# Leuze

# '23/24

International 60 years of Leuze Smart factory Safety at Leuze Intralogistics Packaging #WeareLeuze



# SENSOR THE LEUZE MAGAZINE

# Editorial



Xavier Hamers CEO of the Leuze group



Helge Held CFO of the Leuze group



Jochen Wimmer COO of the Leuze group



**Dr. Henning Grönzin** CTO of the Leuze group

# Dear Reader,

Immerse yourself in the world of the Sensor People and Leuze sensors and celebrate with us two more fantastic achievements:

Firstly, in 2023 Leuze will be celebrating its 60th anniversary. For us, these 60 years are a key milestone in our company's history. Secondly, despite major global political challenges, we Sensor People are celebrating another record year.

And we also have a vision, ambitious growth targets and concrete plans for the future of the family business. To this end, at the beginning of the year we reorganized the executive management and put it on a broader footing. We will of course be introducing ourselves personally. And we will be giving you an insight as to where Leuze is right now and in what direction our journey will be taking us: What future technology trends do we envisage? What topics and industries will we be focusing on?

Find out more about us. Have fun browsing through the new edition of our Leuze SENSOR magazine!

#### Kind regards

Xavier Hamers Helge Held Jochen Wimmer Dr. Henning Grönzin

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# Our focus is on the customer!

**Jochen Wimmer** 

COO Managing Director of Leuze Assembly

"Absolute customer proximity and fast delivery times are crucial to us."

#### **Xavier Hamers**

CEO Chairman of executive board

"Our goal is to ensure the success of our customers in an industry that is ever evolving."



### Dr. Henning Grönzin

CTO Technical Managing Director

"We work intensively with our customers to understand their application."

### **Helge Held**

CFO Commercial director

"We want to be a solid and reliable partner for our customers."

# Welcome to the Sensor People team!

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### **Xavier Hamers**

Born in 1978

My job CEO of the Leuze group and chairman of the executive board

I earned my first money With renovation and gardening work

This is important to me Open communication and trustful, appreciative cooperation

Balance to my professional life My family, travel, DIY, cooking and enjoying good food

My favorite meal Steak with a glass of red wine

**Recommended reading** Beating Inflation: An Agile, Concrete and Effective Corporate Guide (Hermann Simon)

My motto opgeven is geen optie

#### Over a coffee with Xavier Hamers

Due to the company's strong growth, Leuze has begun to gradually and systematically place the entire company on a broader footing - in terms of its processes and its organization. A year ago, Helge Held (CFO and Commercial Director) and Dr. Henning Grönzin (CTO and Technical Director) as well as Jochen Wimmer (COO) joined the Leuze C-level.

#### On April 1, Mr. Hamers, you began work as our new CEO and chairman of the executive board. When you think back to your first day at work, what do you remember in particular?

I would like to thank everyone for the positive reception. Wherever I went, I was met and accepted everywhere and by everyone very warmly. That made my entry into the company very easy. As a newcomer, you feel the special bond between the Sensor People and the extremely positive mindset. I am pleased to be part of the Sensor People and to be able to actively help shape the company and culture of Leuze.

#### How were your first 100 days working at Leuze?

For me it is important to first settle down, to take time to look at and understand everything and then to decide what I need to do first. I'm very lucky to have joined a strongly growing and well functioning company and not a company that is in the middle of a restructuring phase! This shows that a great deal has been done well and right in the past – otherwise Leuze wouldn't be where it is now. Because success is always a collaborative effort!







#### How was or is your personal onboarding?

First of all, I wanted to get to know the Sensor People and the various departments. Not only at the company headquarters in Owen – including the production and logistics departments – but also the Sensor People and Leuze subsidiaries across the globe. This is why I did quite a lot of traveling right from the start.

#### Where did your first journeys take you?

To China, Singapore, Malaysia, USA, Turkey and also to Pilsen. I got to know the managing directors of the European sales companies at the Sales Meeting Europe in Amsterdam.

#### Amsterdam – you were born in the Netherlands, weren't you? So what brought you to Germany's south-western region of Swabia?

Yes, I come from the southern part of the Netherlands. But my family and I have lived in southern Germany, in Rottenburg am Neckar, about 50 kilometers from Owen, since 2006. I basically moved here because of my job. The area, living in rural surroundings while at the same time being close to a town – Tübingen is not far away – led us to settle here permanently.

## What is particularly important to you for your new job as CEO?

Openness and communication, respect, trustful and appreciative cooperation and that everyone takes responsibility for their actions. Of course, the performance and profitability of the company are also key – otherwise I'd be a poor business economist – but it is primarily the culture that characterizes and shapes a company and that makes Leuze a strong brand and attractive employer brand.

#### Are you a business economist?

Yes and no. Initially I studied mechanical engineering in the Netherlands. I combined this with business studies. I therefore have a background both in technology and economics. After completing my studies, I was able to gain international experience in sales and business development as well as product management and production at various companies and in different industries.

#### That means in your role as CEO and chairman of the executive board at Leuze you will be focusing on sales?

Sales is definitely my hobbyhorse. Here I can contribute my many years of experience. But I will be sharing areas of responsibility with my colleagues on the executive board. A number of things have already been decided, others are still in the finding and clarification phase. Of course, one is the chairman, the executive manager, but what is important to me is that together we all form the executive management and everyone contributes their own strengths and know-how. Also the extended executive management – here I'm referring in particular to Jochen Wimmer in his role as COO. We see ourselves as a team that pulls together in one and the same direction. This is the basis for our future growth.

#### OK, we have spoken in length about you in your professional role. Everyone is of course desperate to find out about the person Xavier Hamers. Ready for a few black and white questions?

Sure. But, please, not "black and white" because nothing is ever "black and white". Let's call it "red and white" – our corporate colors. OK, I'm ready ...

# RED WHITE

Coffee or tea? Espresso.

Favorite season: summer or winter? Summer.

Vacation in the mountains or by the sea? Sea.

Mountain bike or e-bike? E-bike.

Sausage or cheese? Sausage – preferably steak.

What do you feel more comfortable wearing: suit or jeans? Both, but preferably jeans. And: no tie!

Privately, are you spontaneous or prefer to plan ahead? Spontaneous. My wife often says too spontaneous :-)

Thank you for the pleasant conversation and very personal interview, Xavier Hamers. All the best for your mission and: I look forward to working with you!

Interview by Martina Schili.

Of course, growth doesn't happen by itself, nor does it happen overnight. It requires you to develop a clear vision of the future at an early stage. And you must have a clear image and objective in mind as well as a plan of how you can continue to drive growth.



#### One team, one rhythm

In recent years, we have worked on and adapted our structures and processes. We have also reorganized both our C-level and our management level and put them on a broader and solid footing. By doing so, we have created a stable foundation and are optimally prepared for the next growth step.



#### Focusing on specific industries

In future too we will focus on specific industries in which, owing to the proximity to our customers and decades of experience, we have acquired real expert knowledge. This stretches across the complete lifecycle of a machine or system. And from presales to aftersales consultation. This enables us to offer our customers real added value. And, of course, we monitor the market and our business environment very closely, evaluate new technological trends and decide what this means for Leuze. Also whether there could be opportunities for new Leuze business models and strategic partnerships.

# **Ready for**



#### Absolute customer proximity

We have secured new expansion areas both at home and abroad to allow us to further extend our production and logistics capacities at any time. At the end of 2023, we will be moving into a larger building in the USA. In Unterlenningen (southern Germany) and also Malacca (Malaysia), we are making concrete plans for the next expansion phase. Everything and always with the goal of being able to supply our international customers quickly and decentrally and to maximize customer satisfaction.



#### **Qualified personnel**

To remain a competent partner for our customers, we need qualified colleagues – worldwide: Sensor People who are prepared to continuously update and refresh their knowledge and to develop themselves further, and who are flexible and agile. To this end, we on the one hand work closely with our customers. On the other hand, we have set up our own Leuze Academy. Here, we regularly school our employees in new products and topics. And the Academy is also open to our customers.

# the next level

#### Interview

# One year of Leuze Malaysia and we're already embarking upon the next expansion phase



Sebastian Raible Managing Director at Leuze Malaysia

#### In July, the new Leuze plant in Malaysia celebrated its first anniversary. What challenges arose during this first year?

Time flies. Yes, in July last year we succeeded in obtaining all of the necessary licenses and then held a fantastic opening event with guests from our headquarters, Leuze Singapore, suppliers, local partners as well as a number of high-ranking politicians from Malacca. The first year was dominated by "learning and growing by doing". After a steep ramp-up in production, we immediately began three-shift operation and were quickly able to achieve our envisaged KPI targets in the categories "output" and "quality". Furthermore, the first year also saw a great deal of "teambuilding and bonding on the job". If colleagues go through one or two challenging situations together, they bond and grow as a result. All in all, we started extremely well. In June this year, we were able to celebrate production of the millionth sensor. In addition, we now have a PV system on the roof and are in the process of localizing our supplier environment. This successful start of the new plant in Malacca was only possible with the outstanding support from our company headquarters and thanks to a highly motivated team on site. This first year can therefore be considered as a real success for Leuze Malaysia and the entire Leuze group.

#### And for you personally? You're not based in Germany, but now live locally in Malacca. Have you now settled in there? Can you already speak Malay?

Yes, indeed. I was already on site a lot during the construction phase and was able to get a first impression of the country and its people. If you live a

long time in a foreign country, you can deepen these impressions. Malaysia is a very interesting country: a huge variety of different and delicious culinary delicacies, extremely friendly, open and helpful people. And there's so much culture and nature to discover across the whole country. However, my Bahasa Malay is limited to the essentials. But I know enough to be able to order a meal.

### You are also frequently visited by colleagues from the company headquarters ...

Yes, we often have Sensor People from Owen here, and also from the rest of the Leuze world. Our new CEO Xavier Hamers also visited us in April. When production lines are transferred, we frequently have colleagues from Owen to train our Malaysian Sensor People here on site. And last year, sales colleagues were also here for their Asia Sales Meeting. Conversely, Malaysian employees occasionally also visit Owen for training. A delegation including the Chief Minister of Malacca was recently on a trip to Germany and stopped off in Owen: It was a special honor for us to welcome the Chief Minister at our headquarters in Owen.

#### A year ago you told me that the new Leuze plant in Malacca was still in its infancy. Are there already concrete plans for the second expansion phase?

Yes, there are! In Operations, we always need to plan the production and logistics areas three to four years in advance to be prepared for our growth. We are currently already in the middle of planning the second expansion phase. The start of construction is scheduled for the turn of the year 2023/2024. We plan completion by the end of 2025 so that we can move into the new areas in 2026. With this expansion phase, we will more than triple our current production areas, almost double the logistics areas and add approx. 1000 m<sup>2</sup> of extra office space. With this expansion, we in Malaysia will be optimally prepared for the future and look forward to being able to contribute to Leuze's growth here at our site.

# Thank you, Sebastian Raible, for the pleasant interview and all the best for the next expansion phase!

Interview by Martina Schili.

# **Click and order at Leuze!**

Benefit not only from our optimized website, but also from our new Leuze online shop: Its new, attractive design, the convenient product search feature as well as intuitive shopping cart management including order history make sure that the online shop is easy to use. Of course, this also applies to use on mobile end devices. In our online shop you will find our complete product range with over 11,000 items including all relevant information about our products. To ensure that you find the desired items quickly, we have assigned our products to various categories. These are named clearly and structured hierarchically. You can refine your search further using a product selector. Furthermore, we have provided images of all items so that you can quickly identify the products you are looking for. To allow you to plan with greater certainty, we have integrated an availability indicator that informs

you in real time how soon the items you want will be available. And, of course, we will also regularly post interesting special offers. To make things even more convenient for you and so that you can start shopping straightaway, we have provided your usual terms and conditions in your personal area. Try out the online shop. We look forward to your feedback.

#### The Leuze newsletter

regularly informs you about our offers and discounts. Discover our new online shop now and subscribe to our newsletter:







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# Common parts management and dual sourcing

Leuze develops sensor and safety solutions for industrial automation. Dr. Henning Grönzin and Jochen Wimmer meet growth and the supply crisis with common parts management, dual sourcing and strategic partnerships in the electronics industry.

#### Mr. Wimmer, you are responsible for production, logistics and purchasing at Leuze. Where are your interfaces to the technology?

The interfaces to the technology result both from our production strategy and through purchasing the direct materials. We have plants in Europe, Asia and in the Americas. Our goal is to produce where the market is located. The production strategy is the responsibility of Operations. Industrial Engineering, the decision regarding the production technologies, is responsible for the technology.

#### Mr. Grönzin, from a technological perspective, how important is strategic purchasing for Leuze?

Extremely important, particularly for electronic components. On the one hand, we work heavily with common parts in many of our products. On the other hand, we set ourselves apart partly due to the components that we use. In addition, we as a medium-sized company usually purchase electronic components from companies that are much larger than us. For this reason, the influence that we have on suppliers with respect to these components is limited.



### Mr. Wimmer, what is particularly challenging for production at present?

The strong sales growth. In 2020 we had eight production lines for binary switching sensors. Today, three years later, this number has increased to 13. We always work with an operative purchaser and a strategic purchaser. The strategic purchaser cooperates closely with Product Development. Each development project has a strategic purchaser. The operative purchaser places orders for materials according to deadline and quantity in compliance with defined rules. The challenge is the procurement of the direct material, particularly electronics.

Henning Grönzin adds: The strategic purchaser plays an essential role with regard to our production costs. In the project, initial preliminary costing is calculated. We develop products that we produce for many years. As far as procurement is concerned, it is therefore important to determine how long we can obtain the components on the market, in what quantities and at what price we can order them, which components we can place in storage, i.e. "bunker", so that our customers can continue using the same technology over many years, also if they wish to fit out new systems. During the supply crisis, this balance was struck under enormous pressure in terms of time and supply.

#### What are critical components, Mr. Wimmer?

Electronic components, but also connectors. The most expensive parts of a sensor system are the assembled circuit boards that we assemble ourselves at our subsidiary in Unterstadion. Another aspect for Purchasing are the necessary dies. When are these dies worn, when do we buy new ones? We have many die-cast parts.

### What do you do if you need or want to switch to new supply sources?

Jochen Wimmer: Dual sourcing was a strategic topic even before the crisis because the high volumes involved make it economically viable. For the testing process, we work closely with the technology. Changing a component does not necessarily work straightaway. Ultimately, new prototypes are produced on a regular basis, which we subject to intensive tests here at our company headquarters in Owen, until we release the products from this supplier for series production using these production tools.

Henning Grönzin: We have proprietary technology. We assemble the components and, coincidently, work with, among other things, low-pressure injection molding, i.e. 200 bar and increased temperature. Our sensors also withstand the pressure of high-pressure cleaners. Exactness is a key consideration, which is why all die-cut parts have to be approved, just like the circuit boards. With 8,000 active part numbers, this requires a considerable amount of effort even though we use common parts. Our developers use a parts library, which limits the number of electronic components in particular. This has many advantages. If, however, a component is not available, this affects a very large number of products.

### How did you get through the supply crisis?

Henning Grönzin: We worked together very closely. We already had the processes in place prior to the crisis. Nevertheless, it involved a great deal of effort because discontinuation announcements often came just before the delivery stop. During the peak phase, 140 parts were on our shortage list. We did, of course, shop around on the market, using brokers, if our regular suppliers dropped out. Despite this, we had to substitute parts and redesign products. We used around ten percent of our development capacity for redesigns.

**Jochen Wimmer:** Owing to the growing demand, we boosted our procurement activities significantly at the beginning of 2021 and increased stocks massively. We

have a material indicator, divided into electronics, raw materials, logistics and energy. This enables us to identify the critical parts. From the start, electronics was the main issue. The shortages in the other product categories never affected us to the same extent.

### What strategy do you apply when selecting suppliers?

Jochen Wimmer: A regional strategy among other things. The goal is "local for local" in Europe, Asia and the Americas. This enables us to achieve greater independence and, if required, the regions can supply each other. However, dual sourcing has to strike a good balance, on the one hand to hold on to suppliers and on the other hand to keep costs under control.

