 frenzy failed miserably. A few machine builders burnt through a lot of money.

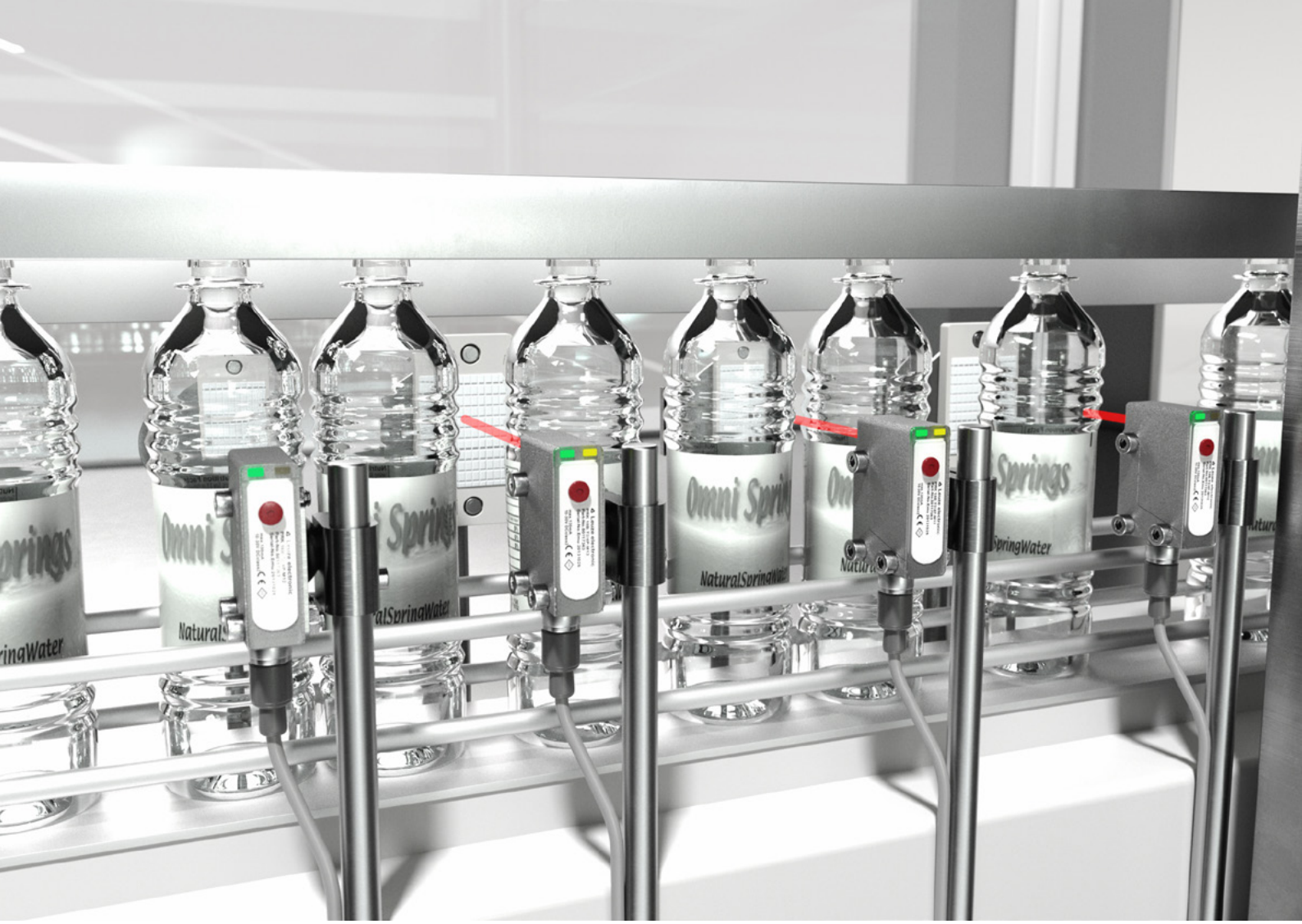
So a change in corporate culture could be useful, with a higher tolerance for the trial and error approach?
To be honest, when you look back, the successful medium-sized companies that dominate the automation sector have never acted differently. Of course, it is not always easy to uphold the virtues of the founding years. But, ultimately, the most important thing for any engineer is that something actually works – not why it works.

Does Leuze pursue a platform strategy?
We view this development with a critical eye. We observed that things have really calmed down over the last half year for many platforms. And, in my opinion, many questions regarding their function and use yield unsatisfactory answers. Since we are talking about digitization, I'd rather focus on the issue of the data model. It is evident that digitization will not work if the data modeling is unclear. In a recent project we only wanted to link our state-of-the-art web shop software with our product databases. The technical loading process took longer than a night. That is digitization live. That has nothing to do with us or the manufacturers. The problem is the interfaces – and nothing about this problem has changed.

What would be the solution?
The management shell is the keyword here. Classic German engineering is in demand. There are good reasons why DIN standards down to the smallest screws have been issued.

Thank you for this informative interview, Dr. Grönzin.


“Things don’t always have to work straightaway. It’s sometimes necessary to learn the hard way. But this desperate approach is not healthy.”
Dr. Henning Grönzin



The dual channel principle

Providing sensor data as and when needed

Ingo Baumgardt, Director of Auto-ID & Machine Vision, Smart Factory Expert

The increasing digitization opens entirely new possibilities in automation technology for increasing the productivity and efficiency of machinery and systems. A much more precise look into the machine is possible today than in the past. It is possible to obtain much more detailed and, moreover, constantly available condition information about the machine – not only on-site, but also remotely, i.e., from great distances, and in digital form. An increase in the amount of information also means ever larger amounts of data, not to say a flood of data, that must be managed. New strategies, competences and future-oriented technologies are necessary here.

Industry 4.0 applications use different sensor data to automation solutions. Sensors with the new dual channel principle can be used in both cases.

What does dual channel actually mean?
Leuze develops smart sensors. Smart means sensors that, on the one hand, record the relevant real-time process data, but, on the other hand, can also supply a great deal of additional information which, once evaluated, can provide information at any time about the current machine state. To ensure the that the various information reaches the desired recipient – be it the process control, the operating company or even the appropriate machine support service – new communication technologies are needed. In addition to offering sufficient bandwidth (e.g., industrial Ethernet interfaces), these must also provide multi-channel capability. Only in this way can the data be delivered in a targeted manner and processed further. This is precisely what the innovative dual channel principle from Leuze offers. First: A real-time-capable process data channel and, second, a need-oriented information channel for exchanging status information and configuration settings.

And what exactly is Industry 4.0?
The primary idea behind Industry 4.0/IIoT is to standardize data and the way it is exchanged across all system borders and all the way up to the cloud. Most of this data is generated with the help of sensors. Their job is to capture process variables and transfer these in the form of data to the receiving systems via one or more interfaces. Through Industry 4.0/IIoT, additional and even new topics, such as a recipe change, format changeover, condition monitoring or the predictive maintenance of a machine or system are increasingly shifting into focus. The data required there is, however, often not essential for the actual automation task. But it does make it easier for the user to plan for maintenance. Preventative maintenance intervals ultimately increase the availability of his machine or system since the maintenance can be performed before his machine or system comes to a standstill with the associated loss of productivity.

Which Leuze communication solutions fall within the scope of Industry 4.0/IIoT?
In the past, point-to-point connections between the control unit and the respective sensor or actuator have defined industrial automation. A master-slave communication model currently prevails. This means that a control unit usually serves multiple end devices via one cable in linear topology (fieldbus installation). The use of new technologies will allow a transition to a netlike or star-shaped communication architecture. We are already accustomed to this from the IT field. As the interfaces to the control systems are increasingly Ethernet-based and therefore powerful enough to serve two data channels simultaneously, this is opening up completely new possibilities. These are necessary for the networked world of Industry 4.0 and deliver the data to the various receivers in a target-oriented manner. With two data channels, the basis for this already exists, through the integrated industrial Ethernet interface with additional TCP/IP channel and the possibility to expand it for OPC UA communication – and even to new cloud-based applications in the Integrated Connectivity devices. The latter are denoted at Leuze with a red *i* in the type designation. This is precisely where IO-Link is indispensable: this simple, 3-wire interface offers all functions that are needed for new IIoT approaches, such as asset management or condition monitoring. It can also be economically integrated in the smallest of devices.

Dual channel in practice

Nevertheless, the original measurement task of the sensors cannot be forgotten – especially as many highly dynamic applications are heavily dependent on all process-relevant information with respect to time. In combination with the newly emerging application possibilities, the dual channel principle from Leuze supports precisely this requirement. The data is transferred to the process control in real time via the first sensor channel. At the same time, the information for monitoring and analysis of the machine flows over the second channel.

The classic IO-Link interface for the binary switching sensor cannot achieve this. In standard IO mode (SIO mode), it permits only one switching signal. During active point-to-point communication, it can handle no more than the direct data exchange of the control. For the process control, however, both types of information are necessary in parallel but with different time requirements.

The dual channel principle is the same for all sensors with one or more integrated data interfaces – regardless of their complexity. Let us consider and differentiate the following possibilities.

Dual channel with connection to the PLC

Consider as an example the KRT 18B contrast sensor, which is used in extremely fast-running packaging machines to determine an exact print mark position: here, the packaging quality of the machine is dependent on the real-time capability of the switching output. The trigger signal from the switching output of a contrast sensor is therefore not processed via the control but is rather connected directly to the actuator. This then directly triggers the placement of a label without time delay. In addition to the fast reaction time of the machine, the exact teaching of the contrast differences between print mark and background is largely responsible for the constant operation of the machine or system. Optical contrast sensors such as, e.g., the described KRT 18B, offer the possibility to determine the optimum contrast ratio for each container or label using multiple transmitter colors. For this reason, the KRT 18B is also equipped with an IO-Link communication interface in addition to the fast switching output. Using a teach routine, the transmitter colors are taught in once and then stored in the respective sensor or the control. Defined or taught-in products can then be selected from the recipe memory of the sensor at any time via IO-Link. If the machine undergoes a format change, the entire configuration file is transferred from the control. A new teach-in process is therefore unnecessary.

Dual Channel and Industry 4.0/IIoT

Within the scope of Industry 4.0/IIoT, data needs to be available to other automation participants, independent of location and worldwide. This is used, for example, for monitoring and configuration. Cloud solutions are generally selected here. Provided the prerequisites identical to those described above exist, the connection can be made via a decentral IO-Link coupling module with Ethernet interface and OPC-UA communication protocol instead of the direct IO-Link connection to the PLC. The data is then connected to the cloud via, e.g., an IoT Edge gateway. A practical example from the area of bottle filling follows: Transparent objects, such as glass or PET bottles, on a conveyor belt must be reliably detected during the ongoing process, even under challenging

environmental conditions, such as fogging. Through the use of a retro-reflective photoelectric sensor for transparent objects with IO-Link – such as the Leuze PRK 3C, PRK 55 or PRK 18B – such environmental influences can be detected and appropriately analyzed so that the machine control can respond accordingly. This also requires a fast trigger signal. For example, to trigger an inspection camera or eject faulty parts. In addition to the convenient teach-in using IO-Link, the second channel can be used to realize a simple but effective contamination monitoring system. The received signal level of the sensor can be compared with the set switching threshold at any time for this purpose, thereby allowing a reduction in the function reserve to be detected. If this information is transmitted to the person responsible for the machine or system via the OPC UA interface of the IO-Link coupling module, the necessary cleaning measures can be determined from the analysis of this information and scheduled during breaks without interrupting production (predictive maintenance).

Dual channel with sensors with fieldbus interface

Leuze offers a dual channel solution for more complex sensors with an integrated fieldbus interface as well. The BCL 348i bar code scanner, for example, primarily has a PROFINET fieldbus interface. Process and alarm values, detailed status and diagnostic messages as well as the complete device parameterization can be carried out from the control via this interface. If the data needs to be available location-independent and worldwide for monitoring, the sensor offers this possibility via its industrial Ethernet interface with the OPC-UA communication protocol. Via an integrated cloud connector or an IoT Edge gateway, the data can be transported all the way to a cloud application.

The dual channel principle offers a real-time-capable process data channel and a need-oriented information channel for exchanging status information and configuration settings.

Challenge:
Industry 4.0 makes possible new functions such as recipe change, format changeover or predictive maintenance. The sensor data needed for this is not usually required for the actual automation tasks and therefore seldom provided by conventional sensors.

Solution:
With the dual channel principle from Leuze, sensors for the first time make data available on separate channels and according to the requirements of the customer. While the data for process control is transferred in real-time over the first sensor channel, the second sensor channel transmits the information for monitoring and analyzing the machine – without the need for an additional physical interface.

Benefits:
The new dual channel principle allows design engineers to prepare machinery for Industry 4.0 applications and cloud connection – e.g. for predictive maintenance or condition monitoring – with minimal additional constructional requirements and financial costs.

How smart is your production?

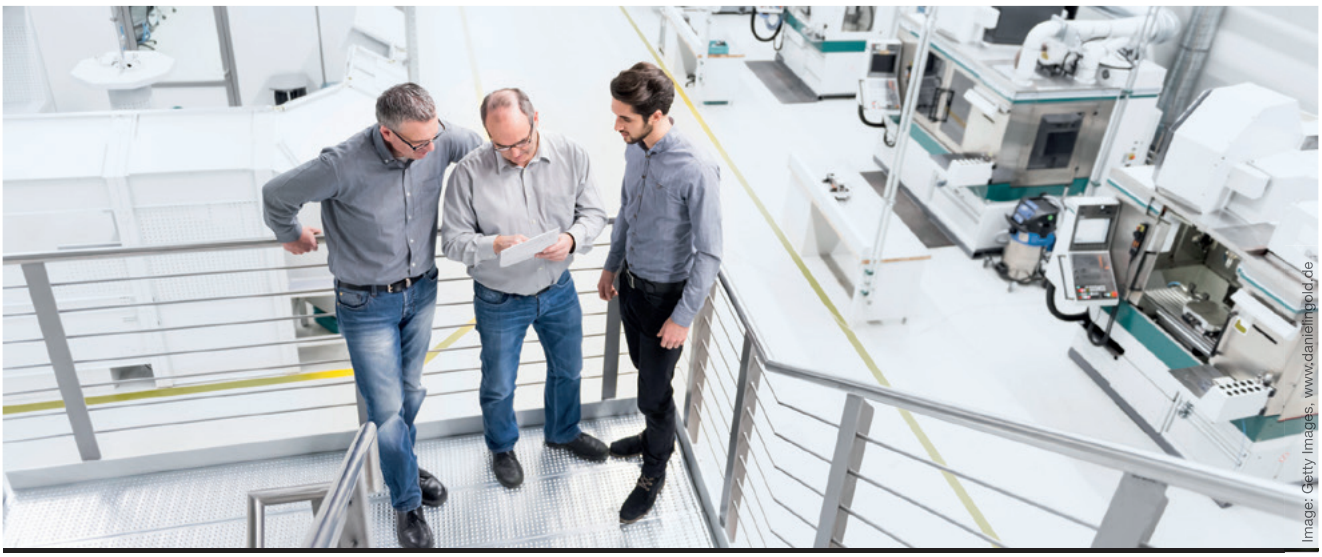


Image: Getty Images, www.danielimgold.de

SENSOR speaks to Michael Schuck about transforming the Leuze production process into a digital structure.