Henning Grönzin: Our growth can be used as a clear quantifier for this change. Our new plant in Malaysia will become our "high-capacity plant". However, Owen continues to be our main plant for new technologies – with a stable, also slightly increasing capacity. But Asia is becoming more important than it was in the past.

# Mr. Wimmer, you increased stocks during the crisis. Will stocks remain high?

We are reducing stocks prudently – we won't simply flick the switch, but instead will act carefully. Every euro that we save on the stock side, potentially leading to delivery delays, costs much more in terms of sales – not least as a result of customer dissatisfaction. Anyway, owing to our growth, stocks will increase again in the coming year.

#### Mr. Grönzin, were an increase in stocks and dual sourcing the only measures that you took during the supply crisis?

At our circuit board assembly plant, we partly emulated the function of missing components ourselves using available parts. As the volumes involved were small, didn't require much space and we have the necessary know-how within the company, we were able to sidestep certain shortage situations fairly easily. Jochen Wimmer: To ensure the demandoriented distribution of scarce components, we developed an allocation process and steered production planning based on customer requirements. This works well because we use a lot of common parts. Collaboration concerned not only Purchasing and Development, but also stretched as far as Product Management and Sales. Input came from practically every part of the company. As a result, we managed to grow by 25 percent despite the supply crisis. In the meantime, the supply situation has eased. The costs are still high, but availability has improved.

#### How will you deal with the requirements of the German Supply Chain Act that Leuze will be subject to from 2024? Have you already taken appropriate steps?

Jochen Wimmer: Our idea is not to have suppliers simply fill out forms in which they confirm that they are keeping an eye on their supply chain. For us it's about collaboration. If collaboration is working properly, then it must be clear to the supplier that he really needs to take care of his supply chain. The action taken depends on the sales share that we have with the supplier. As a medium-sized manufacturer, our reach will never be as far as the copper mine. We may receive signatures, but realistically we have no sway at the deeper levels of the supply chain. Other, considerably larger players drive change there. We drive change at suppliers where we as a customer are large enough to do so.

Henning Grönzin: The largest part of our value generation comes from electronic components. In recent years, we have been dealing intensively with the supply chains in electronics. However, the nontransparent interrelationships in this market make it incredibly difficult to trace back the chains. And ultimately they all end up in the same fab and region. It is not that easy for a fab to relocate. The influence that we as a medium-sized customer have in this market is limited. This must also be clear to policy makers.

### Mr. Wimmer, have your efforts made your supply chain more transparent?

Definitely. As a result of the supply crisis, but also because we and all other companies are working to improve transparency. For years we have been working on our supply chain to increase quality, performance and service. In addition to this, there are social and environmental issues. On-site visits, walking through the production sites with open eyes and asking questions are all crucial. Of course, initially this is only possible for the direct suppliers. The underlying supply levels need to audit these issues themselves. Nevertheless, the demands of sustainability mean that Purchasing is increasingly being forced to assume the role of gatekeeper.

#### Mr. Grönzin, how important is sustainability management at Leuze?

Our quality management system is subject to the entire framework of standards. The ESG regulations are also anchored in this system.

#### How do you intend to further reduce your $CO_2$ footprint in the supply chain? What approach are you taking?

Jochen Wimmer: Having already made our Germany-based production climateneutral in 2022 through the use of solar energy, hydroelectric power as well as the funding of reforestation projects, we are now working on reducing the product carbon footprint and therefore also on increasing collaboration with suppliers. Essentially, we are striving to design our sensors in such a way that they have a long life expectancy and, as a result, conserve resources and are environment-friendly.

Henning Grönzin: As the most effective lever to achieve this lies with the electronic components, it will take time to make these major changes. To achieve climate neutrality, entire industries and technologies will need to change. Here, pressure will come from large customers, the consumer electronics sector and the automotive industry.

#### Interview by Martina Schili.

# Short noted

# Growth through strategic partnerships

Both companies are experts in their field: Leuze is a technology and world market leader in the area of optical sensors. BEA is one of the world's leading experts specializing in activation and safety solutions for automatic inputs. Over the past 15 years, the company with its headquarters in Liège (Belgium) has developed a high level of expertise in the area of laser-based sensors. This enables high performance, cost-oriented design and excellent production know-how for a broad range of products. This year, the two companies began a cooperation in the area of optical distance sensors, drawing on the strengths of each company. Together they are now developing new sensors for factory and logistics automation. The objective is to harness synergies and to jointly develop new solutions in the future.



# New Leuze location in the USA

As part of our Leuze growth strategy, at the end of 2023 we will be expanding our location in the USA. We will then be ideally positioned for further growth and can supply our customers even faster and more efficiently thanks to local production. In addition to our own employees, at our new training center we will also offer our customers possibilities for further training.



### Leuze Engineering in Pilsen, Czech Republic

Back in 2017, Leuze founded a subsidiary in the Czech Republic. Since then, it has grown to 70 Sensor People. Its headquarters is in Pilsen. And the city has much more to offer than just beer – it also boasts a great deal of know-how! Our Czech Sensor People provide engineering services for Leuze customers in Europe and North America. They develop and test embedded software, conduct system tests and set up test systems. Apart from Pilsen, there are also local representatives in Ostrava and České Budějovice.



### Digital Innovator 2023

Chip and Globis Consulting have honored Leuze as a particularly innovative and future-oriented company with the Digital Innovator 2023 award. This innovative strength is measured based on the number and quality of registered patents in digital product categories. Leuze meets these requirements and is listed in the annual ranking as Digital Innovator 2023 in the electrical engineering segment. "We design our sensors in such a way that they have a long life expectancy, making them resource and environment friendly."

> Helge Held CFO and Commercial Director of the Leuze group

In the media, we hear and read a lot about the German Act on Corporate Due Diligence Obligations in Supply Chains ... Mr. Held, could you start off by briefly explaining what the Act is all about and how it will affect Leuze?

Sure. The German act concerning corporate due diligence obligations to prevent human rights violations in supply chains (short form: German Supply Chain Act) will come into power on January 1, 2024, and will apply to companies in Germany with at least 1000 employees. Owing to our strong growth, we will exceed this threshold value in the near future and from 2024 will have to meet the required human rights and environment-related due diligence obligations in the supply chain.

## What are the essential building blocks needed to implement the Supply Chain Act at Leuze?

First of all, the executive management will submit a mission statement. This describes how we intend to fulfill our legal obligations, what risks we intend to prioritize in the supply chain based on an analysis, and what we expect of ourselves as Sensor People and of our suppliers in the supply chain.

#### Many companies are still unsure about exactly what form the legally required risk analysis should take. How does Leuze determine the human rights and environment-related risks?

The executive management together with the relevant departments such as Purchasing and Quality & Environmental Management has defined criteria for determining the risk. These include, among other things, the production country, the product group, existing certifications of the supplier and known incidents or complaints. The criteria are given a score for all direct suppliers.

#### How do you deal with suppliers that achieve a low score and for which there is therefore a potentially increased risk?

The risk that we determine based on the named criteria is verified in a further step by means of a questionnaire completed by the supplier. Here, proof must also be provided that shows how our direct suppliers are fulfilling their due diligence obligations. Based on this risk analysis and the questionnaire completed by the supplier, we may if necessary decide to visit or audit the supplier on site in order to personally appraise how the supplier handles human rights and to jointly implement possible improvement measures.

#### But the evaluation is always just a snapshot ... How does Leuze make sure that its direct suppliers observe human rights not just on one particular day but permanently?

Our risk analysis is conducted not just once but repeatedly, and at least once a year. Furthermore, the analysis is repeated as and when required on an event-driven basis, as are the preventive measures and questionnaires. In addition, on-site visits and audits also take place.

#### How can employees, but also customers, suppliers or other interest groups, inform Leuze of possible concerns in the supply chain?

To ensure that all those involved in the supply chain are able to report potential incidents safely – and if requested also anonymously – we have set up a complaints system. This gives persons entrusted by us the possibility of carefully checking possible situations.



#### Am I right in saying the supply chain plays a key role not only with respect to human rights but also in terms of ecological balance?

That is correct. The environmental impacts along the supply chain are also the result of acquiring components from suppliers as well as using our sensors in the applications of our customers. By the way, to analyze these impacts, we have chosen a very interesting approach ...

#### What does it look like?

On the basis of scientific methods, we already conduct a complete lifecycle analysis on selected sensors.

#### Could you describe this analysis?

We assess the environmental impact of a product over its entire lifecycle. The different process steps are considered based on impact categories: from raw material extraction, incoming logistics, through to assembly and packaging, outgoing logistics and, of course, utilization and disposal.

## How exactly is this done and, specifically, how is it done at Leuze?

In the case of the calculation methodology, we follow the "Product Environmental Footprint" (PEF) guideline. This is a framework, developed by the European Commission, for calculating and communicating the environmental impact of products. The aim of the guideline is to establish a uniform method for conducting lifecycle analyses and assessing environmental impacts. It is intended to help companies deliver transparent and comparable information about the environmental impacts of their products and to allow consumers to make a sound purchasing decision.

## That sounds very interesting! Let's explore the lifecycle analysis in greater detail ...

Sure. The first step in the lifecycle analysis (LCA) is to collect relevant data about the lifecycle of the product or service. For example, information on materials, energy consumption, emissions, transport, manufacturing processes, utilization and disposal. This data is matched with LCA process databases to allow the LCA calculations to be performed based on the collected data.

## Essentially, the lifecycle of a product or service is modeled. Correct?

Exactly. The model includes all relevant processes, inputs and outputs that occur during the lifecycle. This allows us to quantify the environmental impacts of the various lifecycle stages.

## What environmental indicators are included in this calculation?

The calculation takes into account greenhouse gas emissions, energy consumption, air pollution and water consumption, to name a few examples.

## Are you already able to tell us anything about the concrete results of your analysis?

At present we can only speak of initial findings because our analysis is not yet completely finished.





#### Can you share these initial findings with us?

Yes, of course. The  $CO_2$  emission shown in the lifecycle analysis is predominantly in the utilization phase. This is also due to the long service life of our sensors. The environmental impacts during the manufacture of our sensors, including raw material extraction and preliminary processes, are relatively small with respect to  $CO_2$  emission. This indicates that customers who use renewable energy reduce the  $CO_2$  footprint of a sensor considerably.

#### And what can Leuze do to reduce the environmental impacts?

We design our sensors in such a way that they have a long life expectancy. This reduces the need for frequent replacement and therefore decreases resource consumption. Secondly, they are designed so that they can be easily repaired. Of course, our customers can send in their sensors for repair or disposal at any time. We also make sure that our products are modular in design. This means that only the defective parts of a product need to be replaced and not the entire product. And it is also important to us that at the end of their service life our sensors can be broken down into their component parts so that materials can be recovered and reused in keeping with the concept of a circular economy.

## One final question: In your opinion, what is the greatest challenge of the lifecycle analysis?

There are two main challenges: Firstly, the compilation of product-related information. Secondly, "matchmaking", i.e. linking and merging with the matching items in the process database. However, the greatest challenge for the future will be the automation of calculations so that they can be extended to the entire product range.

## Many thanks, Helge Held, for the very interesting interview.

Interview by Martina Schili.





# A family business that creates values for generations

Company history is also always contemporary history. On both small and large scale, it is clear that change is the only constant. Heraclitus recognized the law of movement some 2500 years ago: "panta rhei – everything flows," which, like an eternal river, brings change to everything. Change requires that one move and adapt. In our time, more than ever. There is otherwise a threat of standstill. And standstill means a step backward. But change also opens opportunities to utilize innovations. This knowledge and philosophy is a recurring theme throughout all of Leuze's company history.

The Leuze Group stood and stands not only for a family business. It also stands for a family of entrepreneurs that has shaped the company for generations. Now in the fifth generation. Anyone wishing to create a better future needs to think across generations. At Leuze, this is an applied fundamental conviction. It stands for modern, humane and successful economic activity. Entrepreneurial, technology-focused thinking is harmonized with lived values at Leuze. Over the entire history of the company, focus at Leuze has not been on being successful in the short term. Rather, to create values over the long term – over time instead of on time. A family business for many employees' families, including for future generations.



leuze.com/60years

# Helmut Leuze (1930)



Helmut Leuze in anniversary year 2023 Partner and former managing director of Leuze textil

### "There are two things today's start-ups need to have: courage and modesty!"

This history of Leuze begins in Eningen unter Achalm at the foot of the Swabian Alb, Southern Germany. The sale of textile goods of all types already had a long tradition here. The ancestors of the Leuze family were also thread merchants and settled in Eningen in the 17th century. They were one of the first who gave up the life of a traveling salesman and instead founded a wholesale business for linen. In addition, they processed cotton yarn using weaving looms that increasingly were mechanically powered by water or steam turbines. The search for energy sources led the family to the Lenningen Valley. Because it was possible here to use the consistently reliable hydropower of the Lauter River for a mechanical cotton weaving mill. Weaving and spinning at numerous locations at the foot of the Swabian Alb provided people with a reliable income in their homeland for several centuries. As a result of increased globalization in the 1960s, it finally made sense to diversify the company. Thanks to a down-to-earth culture, entrepreneurial courage and openness to new technical developments, Leuze transformed from the previous family company active in the textile industry into an international sensor expert in automation technology that today creates the innovations of tomorrow.



**Helmut Leuze video** 

# Christof Leuze (1931)



Christof Leuze in anniversary year 2023 Partner and former managing director of Leuze electronic

### "Standing still is a step backwards. If you don't keep up with time, time will pass you by!"

"Cobbler, stick to your last!" Can this saying still ring true at Leuze, if, after having successfully spun and woven for 140 years, highly modern electronic products have instead been produced since 1963? Even more so, considering that this "spin-off" has since become an internationally leading sensor expert that today stands for innovative sensor and safety solutions in industrial automation? Not everything in life is as straightforward as it appears in retrospect: After all, the founding of Leuze electronic, which celebrates its 60th birthday this year, was proceeded by the dissolution of the Leuze cotton weaving mill. Most of the workers made redundant found new positions in a new business segment, Leuze textil, which concentrated solely on the spinning mill from this point in time on. Right from the start, the manufacture of electronic optical sensors was the most important goal and the business idea of the young start-up. However, sales were also necessary in order to recover the initial investments and to get back out of the red as quickly as possible. The founders searched everywhere for new business ideas, even if they were initially in areas that had nothing to do with photoelectric sensors. Among the first revenue contributors was a packaging machine for textile materials which proved to be a strong seller for years. "The cobbler stuck to his last." But a new seedling was also planted. Together with four employees from the textile branch, this first small team around Christof Leuze and Günther Stiefelmeyer was the nucleus that started Leuze electronic in part of the former Leuze textile weaving mill in Owen. A new era of the company began.



Christof Leuze video

# Adolf Leuze (1931 - 2014)



Adolf Leuze Former commercial director of bielomatik

#### "What's new?"

For all of his life, Adolf Leuze was deeply interwoven with the fortunes of the family businesses within the Leuze Group. Everything came second to the interest of the business and the company. After completing high school in 1950 and a year in the office of the textile company, internships in a wide range of enterprises followed - including in Switzerland, among other places. At the end of 1952, Adolf Leuze began his business administration studies, which took him from Heidelberg to Grenoble and ultimately to Munich, where he passed his exams in October 1955. He then completed further internships with cotton dealers and shipping agents in Bremen and Hamburg as well as with cotton and spinning mill companies in the USA. In 1961, his father Robert Leuze passed executive management of the textile company on to the fourth generation: to him, his older brother and his cousin Christof. In addition to the textile industry, additional possibilities for investment were considered in other industries. First, a stake in the bielomatik company in Neuffen was purchased. Leuze's participation was not only financial in nature. Rather, it provided Biel, an engineer, with the support of Adolf Leuze, a trained business manager. In 1968, the company was fully acquired by Leuze. Beginning in 1970, Adolf Leuze served as managing director of bielomatik. In 1991, the then 60 year old left operative business as managing director according to the articles of partnership. He was a member of the supervisory board for another ten years.