Interview with Michael Schuck, Director of Industrial Engineering at Leuze

Mr. Schuck, how far has digitization advanced in your department?
Our Leuze production process is currently undergoing transformation into a digital structure that will best meet the individual needs at our sites around the world – this began long before the general digitization hype.

What does this transformation process look like?
We are introducing new technologies strategically step by step and regard digitization as an opportunity. Before we start series production, we test the new processes thoroughly in practical operation.

Can you describe these tests?
In the Industrial Engineering department, we have set up our own Leuze technical center. There we test under near-practical conditions new, customized solutions for our production sites all over the world. During this phase, we deal with the basics of digitization at workstation level through to topics at plant and company level.

In other words, at the technical center you conduct tests primarily for your own worldwide production sites?
Not only our own production sites. We of course transfer this knowledge and experience to the development of new Leuze products and services for our customers. Like for us, digitization solutions must bring real added value for our customers too.

Let's stay for the moment with the digitization solutions for your own production sites … What benefits do you see?
Owing to the increasing standardization of the production processes, we are not only able to further improve the availability of production, but also its quality and flexibility at the same time. We not only test new production processes there for the shop floor, but also new operational and information processes that take place at ERP level, for example.

In other words, you look at the overall process?
Correct. For us, it is important to take a holistic approach. This applies to the production processes as well as the related areas. This allows us to make the entire process much more efficient. Our own products play a crucial role in this. They must from the outset be designed in such a way that a holistic improvement is actually possible.

Can you give a concrete example?
In summer 2020, for example, we introduced a new supply chain process that we call "finishing on demand". FOD for short.

What does this mean exactly?
Incoming customer orders for certain sensors are processed automatically and forwarded directly to our logistics center. The sensors ordered by the customer are already stored there in a few basic variants. Depending on the requirements of the customer, the appropriate software then just needs to be installed.

What benefits do you see in this?
On the one hand, the customer receives their delivery much faster because the sensors do not have to be manufactured, they only need to be finalized. This is, of course, also of benefit to us: We do not have to stock a large number of finished devices of a certain type. Furthermore, we manufacture far fewer different variants and can therefore process the customer order fully automatically.

Thank you for the interesting interview.

New stationary bar code reader

Guided container and tray identification made easy

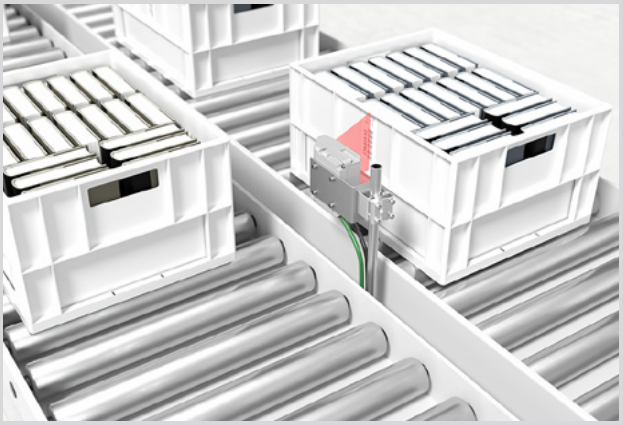
BCL 200i

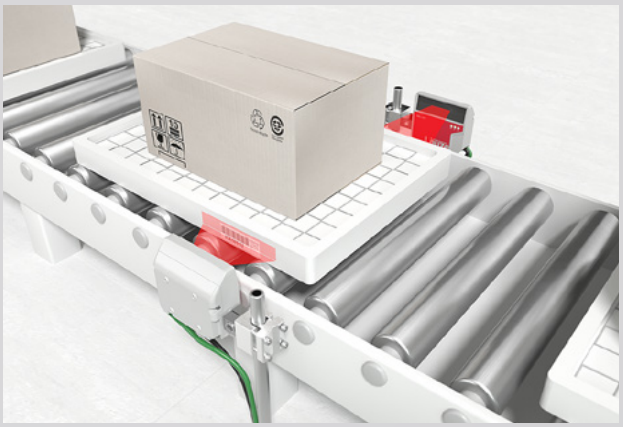
Introducing – It may be small, but it packs quite a punch: the latest product in our BCL series – the BCL 200i. The compact design makes it particularly suitable for applications in tight spaces, such as on or between conveyor lines. In addition to the small dimensions, this type of installation is further facilitated by the cable outlet on the side of the device as well as its dovetail connection.

Specialized for guided container and tray identification
It reliably detects 1D-codes in guided container reading. And regardless of whether they are printed on the label with picket-fence or ladder orientation. The same also goes for guided tray identification when various moving trays are marked with 1D-codes in picket-fence orientation. The device features integrated Ethernet TCP/IP and PROFINET interfaces. The web-based configuration tool enables remote diagnostics from anywhere in the world.

Detected using code reconstruction technology
Thanks to the integrated code reconstruction technology (CRT), the BCL 200i is even able to read bar codes with small bar heights as well as damaged or smudged labels. With the aid of the CRT decoder, bar codes can also be read easily with a large twist angle. The resulting decrease in no-reads significantly increases system availability.

Activation without additional sensor system
Thanks to automatic reflector activation (autoReflAct), the new BCL 200i can be activated without an additional sensor system. This is achieved by directing the scanner with reduced scanning beam towards a reflector mounted behind the conveyor belt. As long as the scanner is targeted at the reflector, the reading gate remains closed. If the reflector is covered by an object such as a container with a bar code label, the scanner activates the read procedure. The label on the container is then read. The read procedure is completed as soon as the scanner has a clear line of sight to the reflector again.





www.leuze.com/en/bcl200i

World’s first combined fork sensor

Two in one

Did you know that Leuze invented the very first optical label fork? And also the first ever ultrasonic fork sensor?

With the world’s first combined fork sensor, Leuze is continuing its decades of innovation history by adding a compact combined light and ultrasonic variant to its range of fork sensors. This variant combines the advantages of the optical solution with those of the ultrasonic solution. It is particularly ideal for labeling machines used in the packaging industry. Affixing labels of various shapes, sizes, and materials on products and packaging by means of a labeling machine is one of the fundamental tasks carried out in this industry. For its precise positioning the label has to be safely and reliably detected – even at high conveyor speeds. This task is performed by fork sensors, which house the transmitter and receiver in a single device and ensure high operational safety. With the new development of a versatile combined fork sensor, the Sensor People once again demonstrate their years of expertise and their application know-how in this area. The new combined fork sensor reliably, quickly and precisely detects a wide range of labels, regardless of their material and surface characteristics. This increases the machine throughput and avoids downtime. Even labels made of inhomogeneous cavitated BOPP material can be reliably detected through the optical operating principle.

The combined fork sensor is especially well suited for applications in which various types of labels need to be detected. Until now, this often required several different fork sensors.

The user saves not only space – the mounting position, which is universal for all objects, also reduces the time and costs for installation and commissioning. The new forked sensor can be quickly and easily set up via the teach button in order to teach the label-carrier combination. The new combined fork sensor features an IO-Link interface. This serves to easily, quickly, and economically configure the sensor.

The interface can be used to enable remote teaching, or to lock the buttons, among other things. In addition, recipe management facilitates easy format changeovers when replacing rolls. Re-teaching to a different label format is then no longer necessary. The format is changed quickly by selecting the appropriate parameter set for the corresponding label format. This parameter selection is directly carried out on the labeling machine via the HMI. It saves not only setup time, but it also increases the production volume and makes the system more economical.

www.leuze.com/en/gsx

GSX 14E

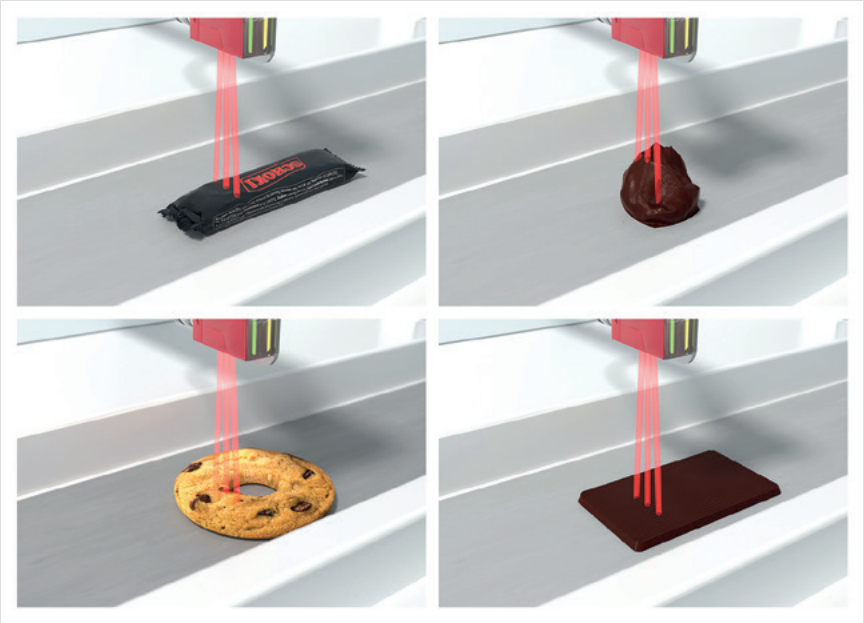
DRT 25C dynamic reference diffuse sensor

The one for everything

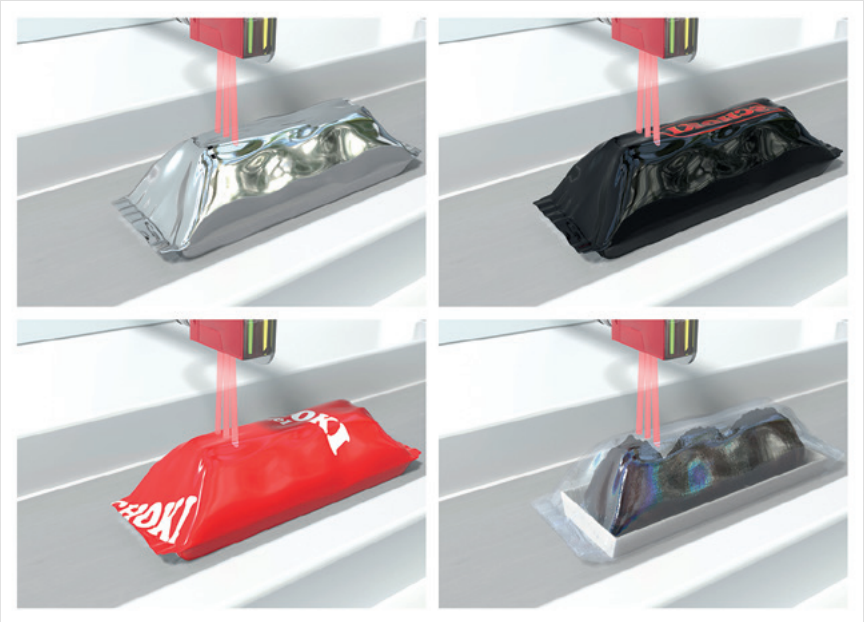
The primary and secondary packaging of confectionery and baked goods can be challenging: Varied shapes and a wide range of surfaces must be reliably detected.

Specialized in packaging machines for confectionery and baked goods

Our new dynamic reference diffuse sensor DRT 25C meets the requirements of packaging machines in an innovative and reliable way:
It uses three light spots and a unique reference technology. This technology does not use the product as the reference, but the conveyor belt instead.
The DRT 25C uses its three light spots to reliably detect the entire spectrum: small, flat, or also tall and spherical products. Even irregular shapes and contours or products with openings, e.g. cookie curls, are detected.



Regardless of color, gloss or transparency, the DRT 25C can detect all objects.



www.leuze.com/en/drt25c

DRT 25C

DRT 25C dynamic reference diffuse sensor

Contrast Adaptive Teach

The DRT 25C is based on a completely new technology: the Contrast Adaptive Teach Technology (CAT). The basic idea is simple: The object can change at any time. The DRT 25C therefore works with an object's environment as a constant reference surface instead of with the object itself. In packaging systems, this is the conveyor belt. This serves as a teachable reference. Once the sensor has been taught the contrast information of the conveyor belt, it only needs to be intelligent enough to adapt this knowledge to a possible change of environment. This is precisely what CAT technology does. With it, Leuze has created a new operating principle for binary switching sensors. The DRT 25C learns the signal parameters of the conveyor belt at the press of a button and stores them as the "standard zero." Every object that is transported on the conveyor belt now generates a signal. If this deviates from the zero state, the DRT 25C reliably detects the object as a "deviation from the reference." The performance of the device is optimized through the choice of teach level. There is, for example, a teach routine for conveyor belts that become heavily soiled over time. Another teach level exists especially for the detection of very flat or even transparent objects. Once the sensor has been "taught," no additional settings or readjustments are necessary. Not even if the object is changed, as the sensor operates together with the conveyor belt as a reference.

"New operating principle for binary switching sensors based on Contrast Adaptive Teach"

In the test environment at Sesotec, no effort is being spared to test the DRT 25C in detail under “real” application conditions.

Precise technologies ensure efficient processes

The food industry has become a complex, globally networked system with many participants: raw materials are purchased internationally at various price and quality levels. They are often sold, stored and processed far from where they were originally produced. Increasing food transports, longer transport paths and multiple loading processes result in a growing risk of contamination. “Manufacturers need precise technologies to comply with the legal standards regarding food safety,” explains Hermann Sammer, Director of R&D at Sesotec. However, an increasing degree of automation means less personnel and fewer inspections by employees in the production chain. The risk of any foreign objects present in the food not being detected thereby increases.

To detect metal contaminants – such as from wires or shavings – metal detectors like those manufactured by Sesotec can be used. For the detection of contaminants from non-metallic materials, e.g., glass or plastics, Sesotec offers X-ray systems. In his function as R&D director, Sammer has already been working together with Leuze for many years. Always with the goal of solving the sometimes tricky application requirements of his customers even better and more efficiently. For reliable detection as well as proper labeling or assignment, optical technologies from Leuze are used here. They ensure that exactly what is on the label is actually in the package.

Sesotec is very satisfied with the Leuze sensors. They have been installed as standard in the company’s machines and systems for years now. In the area of metal detection, these are primarily sensors from Leuze’s 25 series. Sesotec customers confirm their reliable function, cost effectiveness and long service life in an environment that is subject to the highest hygiene requirements and regular cleaning cycles.

Nevertheless, Sesotec is always open to new ideas and technologies. One such example of this is the recent test operation of the completely new Leuze sensor, the DRT 25C with a fully new operating principle based on Contrast Adaptive Teach technology (CAT). “Our company philosophy is very closely aligned with that of Leuze. We don’t view ourselves as a standard supplier of individual metal detectors. We are instead focused on offering our customers specific, complete solutions that are tailored to their respective application and requirements. And these consist not only of our own components. Also included here is all of the sensor technology. Only in this way are we able to help our customers boost their cost effectiveness,” explains Sammer.