#### Adolf Leuze Foundation

His strong local attachment and ties to the region are also demonstrated by the Adolf Leuze Foundation. It represents the legacy of the deceased Adolf Leuze: The foundation is committed to the public good of the Owen and Neuffen company locations. Since its founding in 2000 until today, projects totalling more than 6 million euros have been funded. These include, e.g., projects that support youth welfare, training and education. But also the funding of research and science projects and projects to benefit animal welfare and nature.

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**January 1, 1963** Foundation of Leuze electronic in Owen

1970

# 1960

#### 1981/1982

Foundation of the first foreign sales companies in Switzerland and France

**Beginning in 1988** Foundation of further sales

companies in European countries outside of Germany

# 1980

#### 1977

Foundation of Leuze optoelectronic, in Unterstadion, Germany (since 2007 Leuze electronic assembly GmbH)



**1963** Leuze foundation location, old weaving mill, Owen.



**1977** Foundation of Leuze optoelectronic, in Unterstadion, Germany. Since 2007, Leuze electronic assembly GmbH (production).



**1981/1982** Acquisition of Lumiflex GmbH, Munich. Since 2016 Germering, Germany.

#### 2002 - 2004

Foundation of the first foreign sales companies in Asia – South Korea and China Acquisition of bielomatik jagenberg GmbH + Co. KG, Neuss Acquisition of bielomatik jagenberg Inc., USA

#### Since 2007

"the sensor people" has been a unique selling point and brand claim

2010

# 1990

# 2000

# 2020

2020

Leuze

2020

Repositioning of the brand -

Opening of a new international

distribution center in

2022

Malaysia

Unterlenningen, Germany

Opening of new Leuze plant in Malacca,

Leuze electronic becomes

#### 1994

Foundation of the first foreign sales companies in the Americas – USA and Brazil

#### 1993

Acquisition of Lumiflex GmbH, Munich, current development location, Germering

**2012/2013** New Leuze construction on In der Braike in Owen. Company headquarters since 1886.



**2020** International distribution center, Unterlenningen.



**2022** Leuze plant Malacca, Malaysia.

2019

Opening of a technological competence and distribution center in Singapore

#### Impressions of the anniversary celebration

As a family of entrepreneurs, personal contact with their workforce has always been and continues to be very important to the Leuze family. They have already known some employees over several generations and cultivate these contacts. Be it at Leuze company celebrations, the welcoming of new employees or at gatherings for retirees. The duration of service with the company is exceptionally long and stable at Leuze. In some cases, the grandparents, father or mother have already worked at Leuze. Today, their children may be among the Sensor People or their grandchildren may be starting their professional training at Leuze. An atmosphere of cooperation has top priority in the Leuze Group. This includes mutual respect and a company culture that is shaped by trust, reliability, openness and an informal atmosphere. The Leuzes and their family business stand for these values.







1 Helmut Leuze honoring the winners of the Leuze football competition


















2 Drum performance of C-level | 3 Christof Leuze signing the anniversary publication | 4 Honoring long-standing employees

### Simple interface management with integrated connectivity



## **Efficiency inside**

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



If sensor and interface work together perfectly in a system, it creates advantages for commissioning, machine monitoring and process optimization. Leuze makes it possible with the "integrated connectivity" concept.

### It's all in the sensor

Integrated connectivity means: All relevant industrial Ethernet interfaces are integrated in the sensor, making it possible to access the central device functions. It sounds simple, but is not standard on the market. Instead, manufacturers frequently offer devices without an industrial Ethernet interface to save development effort. In such cases, the interface is provided via a gateway. The reason why this is not the optimal solution and why integrated connectivity from Leuze provides system operators with multiple benefits is illustrated in the following examples. The advantages range from commissioning (device management) to machine monitoring (condition monitoring) to process optimization.

### Considerably leaner system layout

Leuze offers devices with integrated interfaces for PROFINET, Ethernet/IP and EtherCAT. The significant advantage that can already be gained during commissioning is demonstrated using an illustrative system design with and without integrated connectivity. First a system with bar code readers without integrated interfaces: here, every scanner must be connected to a separate gateway - this means an additional gateway with its own power supply for each bar code reader. As a result, the installation effort and the number of cables are double of what is required. The parameterization is also significantly more complex. And not to forget: Because of the gateways required, there are significantly more devices in the system that can cause a malfunction and have to be checked should this occur. In comparison, the same system with integrated connectivity: The industrial Ethernet interface is already integrated in every bar code reader. This means that separate gateways are superfluous. Most importantly, the system layout is significantly clearer and fewer cables are required. Last but not least, errors can be eliminated more quickly as fewer devices have to be checked.

### Switch included

Leuze sensors with integrated connectivity also have an additional feature that contributes to particularly efficient commissioning: the devices have a switch as standard, i.e. an Ethernet input port and output port each. As a result, system operators do not need an external switch. In addition, it is much easier to connect several devices. for example in a ring or linear topology. With linear wiring, the system operator connects one sensor to the next using the integrated switches. Only the last sensor in the row is connected to the control. Again, the benefits are the simplified system design and reduced number of cables. Devices without an integrated switch, however, require an external Ethernet switch. Users must also connect each individual sensor to the switch using a star topology and then connect this to the control.



The bar code readers from Leuze (here the BCL 300i) are equipped with "integrated connectivity".



The implementation of a linear topology for each integrated switch reduces the cabling requirements, saving time and money.

### The familiar control environment

Integrated connectivity also means that you can work in your usual control environment. This is possible because the entire device parametrization is integrated in the GSDML file ("Generic Station Description Markup Language") of PROFINET, for example. In contrast, many other Ethernet-based devices on the market generally have to be parametrized via a web server. This is complex, as every manufacturer supplies their own web server version with its own user interface. Users have to familiarize themselves with new interfaces every time and find the corresponding functions. And another issue: devices without Ethernet that are connected via a gateway frequently need product-specific manufacturer's software for parametrization. This in turn can cause problems regarding compatibility with the hardware used. For example, if the manufacturer no longer updates their software after a number of years. Here too, integrated connectivity has multiple advantages:

- Users stay in their usual control environment
- Installation of manufacturer's software and associated familiarization are not necessary
- Access to a web server is not required

Leuze devices with integrated connectivity are very easy to parametrize. The GSDML file only has to be downloaded from the Leuze website via the control and copied once into the company's own engineering software. The modules are then available in the hardware catalog. A meaningful description of the device functions is also included. This makes it very easy to parametrize and use a sensor and the manual is not required in most cases.

### Support from the sensor

A look at the device profile of sensors with integrated connectivity illustrates additional ways in which programming is made easier. As an example: for the AMS and BPS positioning sensors, Leuze not only supplies positioning values, but also a calculated speed value. Users who require this value in their system save time as they do not have to carry out their own calculations. What is more: without integrated connectivity, the control must be used to filter for specific bar codes. Leuze BCL bar code readers make this more efficient, as it is possible to prefilter according to specific criteria. Only codes which correspond to the required pattern are transferred to the control. The option to duplicate PROFINET devices in the engineering tool is also a time-saver. Users only have to specify the parameters once and can then copy the settings as needed. Integrated connectivity even helps when a device is exchanged: If a damaged sensor has to be replaced, the system automatically transfers all the parameters stored in the control to the new device. The sensor is ready for use straight away.

The Sensor People from Leuze provide support with the selection and implementation of the optimum sensor solution.



Integrated connectivity offers advantages during commissioning, processes can be optimized, making it possible to achieve optimum system operation.

### Keeping an eye on quality

Integrated connectivity not only provides support during commissioning, but also with machine monitoring, also called condition monitoring. For efficient operation, system operators need answers to guestions such as: is the system running without errors? When do I need to schedule maintenance? The answers are provided by the integrated interface. Via industrial Ethernet communication, it not only transmits the actual process values, but also diagnostic data which are available in the control. As a result, all identifying data can be read out via a bar code reader to manage the device. This includes the serial number or the software/hardware version of the sensor. Moreover, there are guite a number of diagnostic parameters, such as the number of OK and NOK readings. In particular, the system provides a quality marker for each individual code reading in a plant with bar code readers. This provides information on the quality of the readings. The value is generally between 90 and 95 percent and can be monitored to detect deviations during operation.

For example caused by contamination or mechanical damage. Remote monitoring can also be implemented as an additional communication channel via OPC UA. The control can be used for this purpose, but Leuze sensors provide a much more comfortable solution, as they can be accessed directly via the OPC UA. As a result, system operators can monitor their devices in parallel to the ongoing process. This gives them real-time information on the performance of the system. If required, these data can also be transferred to a cloud there are no restrictions whatsoever.

### Simple process optimization

How can processes be optimized on the basis of the collected data? This is demonstrated by two representative practical examples using bar code readers.

First example: The scanning window of the sensor can become contaminated. In some systems this does not happen for years, in others it occurs more quickly. Data evaluation via OPC UA can be used to quickly determine which sensor is contaminated. Using the data, a software program records the read quality of each individual decoding process. For bar code readers with impaired reading performance, it indicates that maintenance is required.

Second example: The label itself can also cause problems - for example if the code is damaged or printed incompletely. In this case, it is not enough to monitor an individual sensor to determine the error. Instead, the faulty label has to be traced along different measuring stations to identify it. This makes it possible to detect similar evaluations and use the identification number to determine the label involved.

### Summary: increased efficiency on three levels

Integrated connectivity offers advantages on several levels. It contributes to easier commissioning and provides additional information for machine monitoring. This information is particularly useful for process optimization, resulting in optimal system performance. All sensors developed by Leuze for fieldbus-controlled automation, for example in intralogistics, are equipped with integrated connectivity. This allows system operators to save time and money. The Sensor People from Leuze provide support with the selection and implementation of the optimum sensor solution.

## AutoID technology quo Vadis?

Oliver Pütz-Gerbig, Senior Marketing + Technology Expert AutoID Systems at Leuze



Automatic identification systems such as 1D/2D-code and RFID readers are tried-and-tested, indispensable technologies for controlling industrial production processes and logistics workflows in the supply chain. At the same time, Industry 4.0 and IIoT have put digitization at the focus of advancing automation. What demands will in future be placed on modern identification systems? Has the classic reader, which forwards a code via a serial interface to a control, become obsolete?



### The classic bar code

The classic bar code as an optical identification system was introduced in the 1970s. In the meantime, various types of bar code are now in use worldwide (e.g. GS1-128, Data Matrix, QR Code, Aztec Code). The bar code – e.g. in the form of a printed label – has its simple usability, its extremely low cost and complete global standardization to thank for its significance as the world's most important identification medium. The bar code has become our daily, almost unnoticed companion in our personal environment – but also, of course, in industrial applications.

### RFID

Radio frequency identification (RFID) operates in the radio frequency range and utilizes the electromagnetic interaction between mostly passive RFID data carriers (so-called tags) and an antenna generating the electromagnetic field. Initial practical applications came on the market at the end of the 1980s (e.g. the electronic vehicle immobilizer). The technology then became widespread in the early 2000s with the availability of new frequency ranges (HF and UHF) when contactless card systems were introduced and low-cost RFID labels, particularly in the retail market, opened up new possibilities for automated logistics processes.



Front-side container identification under extreme angles of inclination using the BCL 300i bar code reader from Leuze.

The advantages of RFID compared to the bar code are obvious: Unlike the bar code, RFID requires no direct line-of-sight between the data carrier and reader. And another often important point: Additional

### Advantages of RFID over the bar code

data can be stored on the RFID data carrier so that as well as an individual code (the so-called unique ID or electronic product code (EPC)), each object can also be assigned additional,

decentrally stored information about its properties, history or its current state. After many years of targeted technical development and with extensive experience in different industrial sectors and applications in practically all industrial production processes and in the supply chain, RFID has developed into an established and reliable identification technology. Its advantages over the bar code play out wherever the application conditions and the cost-benefit calculation allow the use of RFID.

### **RFID versus bar code?**

Today, both technologies live in peaceful coexistence, particularly in track-and-trace applications. For example in the automotive industry where production processes need to be continuously monitored while at the same time an eye must be kept on all material flows necessary for component supply. Linked to this are further state information about the condition of the machines and systems as well as the control of container loops and warehouse management. As "enabling technology", both laser-based or camera-based systems and RFID systems today make a major contribution to end-to-end automation and process tracking. And that's not all: They provide the basic data for a digital map of the production system, including all components involved and the logistics processes. At the same time, the evolution of classic production through to the "smart factory", logistics and "smart material flow", all of which was set in motion by Industry 4.0 and Industrial IoT, demands the adaptation of established AutoID systems to the enhanced requirements of digitally networked systems on the shop floor. The developments needed to achieve this extend to the functionality, communication capability and performance of AutoID systems.

### Functionality

An important step toward the optimization of AutoID systems is condition monitoring. This requires the integration of sensors in the AutoID devices. These sensors enable condition monitoring of the reader and deliver cyclical information on the device state, warn of irregularities in the quality of the acquisition process and allow prompt intervention or predictive maintenance of the system. The integration of external sensors in order to determine the current state at the same time as object identification and to link this to the object ID stored on the data carrier also provides a considerable benefit for the optimization of process transparency. Operating as an IO-Link master, an AutoID device can, for example, collect data from multiple IO-Link sensors installed at the reading location very easily and - either forward this data to a control system - or, with the appropriate hardware equipment, even preprocess it in the device itself using suitable software applications.

### **Communication skill**

The communication capability of AutoID systems is of key importance because it is responsible for digital data exchange both at control level and with higher-level administrative and planning systems. Typically, Ethernet-based fieldbus interfaces such as PROFINET or Ethernet/IP have long been used for the real-time capable control of processes. The necessity of combining process-related identification procedures with the monitoring of simultaneously determined operating and device states increases the demands on the communication interfaces of AutoID systems. In particular OPC UA as an open data exchange standard is now increasingly being used in the AutoID devices. The interlinking of devices within a network on the one hand and communication with control and IT systems on the other via so-called **OPC UA Companion Specifications is** possible irrespective of the manufacturer.

For AutoID systems in particular, the **OPC UA AutoID Companion Specification** that provides information models for the use of optical identification systems and RFID has existed since 2019. The ability of AutoID systems to act as OPC UA servers allows all systems involved in the process, e.g. machines, robots, industrial trucks and storage systems, to be integrated interoperably in a uniform production and intralogistics system based on OPC UA. The material flow is controlled dynamically and flexibly based on the order data from the production plan and the most recent process data that is obtained from the identification process (the "read events") and the simultaneously acquired operating states.

### Performance

As is generally known, the use of RFID systems in the UHF frequency range is subject to certain restrictions with respect to the frequency bands authorized in the regions and countries concerned. In this regard, especially incompatibility between EU rules and the regulations in the USA is an obstacle to cross-company use of RFID systems and therefore to complete networking and transparency of a supply chain. To eliminate this disadvantage, in 2018 the European Commission agreed to release a so-called "upper band" from 915 to 921 MHz in addition to the existing frequency band from 865 to 868 MHz. Besides the at least partial harmonization with the North American frequency range, the bandwidth of the transmission channels and the maximum permissible transmitting power were also improved allowing a significant increase in the usability of this technology, particularly in logistics processes. A small drawback: In Germany and a few other European countries, the implementing decision of the EU has so far not been acted on due to national restrictions. Nevertheless, a positive development can be seen across the EU with regard to the functional usability of RFID systems. With logistics processes in particular, large quantities of data often occur, e.g. if industrial trucks are used to transport goods and a pallet loaded with a large number of containers is detected as it passes through an RFID gate. These identification processes

are used to automatically capture and book material movements, and therefore to create complete transparency with regard to order status and material availability. In order to provide a goods management system with only the essential and usable data sets, the use of suitable middleware systems on external servers and IPCs which filter, aggregate and evaluate the often large quantities of raw data from the RFID readers and forward it as business events via IT-compatible interfaces and communication protocols, have proven effective for RFID applications. The hardware performance of AutoID devices has already increased to such an extent that middleware or other software applications can be installed directly in the device, thus enabling direct communication with facility control systems as well as cloud communication e.g. via OPC UA or other network protocols such as MQTT.

> "A positive development can be seen across the EU with regard to the functional usability of RFID systems."