DRT 25C dynamic reference diffuse sensor

Positive test results for complex applications

Leuze's new DRT 25C switching sensor promises to reliably detect every type of object and type of product packaging such as are examined in the food sector with Sesotec metal detectors and checked for contamination. Fully independent of their color, shape and surface structure. Regardless of whether flat, glossy, with openings or transparent. "Such objects are not so easy to detect using conventional sensors, which scan from the side. Above all because the front edge of packaged products cannot always be reliably detected," explains Andreas Eberle, Local Industry Manager Packaging at Leuze. Hermann Sammer from Sesotec adds: "The problem often manifests itself in the form of multiple triggering – especially at high conveyor speeds." He has had this experience above all with irregular shapes as occur, e.g., with fish and meat. This usually involves individual pieces that do not have the exact same length and shape. The same holds for plastic outer packagings of fruit or vegetables.

Sesotec is currently putting the DRT 25C through its paces in the company's technical center. A wide range of objects and packaging are being used here. The objects travel into the metal detector on the conveyor belt. Prior to entry into the metal detector, they are always detected by the DRT 25C at the front edge and over the entire product length – all from above. "The view from above is a big advantage. Irregular shapes can thereby be significantly better detected. The sensor solutions currently on the market have so far only been able to perform this task to a limited extent," confirms Sammer. Test experiences thus far are very positive. Even in difficult work environments, such as with quickly moving and, in some cases, strongly vibrating conveyor belts.

UNICON metal detector system from Sesotec, consisting of conveyor belt, detector coil with control unit and ejector unit.
Image: Sesotec

The DRT 25C shows it strengths exactly where conventional sensors, which scan from the side, are pushed to their limits. In the test environment at Sesotec, no effort is being spared to test the DRT 25C under “real” application conditions in detail: “After all, it needs to function properly afterwards in our customers’ application environments and be free of any malfunctions that would slow a machine or system or, worse, bring it to a standstill,” explains Michael Maier, developer in the product inspection department at Sesotec. As a result, Sesotec intentionally wets, soils or gums up conveyor belts in the test situation as is often the case in actual use.

For example, with stuck labels or chocolate residue. “From these test results, we deduce possible product improvements or further developments,” says Michael Schafferhans, Technical Sales Consultant at Leuze: “This allows us to determine where we need to readjust and improve further”. Leuze takes this feedback from customers and partners very seriously and is actively working on additional sensors based on the CAT technology. After all, it always comes down to providing the customer with the best possible support with his application and making him even more successful. This is the goal and aspiration of the Sensor People.

Image: Ingolf Hatz

IO-Link function modules for packaging

For innovative solutions in the packaging industry

Interview with Andreas Eberle, Local Industry Manager Packaging at Leuze

Leuze sensor innovations create added value for our customers in the packaging industry and in so doing make them even more successful.

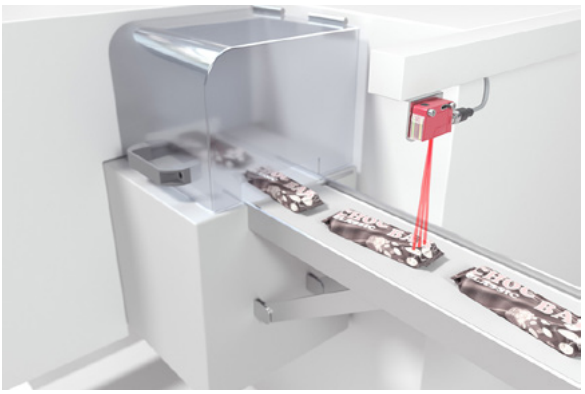
What, in your opinion, are the most important tasks and key trends in the packaging sector?
Increasing individualization of the products and their packaging places new demands on machines and sensors used in the packaging industry. On top of this are a higher level of automation, the desire for maximum flexibility as well as the highest demands and legal requirements with respect to reliable quality control.

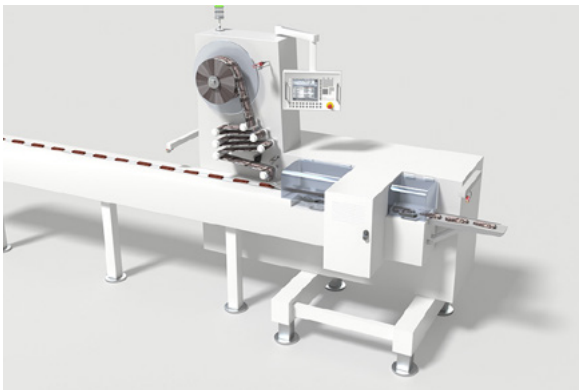
Leuze focuses on the packaging industry – why this sector exactly?
The packaging industry is one of five industries on which we – the Sensor People – have focused for many years. We have decades of experience in this area and, through intensive collaboration with our customers, have been able to build up profound application know-how. In this way, we became real experts and got to know the processes and work-flows of our customers in detail. In the past, this has allowed us to repeatedly set technological milestones in the packaging industry – and this also includes the food and beverage sector. This is set to continue in future. Ultimately, everything we do is always aimed at boosting the success of our customers. After the two packaging clusters Packaging Valley Germany (Crailsheim and Schwäbisch Hall) and Packaging Excellence Region Stuttgart (PEC) merged in 2020 to form a joint organization, Leuze became a member of this organization. The goal is to intensify communication in such an important network of packaging machine builders.

Your latest new developments?
A true innovation specially developed for the packaging industry is our new dynamic reference sensor DRT 25C. It is based on a completely new operating principle: the so-called CAT technology. CAT stands for Contrast Adaptive Teach. In other words, the sensor doesn't use the object but rather the belt surface as the reference variable in conveyor systems. The DRT 25C therefore detects the objects on the conveyor belt from above as "deviations" on the surface of the belt. Even if the conveyor belt is dirty or vibrating.
Our new combined fork sensor GSX 14E that we recently presented is another world first: this new fork sensor combines the benefits of the light and ultrasonic variant in a single, compact device. It is particularly suitable for labeling machines used in the packaging industry.

What role do IO-Link function modules play?
We want to use IO-Link to make our sensors work even more effectively, particularly in packaging systems. To this end, we recently introduced the 3C series, a new generation of retro-reflective sensors with teach function and IO-Link communication V 1.1. On the software side, we are increasingly developing finished, standardized IO-Link function modules and tools that make it easier for users on the control side to integrate Leuze sensors in their control systems. This allows, for example, the operating range of the sensor to be set. It is then possible to perform an automatic format change at a packaging machine without settings needing to be made on site at the sensor. As a result, our sensors make the customer that little bit more flexible – and more successful.

Thank you very much for the interview, Mr. Eberle.





Our mission: To actively shape the future of the industry

Association work as an important platform for exchanging experiences and further development

Actively shaping change and advancing progress with passion and determination – for us, this also means proactively participating in association work in the industrial automation sector. For years now, Leuze has been an active member of various associations – e.g. the German mechanical engineering industry association (VDMA) and the German central association of the electrical and electronics industry (ZVEI). Always with the aim of keeping ourselves up to date about current and future developments in our target markets and industries. In this way, we – the Sensor People – can give our customers the best possible advice, support them and ensure their lasting success in an ever changing industry.

At the same time, association work provides us with a important platform for exchange with other companies. This is why we are active in a number of different committees and working groups, share knowledge and experience and attend specialist conferences. One example of this is the economics working group of the electrical automation division at the VDMA. Here the focus is on economic issues, global and also regional economic trends in various sectors through to structural changes like those we are currently seeing in the automotive industry. With the help of association expertise, the participants of the working group look beyond their own backyard and jointly discuss their take on current and future trends. There is also very active association and committee work e.g. on the topics of Industry 4.0 and IO-Link for the standardization of industrial communication. This represents a key step toward the smart factory, i.e. intelligent production. Leuze was a founding member of the IO-Link consortium. Furthermore, it has been working closely with the OPC Foundation for several years.

Innovationspreis 2021
des Landkreises Esslingen

As a high-tech company and leading innovator, Leuze promotes not only inhouse change, agility and the development and implementation of new ideas. Leuze is also a sponsor of the innovation award presented every two years by the district of Esslingen.

With this award, Leuze recognizes inventive thinking, courage and brilliant ideas. The award that has now been presented for the 10th time is aimed at small and medium-sized companies and supports them in their innovation efforts. After all, innovations are ultimately what provides solutions to challenges and drive the economic success of companies.

This mirrors Leuze's philosophy of actively shaping progress and the future with curiosity and passion.

District administrator Heinz Eininger presenting Jörg Gottlieb, executive partner of label manufacturer Schäfer-Etiketten, with the ninth Esslingen district innovation award in 2019.

24/7 waste gone, parcel delivered – without emissions!

“Test operation began in the fourth quarter of 2020. First conclusions: unaccompanied autonomy still requires control and regulation.”

Creating transformation means shaping the future and accepting responsibility for our environment, society and subsequent generations. Creating also means taking risks and having the courage to simply try something where there is a chance but no guarantee of success. We won’t be able to drive on every road we start to build. But: if you don’t try, you don’t get! With this in mind, Leuze in cooperation with its partners SEW Eurodrive, Transport Betz, FZI (German research center for information technology) and IFL (institute for materials handling and logistics systems at the Karlsruhe Institute of Technology) took on the challenge of developing an efficient supply and disposal system using electrically powered vehicles during off-peak hours to relieve towns and residents. The goal was to elaborate a holistic concept to realize an innovative form of urban logistics using a decentralized, autonomous fleet of LieferBot-E delivery robots. The project is sponsored by the German Federal Ministry for Economic Affairs and Energy.

Interaction of autonomous vehicle and parcel box

The vehicle is based on an SEW Eurodrive drive platform already used in industrial intra-company transport. The parcel box was developed at the research lab of the institute for materials handling and logistics systems (IFL) at the Karlsruhe Institute for Technology (KIT).By the end of the 3rd quarter of 2020, the prototypes of both units were as good as ready. And, at that time, mapping of the test site was also at an advanced stage. It consisted on the one hand of a dense pattern of nodes and edges – this was to provide the LieferBot-E vehicle with basic orientation points and identify speed corridors. On the other hand, a 3D point cloud enabled precise navigation of the vehicle during loading and unloading of the parcel box. In November, the LieferBot-E project then began trials with its eponymous vehicle. First of all on a 400 meter long course at the site of a former barracks in Bruchsal that now serves as the testing ground for autonomous driving for the Baden-Württemberg region. The trials showed that the challenge wasn’t the length of the route, but rather the safety and precision of delivery and disposal.

Delivery at walking pace

Handling that had until now been tested only virtually was now being trialled for the first time under real-life conditions. During the trials, the LieferBot-E drove at walking pace on sidewalks and transported a parcel from a warehouse to the recipient. On arrival, the vehicle deposited the parcel in the specially provided box. At the same time, it removed waste paper and return products from the box. It then returned these to the sender where it again collected new goods to be delivered.

Image: SEW-Eurodrive GmbH & Co. KG

Decentralized goods acceptance from a delivery service was also trialled:
A courier driver met a LieferBot-E vehicle and loaded it with parcels. The autonomous electric vehicle then took over local distribution of the parcels. The system architecture of the digitally planned delivery system comes from the research center in Karlsruhe (FZI). Its sensor system is based on safety laser scanners from Leuze.
To enable navigation of a driverless vehicle in outdoor settings, Leuze extended its existing range of RSL 400 safety laser scanners. Correct navigation is only possible if the laser scanners capture an accurate representation of the surrounding area. To this end, measurement data capture was optimized so that the surrounding area is reproduced precisely even in the case of objects with greatly varying brightness. For example, black clothing or reflective vehicle paint.

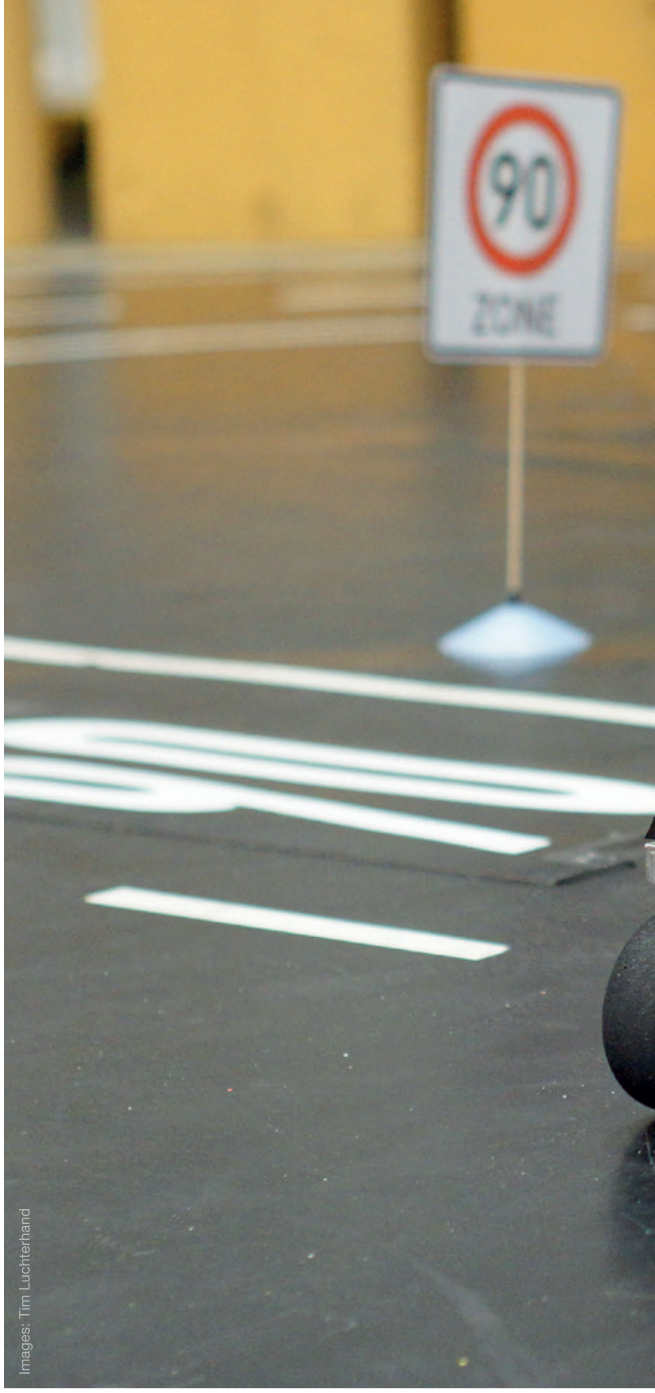
Unaccompanied autonomy versus safety technology

The objective is to develop a functioning system for efficient, CO_2-free delivery/disposal in city centers using electric vehicles. Weather-resistant, with precise navigation, regardless of the surroundings and time of day. Thanks to the autonomous navigation and low-noise drive, also suitable for night-time deliveries. This means that LieferBot-E could avoid dense day-time traffic. During the trials, although the vehicle operated autonomously, it was always accompanied by a person to ensure safe communication with the vehicle at all times. Before unaccompanied operation is possible, a number of issues need to be clarified to convince the relevant regulatory authorities. Only then can the necessary technological and regulatory framework be drawn up jointly with these authorities.