# The future of intralogistics – quiet and unnoticeable





The future of intralogistics is quiet and virtually unnoticeable. Automated guided vehicles glide across the factory floor, loading docking stations with the utmost precision – and this happens almost silently. If it wasn't for the noise of the machines working, you'd be able to hear the hearts of intralogistics providers beat faster with

joy. The good news is that this kind of efficient production, in which people, machinery, floor conveyors and storage systems are combined into a unified intralogistics system, is no longer just a vision. It is already possible today – TRUMPF offers its customers this solution under the term "smart material flow". And the sensor expert Leuze is also on board: Its sensors help with presence detection, data acquisition and safety.

### High-tech from the technology leader

TRUMPF has made a name for itself: With a turnover of around 4.2 billion euro (2021/22), the high-tech company based in Ditzingen (Germany) offers its customers production solutions for machine tools and laser technology. TRUMPF has approx. 16,500 employees at more then 70 locations around the world. The company supports its customers not only with individual machines but, if desired, elevates the entire intralogistics system of manufacturing enterprises to a whole new level. And this pays off for TRUMPF customers: Non-value-adding activities - such as searching for materials, transporting sheet metal parts or administrative order booking activities - account for up to 40 percent of resources in a conventional manufacturing operation. Manuel Schwestka knows that smart material flow makes things much better. The Software & Automation product manager at TRUMPF is an expert in intelligent automation solutions: "With our approach, all machines, processes, interfaces and above all people play a role. We bring everything into harmony." A digital depiction of the production plant, including all components and storage locations forms the foundation. Based on this, the entire production process can be systematically planned and controlled. Anyone wanting to get an impression of this kind of smart

material flow should visit one of the 15 TRUMPF Customer Centers dotted around the world. For example at the headquarters in Ditzingen. Since 1987, the company has presented the entire process chain for sheet metal plate there based on its current product range – from individual machine tools to fully automatic production solutions. Machines involving different technologies are demonstrated to customers. Time and feasibility studies as well as the production of sample parts also belong to the core activities of the team.



The high-tech company TRUMPF based in Ditzingen offers its customers manufacturing solutions for machine tools and laser technology.



Modern sheet metal processing line in the Customer Center; a TruBend Center 7030, a fully automatic swing bending system, is shown in the foreground.

### Reaching the docking station reliably and without error

The process chain for sheet metal plates essentially consists of the following steps: e.g. punching, cutting, bending and welding. For each of these steps, TRUMPF offers the appropriate devices: e.g. 2D laser cutters, swing bending and punching machines as well as laser welding systems. Docking stations are the element that connects all workplaces. They are a key part of a smart intralogistics system: "A docking station can best be described as a 'material depot' for workplaces and machine tools," says Manuel Schwestka. "It is therefore the place where, in combination with the TRUMPF software Oseon, all material movements between the workplaces can be automatically captured and registered. Furthermore, the docking station also serves as a safe and defined handover location for automated guided vehicles (AGV)." These vehicles deliver pallets with or without material to the docking stations assigned to them. To ensure that handovers takes place automatically and efficiently, appropriate sensor solutions are needed. During the design phase, the Sensor People from Leuze provided assistance in an advisory capacity: In the area of intralogistics, Leuze has profound application know-how and extensive experience with innovative and reliable sensor solutions for use in automated environments. Based on the requirements of the customer, all docking stations at the Customer Center in Ditzingen were equipped with sensors along the sheet metal process chain.



Docking station: Roller carriages for pallets can be deposited here. Depending on the order, AGVs collect the pallets or load new pallets onto the roller carriages parked in the docking station.

### Automatic replenishment

The processes at a docking station are as follows: An AGV - or alternatively a manually operated high-lift truck - loads a station with an empty or full pallet. The pallet is in turn placed on a roller carriage which the employees can pull out of the docking station to e.g. their workplace or machine tool closeby. In this way, workplaces can be conveniently supplied with the necessary parts. Employees do not have to walk far to get more of the parts they need. A major advantage is the digital depiction of the processes: Each docking station registers material movements automatically when depositing or removing a pallet. These movements are fed into the Oseon's transport control system using the OPC UA data exchange standard. The docking station is therefore a source of information for incoming and outgoing material movements and also a temporary storage location in the immediate vicinity of various workplaces.

### Everything captured by sensor

Leuze sensors are used for operation of the docking station as well as for transmitting data to the system. A docking station usually has three sensors: A HT5.1/4X sensor is installed at the bottom of the station. It detects the presence of a carriage. A further sensor of this type is at the top of the docking station. Its task is to register the presence of pallets. If a pallet is detected, the HT5.1/4X starts identification of the pallet via a further sensor. A DCR202iC is installed for this purpose: The scanner captures order and material data via the 2D-code on the pallet and transmits the data to the transport control system. Based on the information from the docking stations, the Oseon software notifies the shopfloor employees exactly when and where which order is to be retrieved or temporarily stored or whether it is to be transported to a specific workplace. To do so, the system orients itself to existing order data from the production plan. From this, the TRUMPF software Oseon automatically generates transport processes from A to B and forwards them to employees or AGVs. Together with the associated docking stations at the workplaces, this results in a truly smart material flow.



Docking station with cover. Through the two windows, the Leuze sensors reliably detect the presence of a pallet and the printed 2D-code.



With the column cover removed, a HT5.1/4X for presence detection of the pallet can be seen installed on the left. The DCR 202iC camerabased code reader (center) captures order and material data via the 2D-code on the pallet. The signal light on the right indicates the current status by means of a color signal.

### Automated, yet flexible

For intralogistics, this interaction between sensor technology and software brings with it considerable benefits, explains Mario Mörk, Software and Process Solutions group manager at TRUMPF: "Thanks to the sensor system of the docking stations, we always know whether there is still space at the material depot of the next workstation. If there is, the Oseon production planning software sees to it that the next load of appropriate material is brought to the workstation or a transport order is generated. The order is then passed on to a person with a tablet or to an AGV and processed following a dynamic sequence." The order in which tasks are completed depends on e.g. the priority of the customer orders. Thanks to the Leuze sensors, pallets are booked or registered at the workplace automatically - this saves time. In addition, a certain degree of flexibility is ensured because employees can, if required, also be inserted into the process using the system. This may be necessary if, for example, a company manufactures products in several, physically separated buildings. In this case, the AGV transports material as far as the boundary of the building and a person then transfers this material across the outer periphery between the buildings. Urgent orders too can be inserted into the workflow at any time by the responsible employees.



An AGV going about its business – the automated guided vehicle loading a docking station with material.

### Sensors as the key to automation

"The installed Leuze sensors are, as it were, the backbone of this intelligent intralogistics solution," says Jörg Beintner, key account manager for machine tools at Leuze. Here each sensor displays its strength. The HT5.1/4X for detecting the presence of carriages and pallets is an LED diffuse sensor with background suppression - it detects objects reliably while simultaneously suppressing the background. The operating range can be set intuitively using a spindle. For TRUMPF, the HT5.1/4X was the ideal choice. Leuze also offers other models of the sensor, tailored to the requirements and application of the customer. The diffuse sensor with background suppression is, for example, also available with a laser or as a sensor version for detecting particularly small objects. There are also sensors with extra large or small light spots or optimized for high-gloss and polished surfaces. "As the second key component for TRUMPF's intralogistics solution, we opted for our DCR 202iC stationary 2D-code reader," explains Beintner. The Leuze sensor captures 1D and 2D-codes extremely reliably. At the Customer Center, TRUMPF attached the 2D-codes on two sides of each pallet - at diagonally opposed positions. As a result, it doesn't matter which side of the pallet is pushed into the docking station first. In this way, the code can always be captured by just one sensor. The DCR 202iC camera-based code reader is ideal here: It reads codes which, depending on the type, are printed or directly marked, even omnidirectional. The Sensor People from Leuze offer various versions with respect to size, protection classes IP 67 or 69K, speed and interfaces. By the way, the Leuze sensors used for detection are not the only Leuze products used by TRUMPF at Ditzingen: Safety light curtains are installed at the material locks to the sheet metal processing machines. They reliably prevent persons entering the hazardous area. Here too, Leuze provided extensive support during design and implementation. And further joint projects are already in the pipeline.



A multiple light beam safety device of the MLD 500 series safeguards access to the hazardous area. Furthermore, Leuze sensors for presence detection of the pallets as well as for order and material data acquisition are also installed.



The supply of material to automated machine tools is also supported by Leuze sensor technology.

### Summary: Simply smart

TRUMPF is completely satisfied with the high-performance and reliable Leuze sensor solutions. The sensors detect roller carriages and pallets and identify orders and materials fully automatically by means of 2D-codes. The case example from the Customer Center in Ditzingen shows that anyone wishing to elevate their production to a new, intelligent level can do so easily and conveniently with smart material flow. This applies both to small, handwork-based manufacturing operations and to smart factories. And it has tangible benefits: TRUMPF expects that its smart intralogistics solution will result in a time-saving of up to 25 percent with respect to production throughput times. Leuze sensor technology contributes to the reliable, safe and efficient implementation of a fully networked material flow.

## What's up ahead?

From your company's perspective, how do you judge the economical situation overall and that of your industry in particular – and what conclusions do you draw from this for your strategic decisions?

Leuze has grown strongly in recent years. Owing to supply chain issues, the industry had extremely long delivery times in the last months. This has led to our customers submitting exceptionally large order quantities and carrying out longer-term material planning than usual. Delivery times are currently returning to normal. This also has an effect on our order backlog and order volumes. Nevertheless, we are still keeping to our ambitious growth targets in the area of automation technology and as before we see a great deal of potential for growth in our key industries of intralogistics, the packaging industry, machine tools, the automotive industry and laboratory automation.

What, in your view, are currently the most pressing challenges of your customers – and what particular demands do they place on you as their partner, supplier or service provider?

Our customers live in a complex world. Their prime concern is the productivity and cost effectiveness of their processes. At the same time, however, they are confronted with growing demands with respect to safety at work. This is why we focus on providing our customers with safety solutions that offer the current state of the art in terms of safety and, at the same time, do not reduce productivity but, at best, actually increase it. We attach fundamental importance to ensuring that these solutions are easy to implement and operate for our customers.

New products, solutions, services: At present, what are you working on most intensively? And what news and innovations can we soon expect from your company?

Essentially, we require our products and solutions to be safe, productive and simple. Two examples: We recently brought the ELC 100, a new light curtain, onto the market. It sets new standards owing to its fast and intuitive commissioning. Another example: Our new, patented safety solution, which enables fully automated access monitoring at material transfer stations. Our safety engineers adapt this solution to the individual needs of the customer and commission it on site on the customer's premises. Furthermore, we also offer our customers services such as a risk assessment.



Dr. Albrecht v. Pfeil Director Business Area Safety at Leuze

Access guarding with dynamic format adaptation

## Stay flexible safely

Matthias Bristle, Product Manager Safety Solutions at Leuze

Different material widths, varying material positions or partially loaded pallets pose special challenges for access guarding on conveyor lines. For this, Leuze relies on the concept of dynamic format adaptation: Productivity and safety.





### Variation becomes a safety risk

Access monitoring on conveyor lines can be implemented with classic tried and tested safety concepts if the dimensions of the goods remain constant. These are mostly based on muting functions for automatic temporary bridging of the safety function. However, the area of application of the access guarding with muting function is limited. If the width or position of the goods on the pallet or the position of the pallet on the conveyor varies, unmonitored safety gaps directly next to the goods can emerge. A person would then be able to access the danger zone. However, these gaps can be reliably closed with a safety solution tailored to them. The Leuze safety solution with dynamic format adaptation provides the right concept for this purpose.

### Just triggering is not enough

A look at three examples of real-world situations illustrates the challenges of access guarding. All three examples have the following initial situation: Pallets are automatically conveyed into or out of a danger zone using a conveyor line.

When muting is used, the goods would activate the associated muting sensors in all these cases. The protective function is then bypassed by the muting function. However, it is not always possible to comply with the specified normative framework conditions for lateral safety distances (< 200 mm).



The space next to the goods on the conveyor is larger than 200 mm.



The goods have different widths and/or the pallets are occasionally only partially loaded, resulting in open spaces greater than 200 mm next to the goods.



The position of the goods on the conveyor itself varies, which also results in large gaps next to the goods. The reason could be due to offset pallet positions on the conveyor or a missing pallet centering device depending on the application.

### Measurement sensors and laser scanners cleverly combined

The Sensor People from Leuze offer a safety solution that closes these safety gaps: Access guarding with dynamic format adaptation. For this, Leuze relies on a combination of safety sensors, measuring distance sensors and the associated safety program. The operating principle can be easily illustrated using the application described above. Two RSL 400 safety laser scanners are installed in the safety solution in front of the danger zone to safeguard the entry/exit point. Together they create a vertical protective field. The safety laser scanners are extremely compact and powerful at the same time. Their high operating range of 8.25 meters makes it possible to monitor even extensive entry/exit points. Other important components of the safety solution from Leuze are two optical distance sensors. These are located in front of the protective field of the safety laser scanners on both sides next to the conveyor line. The distance sensors determine the width of the goods and thus also indirectly their position on the conveyor line.

Based on the information from the distance sensors, the safety system releases a "clearance window" in the protective field corresponding to the width of the goods. After the goods have completely passed through the opened window, the protective field is reset by the system to its original closed state. If goods are not only to be fed in but also discharged at one location, the system can be easily expanded. For this purpose, only two additional distance sensors are required, which are installed behind the protective field - i.e. within the danger zone. Thus, the safety system works identically in both conveying directions.



Two RSL 400 safety laser scanners produce a vertical protective field.

The entire process sequence, from distance measurement, protective field opening to resetting, is monitor. ed in terms of safety by the solution's safety program. All necessary configurations and parameters are individually adapted by Leuze to the needs of its customers.

Another issue for these applications is how the safety system behaves in the event of a deliberate bypass attempt by travelling on the goods. A function extension is also available for this scenario. However, further risk minimization using this additional protective measure is often not necessary, or the risk is already sufficiently minimized by existing protective measures. Here it is worthwhile to conduct an evaluation by means of an application-specific risk assessment. This could be conducted by the safety experts from Leuze, for example.

### Overcoming the limitations of muting

The Leuze safety solution for dynamic format adaptation overcomes the limitations of conventional muting concepts. Material width and material position on the conveyor can vary without compromising on safety. The safety solution reliably detects people walking sideways next to the goods, as well as people walking ahead or behind. In this way, operators and manufacturers prevent dangerous situations while having the highest level of flexibility. Productivity is also increased - as no further protective measures are required, the process in the danger zone can continue to run uninterrupted during the material transfer. Last but not least, this safety solution is easy to retrofit and provides optimum protection against deliberate or unintentional bypassing.

### The way to a solution

As a reliable partner, Leuze is at your side in all project phases - from the coordination of requirements at the start of the project, through implementation, documentation and commissioning support, to final application validation and including legal security through CE conformity. This makes safety-related challenges particularly easy to implement for operating companies and manufacturers.

## When apples go swimming



Martina Schili, Corporate Communications Manager at Leuze

By the time an apple reaches the supermarket and the consumer, it has already been through many different processes: It has been picked, checked, stored, sorted and packaged. Few companies are as familiar with these processes as BayWa Obst GmbH & Co. KG. The company's main location for the sorting and packaging of pome fruit is located in Kressbronn am Bodensee. BayWa has had premises there since 1967. A glimpse behind the scenes is exciting for apple fans, but also from a production-related point of view because Leuze sensor technology is used at multiple points to enable the processes to function safely and efficiently.

### Space for 14,000 tons

The BayWa fruit wholesale plant in Kressbronn is surrounded by fruit plantations: Around 1,200 businesses grow juicy apples, pears, strawberries, plums and many other types of fruit on the German side of Lake Constance. The region is ideal for this, thanks to its mild climate and many hours of sunshine. With around 8,000 ha of fruit-growing land, the Lake Constance region is the second biggest fruit-growing region in Germany. "The apple harvest begins already in August with the early varieties, and it lasts until the end of October," says Dr. Markus Bestfleisch, Location Manager. With around 30 apple varieties supplied, there is something for everyone. The process begins with storing the apples: Once the fruit growers have delivered their apples in bins of 300 kg each, the apples are first checked for their quality characteristics. If they are suitable for long-term storage, they are placed in a CA warehouse. The conditions are cool because CA stands for "controlled atmosphere": The temperature is kept constant, at between one and three degrees Celsius depending on the variety. In addition, the oxygen level is kept below two percent. "In this way, the apples are effectively put into a type of hibernation and we slow down afterripening and aging," explains Dr. Bestfleisch. In Kressbronn, BayWa Obst has plenty of space for produce: There are 40 warehouses, each of which holds around 350 tons - that's easily 1,000 bins. The warehouses are opened one by one as the months go by, and the fruit is then sorted and packaged. In this way, BayWa is able to continually supply its customers with many different varieties until the end of July the following year - then, it's time for the next harvest.