LieferBot-E

Carolo Cup at the technical university in Braunschweig

Silver for “Spatz 10”



Images: Tim Luchterhand

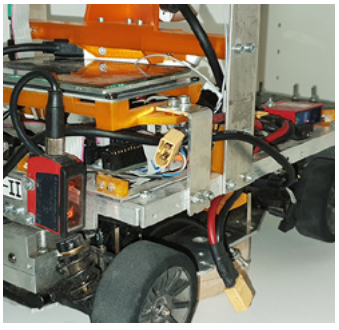
Hotly contested – the Carolo Cup held every year since 2008 at the technical university of Braunschweig. Which European university team is out in front – on the round circuit, the extended obstacle course and in the parking event? The 2021 Carolo Cup was very close – 353 points in total. The team from Ulm took second place, just 2 points behind this year’s winners.

“Spatz 10” (Engl. “Sparrow 10”) is the name of the autonomous model vehicle developed by Team Spatzenhirn (Engl. “Team Sparrow Brain”) from the University of Ulm. This name is not only the license number of the model car. The Spatz is real and is perched on the camera bracket. “Spatz is the nickname given to people who live in Ulm, and so we decided to give our car the same name,” explains Tim Luchterhand, information systems technology student and captain of Team Spatzenhirn. Owing to the coronavirus, the 2021 competition took place digitally. With the exception of the test track, which is real and is on a specially created course in a large building on the University of Ulm campus. Real and big enough to allow live testing during the pandemic. During the year, full-size test vehicles are usually parked in the building. These are used by budding design engineers to prepare for the requirements of tomorrow’s automotive industry.

Like every year, the 2021 Carolo Cup was also split into two different disciplines: the static discipline and the dynamic discipline. In the static discipline, the teams presented their vehicle to the jury. In the dynamic discipline, their vehicle had to prove itself on the round circuit and obstacle course. The coronavirus pandemic meant that this year the dynamic discipline took the form of a video assignment. Each team was posed individual challenges that its vehicle then had to master in front of the camera. The tasks were selected on the basis of the static discipline. If during the static discipline a team emphasized a particular capability of its vehicle, proof of this capability had to be provided in the video. The submitted videos were then also judged by a jury. Points were awarded for both disciplines and added together to give a total score. In the static discipline, the Ulm team focused on the extremely robust lane recognition function.

“The tasks are getting trickier. But can be solved with creativity and technical support from Leuze”

Its “Spatz 10” therefore had to demonstrate this in the video assignment. The team was presented with a scenario where the vehicle had to round a curve on which the lane markings were partially missing. The car also had to overtake a moving obstacle, follow a moving obstacle in a “no passing” zone, observe speed limits, stop to allow pedestrians to use a crosswalk, make a turn, give way to another vehicle at an intersection as well as enter and exit a parking space. The Ulm team had incorporated all these elements in one course so that all of the challenges could be recorded one after the other in a single take. This allowed the vehicle to show that it is able to master not only individual, isolated situations, but also a whole course in one go. For a model vehicle to react to so many different situations requires a large number of sensor systems: e.g. a high-resolution color camera, two stereo cameras as well as acceleration sensors. Leuze distance sensors mounted to the side of the vehicle were also used. They enabled the “Spatz 10” to find parking spaces, and reliably detected when the vehicle had fully passed an obstacle. All of the necessary sensor information was processed centrally on a high-performance miniature PC. The vehicle trajectories calculated there were then transferred to a microcontroller board, developed by the team itself, which controlled the 1.2 kW electric motor and steering system.



Leuze distance sensors ODSL 8/C66-500-S12 and HRTR 25B/66-S-S8.

3, 2, 1
and STOP!

Image: Carsten Riedl

Unconventional use of Leuze technology

For example, as a “counting machine” to monitor how many people enter and then leave a room. And not only at Leuze’s own canteen, but also at schools in Kirchheim and the surrounding area. This counting technology was implemented at the schools even before Leuze started using it at its own canteen. After all, “customer first” has always been the Sensor People’s motto. The request originally came from the Ludwig Uhland High School in Kirchheim. It was looking for a solution to guarantee that no more than the maximum number of students and teachers permitted by the current coronavirus restrictions eat lunch in its canteen at any one time. Without an automated solution, it was the task of two of the voluntary workers at the canteen to count how many people entered and then left the canteen. Trainees at Leuze showed that this can be done more easily: a protective sensor can, of course, do much more than just count – but counting is what was needed to solve this problem. Up and down, 0 and 1 until the set maximum limit is reached. A tricky problem here was that rucksacks or extended arms also had to be detected when two people enter the canteen at the same time. Here, the budding developers at Leuze exploited the hygiene and social-distancing rules. If observed, it was guaranteed that there was a distance of 1.5 meters between each person entering the canteen. However, the technology also had to function correctly and avoid miscounts even if the rules were not observed. And it did so reliably: A signal lamp indicated whether the canteen was full or whether seats were still free. The whole thing can be compared to a kind of traffic light system: If the light changes to amber, only a certain number of seats were still free – set to five in this case. If the light was red, the canteen was completely full. If, however, the limit for the red light is exceeded, the system doesn’t stop at an optical signal. An acoustic alarm is then sounded, similar to that in hazardous zones in industrial plants. When guests leave the canteen again, the system counts down and the signal lamp changes to green to tell people waiting outside that they can enter.

Responsibility for the environment and society

Our ability and conviction to actively shape permanent change extends through all areas:

For us, technological leadership and constant growth form a basis that allows us to take responsibility for our environment and society. This is a matter of course for us and part of our philosophy. We want to shape the future actively and positively for subsequent generations. Not only from a technological viewpoint, but also from a societal and ecological perspective.

Hydroelectric power and renewable energy sources

In the 19th century when Leuze was still active in the textile industry, the Leuze family deliberately settled in Unterlenningen. This was because the River Lauter that flows through the town provided the water required for the textile industry. Even back in those days Leuze used hydropower from its three own hydroelectric power plants in Dettingen, Owen and Lenningen to drive its textile machinery. Two of the three hydroelectric power plants still exist today. The third one was recently decommissioned. However, a new power plant is already being planned. A fish ladder like those at the two hydroelectric power plants in Dettingen and Owen will also be provided at the new plant. An operator agreement for the hydroelectric power plants currently exists with a local partner. The energy produced from hydropower is fed into the mains grid. The electricity generated is drawn again by the operating company. As a source of energy, hydropower is set to continue playing an important role for Leuze: In future, together with the new hydroelectric power plant, water power is expected to generate approx. 2,000,000 kWh at an installed capacity of approx. 400 kWp.

Photovoltaics

Apart from hydropower, Leuze also uses 100% green electricity from renewable energy sources. For example, a photovoltaic system with a generator output of 241.2 kWp was installed on our new distribution center in Unterlenningen. This system provides approx. 50% of the company's power requirements, thereby preventing around 140 tonnes of CO_2 emissions. With the declared objective of being climate-neutral in Germany in 2025, we have drawn up a phased plan with measurable annual milestones. In each phase, we have defined concrete activities that contribute to the goal of reducing our emissions to zero. In 2021, we intend to address the topic of energy consumption and independent power generation using photovoltaic systems at various other Leuze sites.

Certified by the German technical inspection association TÜV

Our environmental management system was tested in 2020 by TÜV SÜD in a certification audit lasting several days. Result: The system was confirmed to have a high level of maturity in line with the internationally recognized standard ISO 14001:2015. In the coming years, surveillance audits will be conducted by TÜV SÜD. The goal is not only to maintain but also continuously improve the high standard.

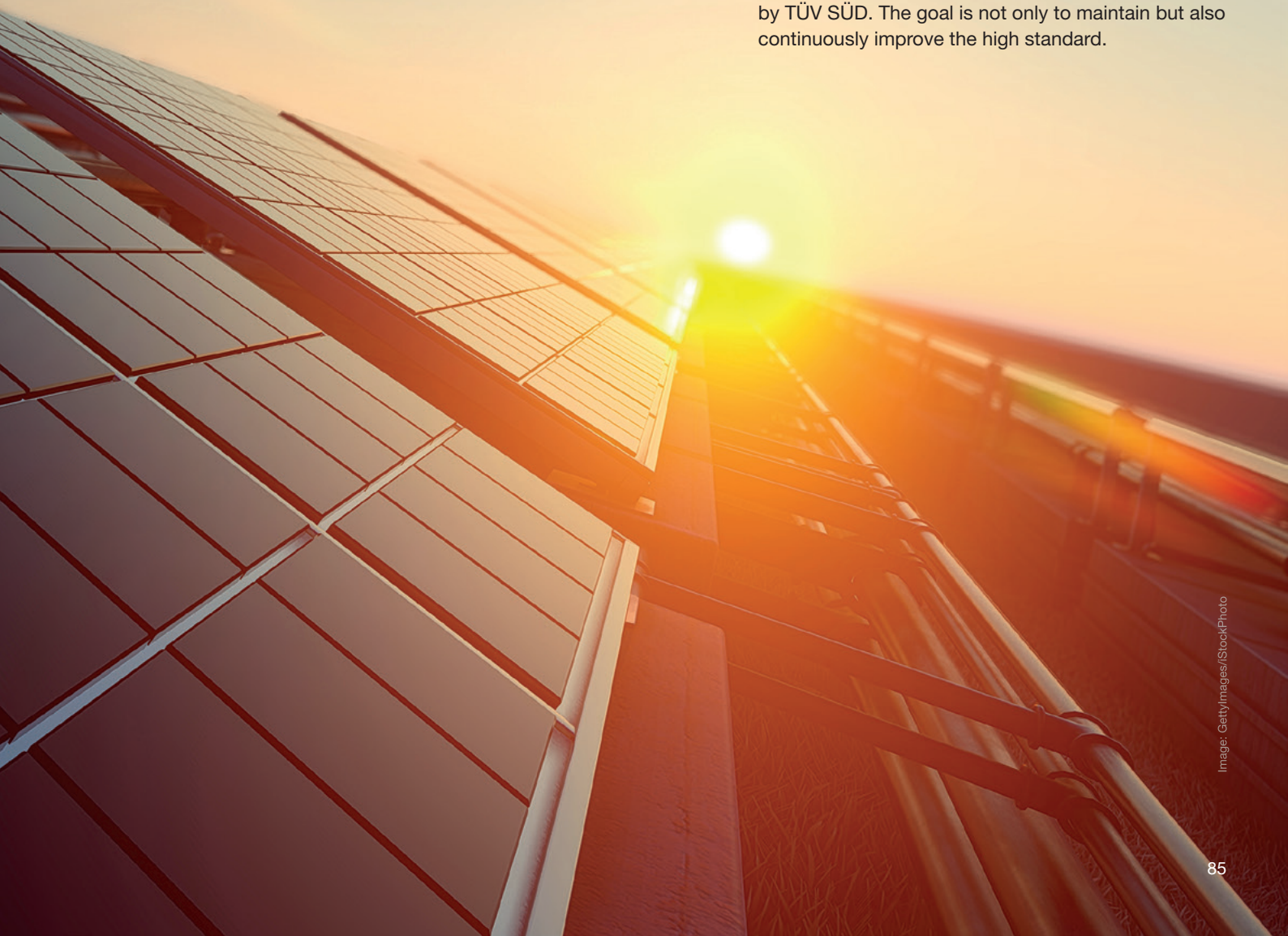


Image: GettyImages/iStockPhoto

Habitat for birds and insects

When designing the facade of our new Leuze distribution center in Unterlenningen, we placed great importance on blending the building perfectly into the natural landscape of the Lenningen valley at the foot of the Swabian Jura mountain range. This is why we opted for a discreet use of color. We also decided on planting vegetation along the side of the road. And not only that. Extensive greening of the roof of the high-bay warehouse as well as a living wall covering a total area of 420 square meters was also important to us. A trough-based variant with climbing plants from Vertiko was used and herbaceous perennials were planted. This planting system comprises, among other things, 40 corten steel plant containers in uncoated rust-look finish. Around 310 sacks each containing 50 liters of planting substrate were used to fill the plant containers.The substrate complies with the roof greening directive from the FLL (Forschungsgesellschaft Landschaftsentwicklung Landschaftsbau – German research society for landscape development and landscaping) and, in its water-saturated state, weighs in at approx. 1300 – 1470 kg/m³. The flowers of the selected perennials and climbing plants such as clematis, hydrangea and honeysuckle attract a lot of bees.
Our living wall also provides an additional habitat for birds and other insects.

Images: Vertiko

Recyclable filling material instead of films

With the commissioning of our new distribution center in Unterlenningen and as part of our Leuze environmental policy, we have completely changed the filling materials that we use to pack our products inside their shipping boxes.

We no longer use film material. Only recyclable paper. This is made of renewable raw materials and is 100% recyclable.

Fire prevention in its truest sense

In its new automatic small-parts warehouse, Leuze has opted for preventive fire and explosion protection using inertization.

Fires and explosions can only occur if the three components forming the triangle of hazards, i.e. fuel, oxygen and ignition source, come together. However, it is not always possible to safely and efficiently protect objects against fire using conventional fire extinguishing systems.
For example, a sprinkler system extinguishes fire effectively. However, its use is possible only to a limited extent because the release of water in the event of a fire would cause additional damage – e.g. to all electronic components.
Fire prevention systems are used in such cases. Whereas extinguishing systems as fire-fighting systems can only fight a fire after it has started, fire prevention systems prevent a fire or explosion from occurring at all. By means of inertization, the oxygen concentration is reduced to below a critical level. To this end, inert gases are fed into the room to be protected. The goal is to decrease the oxygen level to such an extent that explosions cannot happen in the first place. In the automatic small-parts warehouse, the heart of the new Leuze distribution center in Unterlenningen, the oxygen level is reduced to approx. 15 percent. Nitrogen is used as the inert gas. By reducing the oxygen concentration to this level and keeping it at this level permanently, flames are prevented from forming. All oxygen reduction systems are based on this principle. To protect its new small-parts warehouse, Leuze decided on this simple, durable and robust system that generates nitrogen directly from the surrounding air in a fully automatic, electromechanical adsorption or separation process. A fire prevention system is completely harmless for people. With around 78.08% by volume, nitrogen forms the largest component of the air that we breathe. Remaining in rooms with an oxygen-reduced, nitrogen-enriched atmosphere is therefore completely safe. This means that maintenance and inspection work can be conducted over long periods. Oxygen reduction to about 15% roughly corresponds to the oxygen level at an altitude of 3,000 meter – the same level during a mountain hike, when skiing or when traveling long distances by airplane. In such settings, a liter of inhaled air contains a similar percentage of oxygen to that in an artificially created, oxygen-reduced atmosphere.

Image: GEBHARDT

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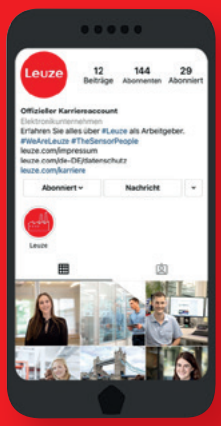

… And also on our new Leuze Instagram account: leuze_careers

Leuze – international high-tech company and a very attractive employer. Find out more about the career possibilities at Leuze: We publish the latest job vacancies, experience reports, provide an insight into our training opportunities and dual study programs, internships and student trainee schemes.

Leuze electronic GmbH + Co. KG

In der Braike 1, 73277 Owen
Phone +49 7021 573-0
Fax: +49 7021 573-199
info@leuze.com
www.leuze.com

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