### Sorted according to customer requirements

Once a CA warehouse has been opened, the apples are transported in bins to the sorting area by high-lift truck. This area is the heart of the Kressbronn location. The current system was built in 2004, subsequently modernized and extended. After being emptied from the bin, the apples spend part of the subsequent process in water – this is a protective and practical way of transporting them. While the empty bins are automatically cleaned, the apples swim to the tenlane sorting unit. Upon arrival, the fruit is separated out onto conveyors and each apple ends up in a type of tray in which it travels through the system. The complex camera technology in the sorting unit takes up to 60 images per apple within fractions of a second. Using the images, the software sorts the fruit fully



View of the sorting system: The heart of the plant.



After the quality characteristics are checked in the sorting machine, the apples are transported in tray chains along a total of 50 water-filled channels and are deposited in the channel for the corresponding sorting criteria. Image source: BayWa

automatically. "We sort the fruit based on criteria such as the proportion of the apple skin color, size, weight and the internal quality," says Dr. Bestfleisch. "We can tailor the sorting criteria to the customer's requirements." The system processes up to 20 tons per hour. Next, the apples continue in the tray chain to a total of 50 water-filled channels. For each apple, the control system now opens the transport tray directly above the channel that is assigned to the respective sorting criteria. As a result, apples with a specific proportion of red skin color and a certain weight all land in one channel, for example. No produce is wasted: Fruit that is not suitable to be sold fresh goes to the processing industry and is turned into apple slices, apple sauce or apple juice.



In the transfer area, it is essential that processes are safe – people must not be able to enter the danger zone unnoticed. Access guarding solutions from Leuze are installed above the stations. A transverse transfer car (Binmatic, front right) picks up the bins containing the sorted apples and stacks them on the opposite side to be collected by the high-lift truck drivers.

### Safety matters at the transfer station

After being sorted, the apples are put back into bins and are ready to be transported again – this time to the packaging area. For this purpose, the bins are picked up by an autonomous bin stacker, which is a railbound transverse transfer car similar to a forklift truck. The autonomous vehicle distributes the bins containing the sorted produce between 34 transfer stations with corresponding bin spaces. Up to four bins containing sorted apples are stacked on top of one another in each case. High-lift truck drivers then transport these stacks to the packaging area or back into the warehouse. At the transfer station, the knowhow of the safety experts from Leuze comes into play: To prevent people getting injured by the bin stacker, a gapless safety device was requested. "It was important to us to have a reliable solution that provides maximum safety at the transfer station without interfering with the operations," says Markus Bestfleisch. The safety solution from Leuze achieves precisely that. After an initial inspection, the experts from Leuze developed a safety concept for this application that enables bins to be transferred through a vertical protective field and can differentiate between people and forklift trucks. In this way, Leuze ensures two safety functions at once:

- The bin high-lift truck is stopped as soon as a person enters the danger zone
- Only forklift trucks have interruption-free release of access to the danger zone

### Made-to-measure protective field release

"The multi-station access guarding at BayWa Obst in Kressbronn is based on sequence- and time-monitored protective field adjustment that fits the zone precisely," says Matthias Bristle, Product Manager Safety Solutions at Leuze. Thanks to the intelligent and scalable safety concept, the project could be implemented with an efficient use of resources and just a few safety components. This is because just one RSL 400 safety laser scanner from Leuze was installed for every two transfer stations. Thanks to its high operating range of up to 8.25 meters and the parallel operation of different protective fields, the RSL 400 can monitor both transfer stations simultaneously. In addition, an ultrasonic sensor and a radar sensor are mounted on each station. All sensors are installed above the transfer stations. This allows optimal use of the space underneath without barriers. A programmable safety control with the safety program developed by Leuze ensures that the individual components interact correctly.



An RSL 400 safety laser scanner from Leuze (center) generates a protective field that covers two transfer stations at the same time. In addition, an ultrasonic sensor and a radar sensor are mounted on each station (to the left/right of the scanner). An illuminated indicator serves as a status display for each station.

### Interruption-free working

Matthias Bristle explains the operating principle: "A laser scanner generates an adjustable protective field in front of two transfer stations. The additional ultrasonic and radar sensors detect when a forklift truck drives forwards into one of the stations. Only under these circumstances does a defined area in the protective field of the laser scanner open for the forklift truck." The forklift truck can then collect boxes from this station. "Another advantage for productivity is that the bin high-lift truck can continue working in the background even while the bins are being taken

away," says Markus Bestfleisch. This is because, during this process, all the other stations remain safeguarded by their own laser scanner protective fields, which are still active. Once the high-lift truck leaves the released area in the protective field, the protective field is automatically reset to its default setting. The area is safeguarded again. The system reliably differentiates between forklift trucks and people: Evading detection by entering alongside a forklift truck while it is collecting bins is almost impossible. If someone enters the danger zone, the system registers it immediately. The bin stacker is then stopped and a warning signal sounds. A clearly visible illuminated display is also installed above each station. It shows the status of the respective transfer station: Green when an area in the protective field is released and the high-lift truck can enter; red when the protective field is closed.

### Dynamic material flow control

Once the high-lift truck drivers have delivered the sorted fruit to the packaging area, the next step is to get the produce ready for sale. According to Markus Bestfleisch, every packaging need is met: "Our customers can choose from over 200 different packaging types." For example, apples can be packaged in foodtainers, bags, nets or boxes, or as loose products. Across 14 packaging lines, the fruit is arranged and packaged entirely based on customer requirements. Up to 80 employees work in the packaging area in the peak season. Here too, sensors from Leuze monitor everything closely: PRK retro-reflective photoelectric sensors installed on the conveyor sections detect the transported produce, such as cardboard trays, each holding four or six apples. These sensors make it possible to optimally control the conveyor speed.



Sensor technology from Leuze is also installed in the packaging area. PRK optical sensors installed on the conveyor sections detect the transported goods. As a result, the conveyor speed can be optimally automatically controlled.

### Safety right to the curb

The final selling units made up of small packages and outer packaging are loaded onto pallets and transported to the shipping area. To ensure that this process is also free from danger, MLD 500 multiple light beam safety devices from Leuze safeguard the transfer station against people accessing the area when this is not wanted. Three-beam versions with separate transmitter and receiver including muting function were installed at BayWa Obst. "Through muting, we temporarily bridge the safety sensor and enable the transported goods to pass through," explains Matthias Bristle. Once the packaged fruit has passed the access guarding solution, an automatic transport system takes the pallets to the binding unit and then to the shipping area. From there, they are loaded onto the freight truck and delivered to the commercial recipient: Each day, 20 to 30 trucks leave the yard of BayWa Obst in Kressbronn carrying fruit.

### Safety solution also ideal for retrofitting

The innovative multi-station access guarding of the Sensor People from Leuze has already proven effective for BayWa Obst. It separates the transport and the transfer area in a way that is both elegant and particularly reliable. With this safety solution, BayWa Obst is at the cutting edge of safety technology. It is suitable for retrofitting existing systems as well as for new systems. An additional benefit: If other transfer stations are ever added, the Leuze system can also be expanded. The Sensor People from Leuze offer this concept as a safety solution in a complete package. For Location Manager Markus Bestfleisch, it was a successful collaboration: "We are fully satisfied with the safety solution and all-round service from Leuze: The sensor experts have supported us optimally, from the hazard assessment and the target/actual analysis right through to the implementation with start-up support and validation of the application."



The final selling units are loaded onto pallets and transported to the shipping area. Here, MLD 500 multiple light beam safety devices from Leuze safeguard the transfer station against people accessing the area when this is not wanted. Via muting, the safety sensor is bridged in a controlled manner so that the transported goods can pass through.

Safeguarding of transfer stations between robot and AGV

## Dynamic interactions made safe



Matthias Bristle, Product Manager Safety Solutions at Leuze

During automated material transfer between robot cell and automated guided vehicle, people must not stray into the danger zone unnoticed. An innovative solution by Leuze secures the transfer stations by means of dynamic protective field adjustment. This makes additional safety measures such as barriers and fences unnecessary.

### **Risk-free full automation**

In smart factories, the flow of goods is fully automated. This means that production materials are made available in prepared containers on staging areas, also known as supermarkets. Digital notifications that materials are needed are sent directly from the production area. Automated guided vehicles (AGVs) are used to supply the robot cells with the required parts and to collect the processed components. The automated processes at these transfer stations, where AGVs interact with robot cells, must be designed so as to be both risk-free and efficient. This can be realized only with reliable safety solutions: AGVs traverse the danger zones without the robot cells interrupting their work, and people must not enter these areas unnoticed at any time. And so the Sensor People at Leuze have developed an innovative safety concept that is tailored to such transfer stations in smart production environments. The approach is based on dynamic protective field adjustment around the AGV during the transfer of materials. Automated material transfer between AGV and robot requires comprehensive consideration of the safety functions at the transfer stations. This encompasses the entry of the AGV into the station, the reaching of the transfer position, and the exiting of the station. The AGVs themselves are secured by means of their built-in sensors—through safety laser scanners for instance. And the robot cells are equipped with sensors that recognize whether a person is approaching the hazardous work area. But for automated material transfer between AGV and robot, the different control units of the systems involved in the process (robot cell, AGV, and material flow control) must be able to communicate with each other. Moreover, they must be coordinated in such a way as to guarantee safety and reliability throughout the entire cycle. This can be realized only through close coordination between the various departments involved. In addition to (factory) planners, logistics managers, and occupational health and safety officers, the IT department also makes a substantial contribution to success in this phase.

### Requirements for fully automated transfers

Traditional approaches often work with light curtains to secure access to the transfer area between AGV and robot cell. Although this is technically feasible, it has limited capabilities: The presence of people inside the transfer area cannot be automatically monitored. To keep people out of the danger zone, these classical concepts require further safety precautions—such as mechanical separators like fences and barriers. A fully automated, secure transfer between AGVs and robot cells without physical barriers is a more efficient solution. However, the system must be able to reliably distinguish people and AGVs. For this approach, the following conditions must be in place:

- The danger zone of the AGV transfer station must be secured during the entire process.
- Defined AGVs should be able to travel through and exit the work area axially (optional: radially also) in a fully automated manner.
- Persons or other deviations from the defined AGV contour must be recognized at all times, triggering a secure stop signal.

The safety program adjusts the protective field of the safety laser scanner dynamically around the moving AGV. In this way, it can automatically be moved in and out of the station.

At the same time, the entire area of the transfer station is monitored seamlessly for access and the presence of persons. This means that the station is perfectly safe at all times.

### AGV surrounded by protective fields

The solution developed by Leuze for safeguarding robot/AGV transfer stations guarantees two safety functions:

- Stopping the dangerous movement of the robot cell
- Dynamic adjustment of protective fields around the AGV

To secure the entire area of the transfer station, Leuze utilizes safety laser scanners. These scanners use protective fields to detect the entry and presence of persons in the transfer area. When this happens, the system triggers a stop signal. In a parallel process, the position of the AGV in the monitored zone is recognized at all times. So that the AGV itself does not trigger a stop signal, the safety program masks out its contour from the secured zone. The protective field thus adjusts dynamically around the moving AGV. To this end, the laser scanners incrementally shift their preconfigured protective fields. This allows the AGV "enclosed" by protective fields to automatically travel into the station, transfer the material at the parking position, and then exit the station again. The safety level is maintained during the entire cycle. This has the advantage that the rest of the environment is covered at all times by the remaining protective field-offering all-round protection. As a principle, only the AGV contours defined in the system in advance are capable of crossing the protective field. In order to detect tampering or scanner misalignment, Leuze uses the spirit level function built into the device as well as additional external reference contours.



### Axial or radial entry possible

Only a few components are needed for Leuze's safety solution, including two RSL 400 safety laser scanners, which are noted for their excellent performance, robustness, and easiness to handle. With their high operating range of 8.25 meters, they are able to monitor even large areas. The solution is rounded off by a safety program from Leuze and by the Siemens SIMATIC S7 system control. Optimal positioning of the RSL 400 laser scanner in the application depends on various factors. To be taken into account are:

- Application layout and potential shadowing due to the design
- AGV specifications (such as dimensions)
- Entry and exit positions of the AGV into/from the protective field
- Transportation paths and speed of the AGV in the protective field (axial and/or radial)

Depending on the above, a diagonal or linear positioning of the laser scanners around the protective field may be preferable. In special cases (e.g., involving corner layouts with shadowing from the building or cell structure), the system can also be operated with more than two laser scanners.

### Easy to implement

For this smart type of safeguarding, only a handful of requirements must be met, such as the minimum width of the AGV and the maximum travel speed in the protective field. In addition, the route accuracy of the AGV should be around 50 millimeters. Furthermore, there must be sufficient space available in front of the danger zone in order

- to be able to maneuver the AGV in the space and
- to be able to implement a sufficiently large scanner protective field (required minimum distance to hazards from all access sides).

To initiate an entry or crossing of the AGV, the material flow control's AGV guidance system must report its route in advance to the safety solution. Depending on the risk assessment for the application, it can be necessary in the case of a protective field violation to stop the AGV in addition to stopping the robot cell. This presupposes secure communication between the cell and the AGV.

### Flexibility with transport material

With this concept for securing robot/AGV transfer stations, system operators receive a cost-efficient solution that offers fully comprehensive safety throughout the entire cycle. It fulfills Performance Level d according to ISO 13849-1 and SILCL 2 according to IEC 62061. This means that accident risks can be reliably minimized. The safety solution from Leuze works autonomously after the AGV has been registered through the AGV guidance system. And it offers maximum flexibility, with no restrictions during part transfer. The safety system and the protective fields work based on the contour of the AGV and not on the material being transported on it. Even parts sticking out the front or the sides are transported reliably. Furthermore, the integration makes mechanical safeguards such as fences and barriers superfluous. This saves valuable space in production.

> Radial AGV entry points are also possible in cases where material transfer is to take place within the cell.

### From risk assessment to results

Any business that wants to implement this concept for its automated system needs an experienced partner at its side. It is important here that the entire process is accompanied by the provider of the safety system. In this way, a customized solution can be devised and implemented. The first step is risk assessment: the dangers (e.g., in the robot zone) must be clearly defined. It must also be known how quickly the robot cell stops. On this basis, the size of the protective field and the timing of actions can be defined. The Sensor People from Leuze are the right contact partner for these steps. They assess the situation on site, determine the requirements, and develop a safety concept. After installation of the components, Leuze provides support with the corresponding documentation and with sensor parameterization and commissioning. The service offer also includes a final validation of the application. And last but not least, CE conformity provides legal certainty. This allows businesses to reap the benefits of innovative material logistics systems without compromise.



## New standard in terms of compactness

Our AMS 100i is one of the smallest laser positioning systems available on the market. This makes it the perfect solution for tight installations spaces.





Whether on the stacker crane, automated guided vehicle, or lifting system: In automated intralogistics, the sensors used for positioning applications must be able to operate on a small footprint in many cases. Our new AMS 100i is up to the task without sacrificing performance. With its small dimensions of  $105 \times 68 \times 75$  mm, it is one of the most compact laser positioning systems on the market. The sensor works with very high accuracy: With our AMS 100i, users are able to position with millimeter accuracy for up to 120 meters! To ensure slippage-free positioning, an absolute value encoder is needed.

### Positioning right up to the sensor

We have developed the AMS 100i with a minimum blind zone of only 100 mm. This enables positioning applications right up to the sensor. The available space is used efficiently. Useful: Modular assembly options and easy alignment facilitate flexible and quick installation.

### Reliable in heat and icy cold

The modular laser positioning system is also available in the AMS 300i version. This device model offers an operating range of up to 300 meters. Both variants meet the high requirements of degree of protection IP65. Optionally, the AMS 100i and the AMS 300i are also available with integrated device and window heating. With this variant, the sensors can be used for low-temperature applications down to -30°C (without heating down to -5°C). In hot ambient conditions, our AMS 100i is designed for temperatures of up to +60°C.



Versatile: The AMS 100i is able to determine the position of a stacker crane by detecting the distance between the vehicle and the end of the aisle. The aisle in the high-bay warehouse can be up to 120 meters long.



The AMS 100i can also be used to determine the height of the extendable forks of an automated guided vehicle. Compared to mechanical distance sensors, the optical system does not wear out. The sensor also only measures the actual distance to the relevant target.



## Sensor technology for the future of retail

The distribution logistics in food retail are changing: To overcome the challenges posed by online retail, more and more retailers are using micro-fulfillment centers (MFCs), meaning that orders are picked in proximity to the customer. The sensor technology needed for the order picking must meet certain requirements. Leuze offers tailored solutions for this application.



### More online in the future

Ordering food online is still unusual in Europe, where the market share of online supermarkets is currently 2.5 percent, according to market research company IDG Europe. In the United States, the share is 3.4 percent, while in the Asia-Pacific region it is already 7.5 percent. The trend is growing: Experts predict that customers will be doing around 20 percent of their supermarket shopping online by 2030. This is due, on the one hand, to the fact that there is, in Germany as well, an increasing number of food retailers who offer a combination of online shop and delivery service and, thus, compete with stationary retailers. On the other hand, it is due to the growing influence that megatrends such as digitization have on commerce and society.

### Fresh merchandise with just a click

Retailers who wish to remain competitive must respond to these trends sooner or later. Those that allow customers to buy products – including fresh food – online, face certain challenges:

- Short delivery times: System gastronomy and delivery services set the benchmark for this and in some cases offer delivery within the hour.
- Direct delivery from the warehouse to the customer: Delivery routes to the customer must be direct, short and efficient to keep merchandise fresh and transport costs low.
- Reduction of personnel costs: Routine processes involved in orders must be automated because manual processing is not cost effective.
- High availability: The desired merchandise should always be available in the online shop. Otherwise, customers will soon take their business elsewhere, as competitors are only a click away.

### Highly flexible warehouse

To meet these requirements, suppliers must control their supply chains and orders must be picked in proximity to the customer. A solution to these challenges are micro-fulfillment centers (MFCs) - highly flexible, automated order picking warehouses only a short distance from the customer. Ideally, they should be located in the same building as the supermarket. This makes it possible to incorporate them into a hybrid model and thereby combine the advantages of an online shop and a supermarket: The MFC area or "black store" can be found in the rear part of the building. Here, the merchandise is stored and, as necessary, made available for the delivery service fully automatically. The front part of the building remains a conventional supermarket for on-site purchasing. Furthermore, there is the option for customers to order merchandise online and collect it themselves. Employees pick the merchandise and give it to the customer at a collection point. The warehouse responsible for the supermarket supplies the supermarket as well as the MFC as an additional warehouse.



The hybrid model: MFC and retail space with pickup station in one building.

### Tailored sensor technology for areas with different requirements

Special sensor technology is required to ensure that MFC operation is efficient and automated. The key tasks carried out in such logistics centers are identification, detection and guarding. The sensors used must be very compact because the use of space in MFCs is planned extremely efficiently. In addition, an MFC is divided into various areas that place different requirements on the sensor technology: Fresh and deep-freeze area, standard area, order picking area, receiving area and shipping area.

### Fresh and deep-freeze area: Detection using photoelectric sensors

In this area, detection is the main task. This requires sensor technology that is not sensitive to low temperatures or condensation – for example, when the warehouse shuttle moves from the deep-freeze area into the standard area or to the order picking area. For this application, Leuze offers small, powerful optical series such as the 3C and 25C series. This technology functions even in the deep-freeze area and with fast movements. For simple applications, cost-optimized series such as the 5 and 23 series are also suitable.



Small, fast and powerful optical series such as the 3C and 25C series function even in the deep-freeze area and with fast movements.

### Standard area: Identification using bar code readers

Compact scanners with a relatively short range can be used to identify merchandise containers. Ideally, these scanners should be mounted directly on the conveyor system. It is crucial that the system operator does not need to align the scanners before use. In fact, the scanners should be functional as soon as they are installed. Therefore, Leuze has developed "integrated connectivity" for its BCL 300i series: This function enables the stationary bar code readers to communicate directly with the control without the need for an external interface. Commissioning takes place automatically as soon as the device is connected to the software.



The stationary bar code readers of the BCL 300i series communicate with the control without the need for an external interface. This is possible thanks to the "integrated connectivity" function.

### Order picking: Guarding using safety light curtains

Picking stations must be guarded reliably, even when there are large quantities of them. Safety light curtains such as the ELC 100 from Leuze are suitable for this application. Where man and machine work "hand in hand", the safety light curtains can be used vertically as hand and finger protection, as access guarding as well as horizontally as area guarding.



The ELC 100 safety light curtain from Leuze is ideal for easy guarding of picking stations.

### Focus on stacker cranes: Optimization potentials with smart sensors

Video: Sensor applications to optimize the performance of stacker cranes in pallet and container storage facilities



Matthias Göhner, Corporate Industry Manager Intralogistics at Leuze



Special sensor technology is required to ensure that MFC operation is efficient and automated. The key tasks carried out in such logistics centers are identification, detection and guarding. The sensors used must be very compact because the use of space in MFC is planned extremely efficiently. In addition, an MFC is divided into various areas

that place different requirements on the sensor technology: Fresh and deep-freeze area, standard area, order picking area, receiving area and shipping area.

### The development of stacker cranes continues in the direction of lighter weight and more dynamic systems which, through high driving performance, increase the performance of the overall system. What does this mean for the sensor systems?

That is correct. Stacker cranes will increasingly be more flexible, more dynamic and lighter. To meet these requirements in design, more compact sensor systems and sensor systems with a modular design are needed.

### What optimization potentials do you see with stacker cranes and how can these be implemented using appropriate sensor systems?

Owing to the size of the device or the technical features of existing laser positioning systems, design constraints can arise with respect to the position at which a sensor can be located on the stacker crane.

### What, in your opinion, would be the solution? Could you briefly describe it to us?

The small design in combination with the minimal dead zone of just 100 mm makes our new laser positioning system AMS 100i the most compact on the market. On the one hand, the housing of the AMS 100i is extremely compact: 105 x 68 x 75 mm. On the other hand, the laser positioning system can be mounted modularly and interference-free, even directly next to an optical data transceiver. And it is easy to align. Positioning possible up to a close range of 100 mm.

### What are the advantages for the customer?

For the customer, the system provides maximum constructional freedom and easy implementation even in innovative applications with low space availability.

### And what about commissioning?

In the compartment fine positioning of stacker cranes, for example, the standard solution involves the use of multiple sensors, all of which must be wired, mounted and aligned. Nowadays, however, things are much more modern: Today you need just one single camerabased sensor. A camera detects circular holes and reflectors. It determines the position deviation in the X and Y direction relative to the nominal position and passes the position deviation to the controller via an interface or I/Os.

### Which sensor do you recommend for this?

A camera-based sensor such as our IPS 200i/400i is ideal for compartment fine positioning of the stacker crane. Only one sensor then needs to be wired, mounted and aligned. Setup and parameterization are also quick and easy. Result: Considerable time savings and faster commissioning ... Also when swapping out damaged sensors at a later time.



Compartment fine positioning of stacker cranes with the IPS 200i/400i camera-based sensor.



With its new AMS 100i, Leuze offers the most compact positioning sensor on the market.

### What about the safety requirements for stacker cranes?

To satisfy the changing safety requirements for stacker cranes, existing solutions must be reconsidered and sensors adapted accordingly. The safety standard stipulates safe position detection under certain conditions.

### What exactly does the safety standard stipulate?

It stipulates, for example, safe position detection in situations where a person is on the stacker crane while it needs to be moved – e.g. for maintenance work or during commissioning. The stacker crane must safely maintain its position or it must be possible
to move the stacker crane at a safe speed. A safe speed can allow the buffer zone at the end of the aisle to be reduced.

### What performance level must be achieved in this case?

The standard solution, i.e. with two diverse sensors, achieves a maximum performance level of PL d. By using a safe sensor, the performance level can even be increased to PL e.

### This means more safety with just one safe sensor ...

Exactly. The world's first safety bar code positioning system, FBPS 600i, requires just one sensor for safe position detection. The device is connected to a safe evaluation unit – e.g. to a frequency inverter – via two SSI interfaces.

### What are the benefits for the customer?

On the one hand, safe position detection can be performed with just one device that meets PL e/SIL 3 requirements. It has low space requirements and a short error reaction time of just 10 ms for use on fast stacker cranes.

### Faults, downtimes or unscheduled maintenance work are the worst-case scenario in intralogistics. Intelligent sensors can help increase the system availability here ...

That's right. Even the failure of just one component in a system reduces efficiency or brings the system to a complete standstill. Efficient condition monitoring enables faster response and minimization of the downtimes in intralogistics. For this purpose, either additional functions of existing sensors are used or special sensors are implemented.

### How does such an efficient condition monitoring system actually work?

The contamination control and the quality score constitute a warning threshold at which the sensor still functions safely but signals that intervention is necessary. In order to ensure that the sensor continues to function properly, its front screen should be cleaned, for example. Or the opening for compartment fine positioning has changed and must be checked.



Dropping below the set warning threshold indicates that intervention is required.

### That sounds like predictive maintenance ...

Yes, that's exactly what it is. The state of the sensor can be assessed at any time, maintenance can be planned and downtimes thus avoided. We also refer to this as "condition monitoring".

The efficient flow of goods and high system availability are key criteria for the operation of logistics centers. Here, the traceability of events also plays a crucial role in enabling faults to be rectified quickly and efficiently.

Using the new LCAM 308, visual checks can be performed on an stacker crane in the event of a fault. A snapshot mode is also available to capture a single image, e.g. for recording the content of a carton. This enables faults to be rectified conveniently, quickly and efficiently, which in turn increases system availability.



Thanks for the interesting insights into the optimization potentials that modern sensor systems offer.

Interview by Martina Schili.

## Cost-effective presence control

Highly economical:

Our new 5B sensor series detects objects extremely reliably and cost-effectively. At the same time, the sensors convince with their easy handling.







Sensors for presence control in intralogistics, packaging processes or the automotive industry often need to fulfill many diverse requirements. This is why we developed our new 5B sensor series. They convince with their flexible handling and offer high level of cost effectiveness. These are often decisive arguments in cases where a system requires a large number of sensors. We offer the sensors as retro-reflective photoelectric sensors, throughbeam photoelectric sensors and diffuse sensors. Our 5B series is certified to degree of protection IP 67 and ECOLAB.

### Fast alignment and startup

With their compact housing (11 x 32.4 x 20 millimeters; W x H x L), the sensors are ideal for situations with limited installation space. As a result, they can be installed close to conveyor lines, for example. Furthermore, our 5B series is compatible with the predecessor series in terms of mounting. This makes modernization easier. The metal inserts with M3 thread also contribute to easy installation. Configuration is simple too: Thanks to the user-friendly potentiometer, system operators can quickly adjust the sensors and adapt them to changing conditions at any time. The homogeneous and clearly visible light spot makes our sensors easy to align. Various electrical connection options, e.g. by cable, M8 connector or pigtail, help maximize flexibility. A further advantage with regard to installation and status display is the 360° visible LED indicator.

### Also detects glossy objects

Our 5B series sensors reliably detect even depolarizing objects such as reflective, shrink-wrapped or glossy objects. The throughbeam photoelectric sensors operate at a switching frequency of up to 900 Hz and thus offer a high performance and function reserve. The operating range of this model is up to 15 meters, and up to 6.5 meters in the case of the retro-reflective photoelectric sensors. The diffuse sensors operate with a switching frequency of up to 1,000 Hz. Last but not least, we have also thought about protection against unwanted access: The light/dark switching of the switching output is possible in a tamperproof manner by means of the wiring.



Space-saving mounting directly on roller conveyors or conveyor lines.



Our throughbeam photoelectric sensors of the 5B series can also be installed horizontally at conveyor lines.



Background suppression of our HT 5B diffuse sensors ensure that overfilled cartons are detected and removed reliably.

### More than you expect. Packaging. Sensors. Solutions.



Automated systems for production and packaging processes need to be more flexible, more efficient and more intelligent. We help you with our innovative sensor solutions. From the first to the last step in the packaging process.

### www.leuze.com/packagingsensors





Andreas Eberle has worked at Leuze since 2000. Most recently he was active as Key Account Manager Food & Beverage and as Local Industry Manager Packaging for the German market. He is now looking forward to his new role as Corporate Industry Manager Packaging.

### What does "packaging" mean at Leuze?

At Leuze, the term "packaging" refers to all steps in the packaging process: from primary packaging to secondary packaging, i.e. the packaging of items in cartons or containers, labeling through to final packaging or positioning on pallets or load carriers. We consciously focus on sensor systems for beverage filling, sensors for packaging sausage and cheese, confectionery and baked goods, and pharmaceuticals – i.e. on the most challenging areas and environmental conditions of the packaging process. Furthermore, the requirements differ depending on the industry: With the primary packaging of meat products and cheese, conditions are cold and wet; in the baked goods industry, however, conditions are hot and dry. In all cases, of course, hygiene requirements are extremely strict.

### The new claim is "More than you expect." So, what can customers expect?

For decades, our sales colleagues have worked closely with manufacturers of packaging machines and with consumer goods manufacturers, i.e. the users of the machines. As we focus on just a few industries, we know the requirements of the food and pharmaceutical industries very well. Our colleagues are regularly on site at the customer's plant and work together to produce the perfect solution for the respective automation task. Today, many of our customers know us mainly as an expert for sensor systems for special applications which otherwise seem almost unsolvable. One example is our GSX combined fork sensor, which combines the two detection principles of light and ultrasonics in a single housing and can therefore detect all types of selfadhesive labels. Further examples are our clear-glass sensors or the most powerful throughbeam photoelectric sensor on the market with the designation LS25CI, which transilluminates even metalized packaging films. We also have a very large and innovative range of standard products. It is structured in such a way that all applications can be covered with one housing design and one mounting principle – this ensures a high level of flexibility when using the sensors in our customers' applications. The Leuze product range includes sensors for optical detection and measuring tasks, sensors for detecting 1D-codes or 2D-codes, Vision sensors as well as sensors and solutions for machine safety.

### What are you currently focusing on in the case of sensor systems for packaging machines?

The demands on machines and systems and therefore also on the used sensors are particularly high in cases where food has not yet been packaged. Here, food manufacturers must ensure that the systems can be cleaned very thoroughly and easily and that, for example, bacterial carry-over cannot occur. This year, our 53/55 stainless steel series, which has been a fixed part of the Leuze product line for 16 years, received a technology update. There is also the DCR 200i code reader as well as inductive sensors in hygienic stainless steel housings. For the safety light curtains of the MLC series, we also offer an IP 69K protective tube. Our sensors in stainless steel housings meet the hygiene requirements of the food industry. They are characterized by a special hygienic design as well as a high leak tightness and resistance to cleaning agents.

### Are stainless steel sensors only suitable for applications in primary packaging?

Sensors in robust stainless steel housings are also a very reliable solution for applications other than primary packaging. For example, series 55 sensors in wash-down design or the GS08B fork sensors are used in packaging areas with high mechanical requirements or with intensive cleaning processes. The advantage of sensors with stainless steel housings or special metal housings coated with chemical nickel, such as the 18B series or GSX fork sensors, is that no paint chipping can occur and the housings are not destroyed over time by the used cleaning agents. We will in future also be focusing on the area of stainless steel sensor systems.

### What can customers expect from a sensor in future?

The primary focus of food and beverage manufacturers is to ensure that their products have a consistently high quality and that the systems used have a continuously high output. A sensor in a packaging system should be practically unnoticeable and should perform its task as in the most uncomplicated way possible. This requires robust, durable sensors that are easily integrable and that need as little operating effort or "care" as possible during operation. If it is possible to perform necessary format changes e.g. via IO-Link, system downtimes can be kept to a minimum. Via the standardized IO-Link interface, predictive maintenance is also possible or any necessary maintenance cycles can be identified in good time and then scheduled.

### Interview by Birgit Werz.



Andreas Eberle Corporate Industry Manager Packaging at Leuze

## Put into the right light

Many light types and a compact housing: Our new KRT 3C contrast sensor can be flexibly integrated into packaging processes thanks to its multicolor capability and small size.

The KRT 3C is the smallest contrast sensor that we have ever made for the packaging industry. Our KRT 3C detects glossy surfaces or highly reflective material reliably and with high position accuracy even if there are only small differences in contrast. This is made possible by the multicolor functionality: red, green, and blue light as well as white and laser red light will not allow any object or printed label to pass through unnoticed. This allows users to select the right light source for any material and contrast mark color for their packaging and labeling processes.

### Tight space? No problem!

Our KRT 3C detects contrasts very precisely and reliably with a short response time of only 50  $\mu$ s (laser: 125  $\mu$ s) and minimal signal jitter. This helps to achieve optimal machine throughput. Advantage in small spaces: With its small dimensions of 11 x 32 x 17 mm, the sensor is designed for tight installation spaces. This means it can be fitted almost anywhere. Using the integrated IO-Link interface, users can easily set up our KRT 3C. This also speeds up product format changeovers.

### **Really resilient**

The housing is robust: It meets degrees of protection IP67 and IP69K. Our KRT 3C is also ECOLAB-certified. So it can even handle aggressive cleaning agents.





In the packaging industry, products are often packaged into tubular bags. Sensors detect the printed contrast markers and determine when the packaging film is cut. With the KRT 3C, this is always possible thanks to the multicolor functionality, even with materials with different color or gray value combinations.



When things get tight, the compact size of our KRT 3C contrast sensor is the right choice. The sensor detects contrast markers of different colors even on round objects and different materials.

## Ultra-precise thanks to ultrasonics

Our new compact ultrasonic sensors of the HTU200 and DMU200 series can also deal with challenging applications in the packaging and automotive industry.



Our sensors of the HTU200 and DMU200 series reliably solve difficult detection and measuring tasks: The new Leuze sensors detect objects irrespective of their surface structure by means of a reflected acoustic pulse. They detect even glossy, transparent or dark surfaces as well as liquids or granular products without problem. With the new series, we offer switching and measuring ultrasonic sensors in different sizes. The devices have operating ranges between 0.1 and 6 meters. Some models are also available with IO-Link interface. This allows system operators to find the perfect solution for every requirement.

### Optimum object detection and presence control

We offer the switching sensors of the HTU200 series in a total of 20 different models. They include the compact HTU208 ultrasonic sensors, which are characterized by their extremely slimline design (M8 threaded sleeve). This allows them to also be mounted in confined production environments. Thanks to their narrow sound cone, the sensors detect fill levels even through extremely small container openings. Also in this series: our sensors in the sizes M12, M18 and M30 with even greater operating ranges.

### Precise distance detection

Our measuring ultrasonic distance sensors of the DMU200 series are available in eight models. Owing to their analog output, the DMU218 sensors are suitable for precise distance measurement. The DMU230 sensors in M30 design have operating ranges of up to six meters.

### Models with IO-Link interface available

Our new ultrasonic sensors are all characterized by a robust and compact metal housing. They fulfill the high requirements of degree of protection IP 67. The sensors also function reliably in harsh environments – such as in steam, humidity, dust or ambient light. Particularly convenient: Our switching and measuring ultrasonic sensors in the sizes M18 and M30 can be easily connected to the automation system thanks to the IO-Link interface. IO-Link makes the sensors extremely easy to parameterize and operate. Furthermore, an internal object counter as well as diagnostic data, e.g. temperature information, enable predictive maintenance.



Dusty environmental conditions do not affect the detection tasks of our ultrasonic sensors. HTU218 switching ultrasonic sensors are therefore ideal for fill level monitoring, e.g. when filling granulates or powders.



Our new HTU208 compact ultrasonic sensor in the form of an M8 threaded sleeve has an extremely narrow sound cone. As a result, it is able to monitor fill levels even through extremely small container openings.



Ultrasonic sensors of our DMU200 series measure the distance to objects by means of an ultrasonic cone. They achieve this irrespective of the material and surface structure of the object. If a sensor with a wide sound cone is used, not even holes punched in cartons pose a problem.

## **Clearly visible light signals**

Our TL 305 series impresses with bright and homogeneous illumination as well as an optional IO-Link interface.



Tower lights are indispensable in machine and system construction as well as in intralogistics: They make states, faults and ongoing processes clearly visible from a distance. Our new tower lights of the TL 305 series can do all of this extremely reliably. They light up brightly, uniformly and fully. This enables optimum signaling - whether at the machine, on the conveyor belt or for access control. The compact towers are available preconfigured with three, four or five segments. Our new range of tower lights includes the TL 305 models with predefined color assignment as well as the TL 305-IOL models with IO-Link interface. The IO-Link variants allow different operating modes and provide an extensive selection of colors. On request, the tower lights are also available with additional acoustic signaler.

### **Quick and easy implementation**

System operators benefit from the immediate usability of our tower lights. The M30 thread and M12 connector make them easy to install. Matching accessories simplify installation. All models of the series are characterized by a high-quality and robust design. The aluminum housing allows the tower lights to be used even in demanding industrial environments.

### Flexible configuration

Our IO-Link version TL 305-IOL offers maximum flexibility. Segment mode enables the segments to be actuated individually via IO-Link. This allows color, intensity and lighting sequences to be configured individually. Level mode is used to visualize fill levels. If fast commissioning is required, users can actuate eight predetermined or user-defined configurations via the three external trigger inputs even without IO-Link connection.



Our individually configurable TL 305-IOL tower lights can be parameterized extremely flexibly via the IO-Link interface. System operators can signal machine states by means of different brightnesses, lighting sequences, colors or types of signal sound.



Our TL 305 tower lights used in combination with a proximity sensor are also suitable for safety-related monitoring tasks. For example, if a door is opened, a visual and/or acoustic warning is output.



## Absolute hygiene

Hygiene-sensitive production and packaging processes require sensors that meet the most stringent requirements. Leuze makes this possible with sensor series intended for the food industry and with its many years of application know-how. There are few industries where the demands placed on the sensor systems are as great as they are in the food industry. Whether sausage or cheese, confectionery or pastries, dairy or beverages: Hygiene is always a key factor when processing and packaging the products. Sensors in these areas must be resistant to intensive cleaning and disinfection cycles. The technology must also be able to withstand considerable fluctuations in temperature. With its new miniature sensors in stainless steel housings, Leuze fulfills all the important requirements of the food industry: chemical and thermal resistance, leak tightness and a hygienic product design. Protection classes such as IP67, IP68 and IP69K as well as ECOLAB, CleanProof+ and JohnsonDiversey certifications confirm that the devices operate properly at all times even in extremely harsh environments.

In the food industry, hygiene requirements are most strict wherever the food product or beverage is not yet protected by primary packaging. "This places high demands on sensors that are used for automation in these areas," says Steffen Hundt, Product Manager at Leuze. "Sensor systems must be high performance and hygienic, but also robust so that they can operate reliably in harsh environmental conditions." With its new solutions, Leuze ensures the following four key requirements for sensor systems used in the food industry:

### Chemical requirements: high resistance

Cleaning plays a major role in the packaging area of the food industry. Intensive cleaning processes, particularly after production runs, are necessary in order to remove food residue and to prevent bacterial carry-over. There are many cleaning cycles, long exposure times as well as preliminary and main cleaning. Furthermore, the sensor systems must be able to deal with a broad range of different cleaning agents – from ECOLAB cleaners to various foam and disinfectant cleaners that may be acidic or alkaline. To make sure that the sensors optimally withstand the cleaning agents, Leuze checks the devices using the ECOLAB test and also CleanProof+ and Johnson-Diversey procedures. This ensures the long-term resistance of the sensor housing.

### 2 Thermal requirements: major differences in temperature

Major differences in temperature exist particularly when food is placed in its primary packaging. For example: Owing to the sensitive foodstuffs handled in meat processing, the temperatures often range from 5 to 10°C. In contrast, however, cleaning is performed at extremely high temperatures. "Here, we again play it safe with our sensors and always test the products in several ways: in the climate chamber, by thermal shock testing and also by means of a steam jet test," explains Steffen Hundt.

### 3 Leak tightness: reliably waterproof

As the sensors are exposed to continuous wet conditions and humidity during cleaning and because high-pressure water jets are additionally used, absolute leak tightness is essential. Leuze always tests all sensors using leak testing equipment. The sensors intended for the food industry meet the demands required for IP69K approval: They are tested using a steam jet with an extremely high water pressure of up to 10,000 kPa and a temperature of up to 80°C. The distance to the sensor during testing is very close at just ten centimeters. Furthermore, the sensor is exposed to the steam jet from different angles in order to simulate cleaning as realistically as possible.

### A Materials/product design: hygienic and food-safe

Sensors installed in packaging machines should be made of material that is approved for contact with food. Furthermore, the devices must be designed in such a way that they can be cleaned easily. In addition, no bacteria and no food residue are allowed to accumulate. For this reason, smooth surfaces without gaps and cavities are required. Leuze meets these requirements by implementing a hygienic product design and using selected FDA-compliant materials. This means that Leuze sensors for the food industry have a stainless steel housing as well as glass-free and scratch-resistant optics covers.





In a filling system for milk bottles, the position of the bottles must be reliably and precisely detected on the conveyor belt for the subsequent packaging steps in the system. The PRK55C.TT3 retro-reflective photoelectric sensor also reliably detects transparent containers.

In the food industry, sausage is delivered in large bars and cut into thin slices in a cutting machine. The HT53C.S diffuse sensor in Hygienic Design reliably monitors the product infeed at the sausage cutting machine.



Leuze 53C series diffuse sensors have a hygienic design without drilled holes and are suitable for areas of application with direct contact with food. They also reliably detect the leading edges of cut-good products.



Reliably detecting the fill level of aqueous liquids in containers is one of the most demanding detection tasks. This requires particularly powerful sensor solutions such as the throughbeam photoelectric sensors of the 55C series from Leuze, which have been specially optimized for this application.

### Precise and robust at the same time

The requirements make it clear that suitable sensor systems are needed for hygiene-sensitive production and packaging processes. To this end, Leuze has specially developed the 53C and 55C sensor series. They are characterized by the housing made of high-quality, particularly smooth V4A stainless steel and the glassfree, scratch-resistant optics cover. The sensors can thus withstand demanding cleaning and disinfection cycles as well as large temperature fluctuations.

### Sensor systems from the expert

Anyone wanting to be on the safe side when it comes to sensor systems used in the food industry should opt for a sensor manufacturer with extensive expertise in this area. Steffen Hundt explains: "Leuze not only understands the challenges in hygiene-sensitive environments, but has for decades worked closely with its customers from the food industry. We implement the Sensor People's comprehensive application knowledge in optimum sensor solutions for every requirement." The high-tech product range includes a number of different sensors for the field of automation technology. For example, switching and measuring sensors, identification systems, data transmission and image processing solutions as well as safety components, services and holistic solutions. Another advantage: Leuze covers not only a sub-process, but provides its customers from the food industry with assistance from the first to the last step in the packaging process completely and at all times.

### Food-safe in stainless steel

Leuze has developed the sensors of the 53C and 55C series especially for hygiene-sensitive production and packaging processes. They can be used very flexibly as throughbeam photoelectric sensors, retro-reflective photoelectric sensors or diffuse sensors. Depending on the model, Leuze solutions reliably detect glass, PET, film or small parts.

The fill level of aqueous liquids can also be easily detected. The 53C and 55C sensor series are dustproof and waterproof and meet the requirements of protection classes IP67, IP68 and IP69K.

The housing is consistently designed to prevent bacterial carry-overs and contamination. Smooth contours without fastening holes prevent deposits. A special fastening concept of the 53C series in hygienic design also contributes to this: The sensor and the machine have a gas-tight connection via the mounting trunnion. Useful: The sensors can be configured, operated and maintained via IO-Link.



Steffen Hundt, Product Manager at Leuze



## Sensor technology – robust and reliable

Beer lovers in South West Germany are familiar with these traditional brands: Dinkelacker, Wulle Biere, Schwaben Bräu, Sanwald, Cluss or Haigerlocher. They are all regional beer specialties, each with its own character, and are brewed by Dinkelacker. The family brewery has been in existence since 1888. It was founded by Carl Dinkelacker in the Tübinger Strasse in the heart of Stuttgart.

Martina Schili, Corporate Communications Manager at Leuze

The company has always placed great importance on the best raw materials. They form the basis for the quality of the beers - whether Kellerbier in a swing top bottle, top-fermented wheat beer or non-alcoholic Pilsner. This quality standard is also reflected in the technical components used in production. For this reason, Dinkelacker has long been relying on Leuze application know-how, as well as sensor technology that meets the most stringent requirements for reliability, robustness and hygiene.

### Strictly in accordance with the German purity law

Processes in a brewery follow a precisely defined sequence. Thousands of visitors on guided Dinkelacker brewery tours are impressed by this every year. If you take a look behind the scenes, you can experience the brewing process from start to finish: first, 40,000 liters of brewing water and 8.5 tons of malt from local farmland are mixed to create beer mash. For its malt, which consists of barley and wheat, Dinkelacker uses summer barley from the Strohgäu and the Swabian Alp. Dinkelacker is one of the few breweries in the world who still use a strain master. When it is ready, the mash is pumped there and filtered. Experts call this the "lautering" of the wort. The spent brewer grains remain, which are then used as supplementary animal feed. The mash turns into wort. The wort is then boiled and the hops is added. The brewery procures this from Tettnang near Lake Constance. This is followed by the brewery's own selected yeast, the last ingredient of the beer. The beer wort runs through a cooler into the beer storage cellar into one of 39 huge storage tanks. Each tank contains between 300,000 and 500,000 liters and is up to 25 m high. It is filled from the bottom until it is approx. three-quarters full, as the beer needs space to ferment in the tank. In order to deliver the finished product to the consumer, it is pumped to the filling installation.

### Indispensable sensor technology

The sensors installed in the filling installation often look inconspicuous. But they are indispensable for efficient processes. Dinkelacker uses Leuze sensor technology at nearly every station. "To ensure faultfree operation, we depend on particularly robust and reliable sensors", explains Florian Fahr, Head of Technology at Dinkelacker. "The requirements for the technical components in the filling installation are very high. Here, there are strong vibrations and the sensors must be able to withstand frequent cleaning processes." Only selected sensor solutions can rise to the challenge. This is why Dinkelacker relies on the technology provided by the Sensor People from Leuze. Andreas Eberle, Local Industry Manager Packaging at Leuze, explains the advantages: "Primarily, retroreflective photoelectric sensors of the Leuze PRK series were installed here." This series is particularly well suited for applications in the beverage industry. The metal housing of the optical sensors is resistant. As a result, the devices can also function optimally in harsh environments." Furthermore, the optically switching devices even detect highly transparent objects such as bottles, due to the reflection principle. Highgloss plastic crates with different imprints are also detected. At Dinkelacker, the technology provided by Leuze has proven its high reliability in practice, as Andreas Eberle knows: "Many of the sensors have already been working in the family-owned brewery with great precision for decades. Some were installed at the end of the 1990s, some at the start of the 2000s." Another advantage: by focusing on one sensor series, the brewery has to stock fewer different spare parts and in the rare event of a defect, they can react quickly and exchange sensors easily. And if there should be an urgent problem, they appreciate the close proximity to the headquarters of the Sensor People, who will promptly offer support.

### Material flow without jamming or collisions

The Leuze sensors are used at different points in the filling installation and they have specific tasks. The process starts in the filling installation with the cleaning of bottles, beer crates and barrels. Cleanliness and hygiene play an important role. "The PRK optical sensors are installed on the individual conveyor sections and detect pallets, barrels, beer crates or even bottles", explains Frank Karle. Head of Electrical Workshop at Dinkelacker. "Thus the speed of the conveyor belts is automatically regulated to prevent jamming and collisions." In the barrel filling section, Dinkelacker has installed approx. 100 sensors on the conveyor belts. Up to 240 barrels an hour are cleaned and filled there. Two new robots which look like a full beer glass support the employees: they lift the empty or full barrels and place them on the conveyor belt or on pallets. Dinkelacker newly installed the robots while the hospitality sector was shut down during the Corona pandemic.

Leuze safety technology also has a part to play at the robots: multiple light beam safety devices of type MLD secure the working range against unauthorized access from outside. Two PRK sensors which are switched crosswise in front of each of the robots reliably detect an incoming pallet. They then start the muting function, which briefly bridges the safety light barriers so that the pallet can pass through.

"The requirements for the technical components in the filling installation are very high. Here, there are strong vibrations and the sensors must be able to withstand frequent cleaning processes." Leuze multiple light beam safety devices of type MLD 500 secure the working range of the robots against access from outside.



No need for heavy lifting: in the barrel filling installation, two modern robots grip the beer barrels and place them on conveyor belts or pallets.





Retro-reflective photoelectric sensors from the Leuze PRK series can be found in many points in the filling installation - here, they record every single bottle in a fraction of a second. Even highly transparent objects are not a problem for these sensors.



Filled beer bottles on their way to labelling.

### 72,000 bottles cleaned hourly

Empty beer crates are cleaned by running them through a special cleaning machine. The bottles, which were removed previously, end up in a large bottle cleaning machine. There, they are cleaned with water heated to 80°C - the machine can handle up to 72,000 bottles in one hour. Here too, Leuze sensors are indispensable for safe operation: sensors of the PRK series detect immediately when a bottle is not in line on the bottle cleaning machine. Then they stop the machine. Again, access is monitored by safety light curtains. After cleaning, each bottle is checked for residues. If there are any residues in the bottle after the first pass, or remnants of labels are still adhering to the outside, the bottle is put through the bottle cleaning machine for a second time. If this is still the case afterwards, the bottle is rejected. This means: "If beer lovers want to do breweries a favor, they should not put anything in the bottles and open empty swing-top bottles before placing them in the crate", says Frank Karle.

### **Freshly filled**

If the bottles are undamaged and completely clean, they are filled. Leuze sensors make it possible to regulate the conveyor belt speed. The system calculates the optimal speed based on the spacing between two bottles. The reusable bottle installation then fills the bottles with beer. It can manage up to 66,000 bottles per hour. This corresponds to 3,300 crates. The swingtop bottle installation works on a separate production line. It fills 30,000 bottles an hour. That means 1,500 crates per hour. As the filling process continues, checks are carried out to see if the level of the bottle contents is correct. After closing, PRK sensors detect if each reusable bottle has been correctly fitted with crown caps or if the swing-top bottle has been closed correctly. This is followed by labeling: the bottle is aligned and labels are applied to the neck, front and back. Here too, nothing is left to chance: every label is checked for its correct position on the bottle while it is still in the machine.



Here, filled and labelled swing-top bottles are placed into crates. The machine fills several beer crates at the same time.



Here, the swing-top bottles are aligned as the beer crates are filled. For this purpose, one Leuze sensor per bottle detects the position of the label.



Nothing escapes the sensors above the conveyor belt: if a bottle is missing or lies horizontally in the beer crate, they will detect it immediately.

### Every crate in view

Then the crater starts its work. The machine fills several crates at once with 20 beer bottles each. Leuze sensor technology is also employed at this station: "During full-crate monitoring, sensors detect in a fraction of a second if a crate is completely filled", explains Andreas Eberle. "If a bottle is missing or in a horizontal position, the crate is rejected and the error is corrected manually by an employee." When crates are filled with swing-top bottles, they are also aligned so their labels face outwards, for a pleasing look. Leuze sensors detect the labels on the bottles and support the machine with the correct positioning. This is followed by the last step: the crates are placed on pallets and delivered. Here too, sensors are used for presence detection of the pallets and optimize the material flow.

### **Continued tradition**

Six widely known brands, beers for every taste and production which is virtually fully automated and fills many thousands of bottles and quite a number of barrels per hour: the Dinkelacker family-owned brewery from Stuttgart has successfully transitioned into the modern age. The Sensor People from Leuze make an important contribution to efficient production in all process steps, with their reliable and robust sensors. These are things Carl Dinkelacker could not even have dreamed about in 1888. But he would have found that one thing was unchanged even after 135 years: the passion for brewing beer from regional ingredients to the highest quality standards.

## Keep it simple



DCR 1048i

### Interview



Stefan Ambos Product Manager Vision at Leuze

### Mr. Ambos, what are the new Simple Vision sensors?

The new Simple Vision product range offers quick and easy entry into image processing used in industrial automation. This concerns applications in testing and quality processes. These include e.g. part differentiation, shape checking, contour analysis, pattern detection, sorting, counting, measuring and code reading. All this may be required in food packaging, beverage filling or the pharmaceutical industry.

### And what exactly are the benefits?

Image capture, processing and communication functions are all integrated in just one image processing sensor. This results in a multifunctional, modular, extremely reliable image processing solution. Powerful, embedded software tools work either independently or together in a job pipeline without the need for an external control.

### That sounds like a complex sensor ...

No, just the opposite is the case of the new Simple Vision sensors: They offer significant added value compared to a standard optical sensor, but are far less complex than an image processing system. You don't need any specialist knowledge. Configuration and parameterization of the sensor is easily completed without specialist knowledge: The software tools of a Simple Vision sensor need only a few parameters and can be set up quickly and easily. Various interfaces enable complete solutions to be created and integrated into the control environment.

### Just now you mentioned that it is a modular image processing solution. Could you explain this in greater detail?

The Simple Vision product range consists of three different device types: The IVS 108 for presence detection tasks. The DCR 1048i with its powerful code reading algorithm and optional algorithm specially designed for DPM codes. And finally the IVS 1048i, the all-rounder model that makes detection, inspection and identification possible with just one device. Furthermore, models with two different resolutions are also available. We therefore offer a flexible selection of models with various device options for different tasks and budgets.

Interview by Melanie Kern.

## Easy detection

New, high-performance image processing tools: Our Leuze sensors of the Simple Vision series convince with their flexible usability and easy handling.

With our Simple Vision sensors, system operators are always on the safe side. The compact devices are just as easy to use as optoelectronic sensors, but are almost as powerful as camera systems.

### IVS 108: Simple presence detection

Our IVS 108 detects present or absent objects. For example, prints or labels on packaging. Thanks to autofocus adjustment and simple teach-in, commissioning takes almost no time at all: a pass part and a fail part are placed in front of the target system. The user confirms each one using the teach button. Done. And it's practical too: The sensor saves up to 32 different tasks. Moreover, live images can be viewed on a web browser and further parameters can be set in a user-friendly way on a graphical user interface. Our IVS 108 is ideal for transport, sorting and conveyor systems. And our sensor is also the right choice for quality control tasks and for the automatic assembly of mechanical or electronic parts.

### IVS 1048i / DCR 1048i: Variable detection, inspection and identification

Our IVS 1048i is a high-performance all-rounder: Users can choose between six models with two different resolutions. Depending on the model, the functions of the IVS 1048i range from object detection and measuring tasks to integrated bar code reading. If just codes are to be read, our DCR 1048i sensor is available as an alternative. Advantages of all IVS/DCR 1048i sensors: Four interchangeable S-Mount lenses with variable focus adjustment and two apertures provide a high degree of flexibility in terms of reading distance, field of vision, resolution and depth of field. In addition to digital I/Os, interfaces with the TCP/IP, PROFINET, FTP and SFTP protocols are also integrated.



Presence detection of information printed on packaging: Our IVS 108 offers an outstanding price/performance ratio for this task and is extremely user-friendly in terms of setup and installation.



Quality control during the labeling process: Our IVS 1048i can easily locate, measure and check whether the label has been attached at the correct position.

Multi-code identification using our DCR 1048i.





# The new normal @ Leuze

An interview with Boris Wörter, Senior Vice President Human Resources, and Isabel Bob, Manager People Development, about the new normal at Leuze.

"Our Sensor People culture and the cooperation between individuals make us 'special' and successful."





Welcome, Isabel Bob and Boris Wörter. I am delighted to be discussing the "new normal" with you today. What does it mean in the context of Leuze?

**Boris Wörter:** Even at an early stage, we recognized that our strengths as a family business lay in our Sensor People culture and the cooperation between individuals. This culture of togetherness makes us "special" and successful.

In what specific ways do you promote this culture? After all, with coronavirus regulations, a rise in the number of employees and the growing popularity of flexible and mobile working, it isn't easy to sustain this culture or make new employees feel part of the team ...

**Boris Wörter:** That's true. Even during the pandemic and despite prioritizing the health of our employees above all else, it was clear to us that a model based purely on working from home was not an option for Leuze! It also wouldn't be fair on our colleagues who work in product-related areas such as production or logistics – we are a team!

### How have you resolved this "conflict"?

**Isabel Bob:** Ultimately, we've tried to find a way of meeting our employees' need for more flexibility through mobile working, while also sustaining the Sensor People mindset.

### How have you managed this?

**Boris Wörter:** Together with our management team, we have intensively assessed the impacts of hybrid working – the pandemic certainly sped up the process. Our experiences during the coronavirus pandemic taught us a lot and enabled us to find the ideal solution for Leuze: We see the ongoing digitization as an opportunity to further optimize our processes, work even more efficiently and as a result become even faster and better – for our customers.

**Isabel Bob:** We have also recognized once again how important our Sensor People culture is to us. Rather than just maintaining this unique selling point, we want to strengthen it. And the only way to do this is by creating moments when the Sensor People



### 

### How do employees rate Leuze as a company?

On average, employees rate Leuze 4.1 out of 5 as an employer. Leuze's score is higher than the average for the electrical engineering/electronics industry (3.5 points).

Based on the evaluations of the last two years, 90 percent of employees would recommend Leuze as an employer.



meet in person. We see Leuze as a type of "cultural filling station." Our internal values of collaboration, such as respect, team spirit, cooperation, reliability and trust, define us and must be lived and experienced in person and on site. We are currently developing new measures to enable this.

### Can you tell us a bit more about these measures?

**Isabel Bob:** For one thing, we are training our management team on how to manage employees in a hybrid-working context because mobile working requires a different management approach. We are also offering all employees the appropriate equipment but also the appropriate IT support, technical tools, and further training on topics such as self-organization and time management. And there are, of course, also guidelines regarding work-life balance and various opportunities for social interaction.

**Boris Wörter:** Naturally, we are also constantly monitoring the new work trends both within and outside our industry, as well as encouraging our colleagues to provide feedback and contribute new ideas and suggestions. In addition, we are continuously evaluating our offerings and adjusting them as required. What's more, sometimes we simply try something new.

### For example:

**Isabel Bob:** We are currently introducing the new "Sensor People meet Management" format: Once a month, eight Sensor People from a mix of areas meet with a member of the management board to talk over lunch. This interaction is completely informal. Work is discussed, but so are other topics. This format is intended to encourage togetherness and understanding of one another.

Sounds exciting. I'm also interested in another topic – I've noticed that we're sat in brand-new offices with a completely different spatial concept ...

**Boris Wörter:** Yes. The new HR office is a bit of an experiment. We've realized that the new ways of working require a new spatial concept, so we no longer have assigned seating. Each individual finds a seat each morning. This requires a clean-desk policy to enable desk sharing. Paper free and minimalist.

### How do you handle confidential topics and conversations?

**Boris Wörter:** Confidential conversations stay confidential. For this purpose, we have incorporated "phone booths." On the other side of the office, there are also creative spaces and a collaboration area where large groups can meet to brainstorm, for example.



Is it working? What are employees' initial impressions?

**Boris Wörter:** It's working brilliantly. The feedback from our colleagues is very positive and everyone is happy with the new arrangements. If you sit next to someone different each time you come into the office, you get more out of it – interactions are easier, information flows more quickly and you get to know all of your colleagues better. Of course, we are also implementing our new spatial concept at our international Leuze locations.

Thank you for the interesting interview, Isabel Bob and Boris Wörter.

Interview by Martina Schili.



Leuze Turkey



Leuze China

## My training at Leuze



**Moritz Hambach** Trainee electronics technician for devices and systems, third year of training

"Everything related to electronics can be put into practice: Leuze gives me lots of freedom to implement my own ideas." My workday in the training workshop at Leuze generally begins at 6 a.m. I usually begin by taking my time going through my e-mails and appointments for the day. Typically, we are then assigned jobs by our trainer, Rolf Blind, or we work on our own projects. Tasks for a trainee electronics technician for devices and systems include developing and soldering wiring. Once or twice a week, I attend the vocational school in Esslingen/Zell. There, we are taught the theoretical part of our training.

My training will last 3.5 years in total. In the first year of training, after about six weeks, you do three months of basic mechanical training at Metabo, before continuing at Leuze. Leuze and Metabo work together to provide training. In the second year of training, we study production for around three months and familiarize ourselves with the construction of our products. After our intermediate examination, we have the opportunity to gain an insight into other departments. This may include placements in quality management, in the Customer Care Center or in industrial engineering. Primarily, we experience the departments that may also interest us after our training. This also gives us a good overview of the corporate structure and enables us to get to know many different interfaces. Our training is very varied and covers many exciting projects and tasks. I do jobs for a variety of departments, for example I build test systems for production. Another thing I really like about training at Leuze is that I can implement my own projects and all options are open to me.

Together with the other two trainees in my year, I have put into practice a special project: The "Simon Says" memory game. It is a game case that outputs a sequence of colored light signals. You must memorize these signals and correctly reproduce them. For this purpose, four Leuze sensors in the case detect hand movements above the respective color fields. In each round, an additional light signal is added. To win, you must complete ten rounds. Among other things, the case is used at vocational training fairs. Its noticeable sound and the vibrant color fields quickly attract the attention of visitors. Last but not least, we have also been able to implement a big pilot project based on an idea from one of our sales colleagues: The "Wall of Innovation." It's a wall with some of our Leuze sensors attached to allow demonstrations for potential customers. The sensors are firmly screwed on and are intended to give an initial impression of the device. If a customer is particularly interested in a sensor, a further functional sample can be found in the drawer below the wall. The wall also features a QR code for each sensor. By scanning one of these codes using a Leuze hand-held scanner, customers can access the configurator on our website. There, customers can find out which Leuze sensor is best suited for their specific system.



Leuze sensors at a glance. The "Wall of Innovation" displays some of our products in detail.



The "Simon Says" game case is a real eye-catcher at vocational training fairs.

## My DHBW studies at Leuze



In collaboration with DHBW Stuttgart (Baden-Württemberg Cooperative State University), we offer various dual courses of study. Every three months, students on these courses alternate between practical training with us and theoretical training at the university. Depending on the course of study, our students try out various areas of the company and gain valuable experiences, e.g. during the semester abroad.



Elina Wagner and Lea Weible are in their fourth semester of studying "Business Administration – International Business."

### How are DHBW studies for "Business Administration – International Business" structured?

Lea Weible: For the first three semesters, you study the basics. From the fifth semester onward, you can then choose between the specializations of finance, supply chain management, human resources, marketing and digital business management.

**Elina Wagner:** The course of study also includes a lot of content taught in English, such as international management and business communication. And an important aspect is the placements abroad, which are scheduled for the fourth semester.

### Let's talk about the theory first. How is the teaching at the university structured?

**Elina Wagner:** During the theoretical training at DHBW, you are given a timetable that varies each week. A lecture lasts three to four hours, but you only have one or two of those per day. The classes for lectures are small. As a result, the learning atmosphere is very pleasant and you also have the opportunity to ask questions. As the theory semester only lasts three months, it is recommended to always go back over the lectures right from the outset. This makes the examination periods less stressful.

During the practical training at Leuze, you then have the opportunity to try out various areas of the company. Which area have you liked best so far or which area has surprised you?

**Elina Wagner:** I've liked marketing and digital sales best. I enjoy making people enthusiastic about something, which is precisely what that area is all about. It also involves working out how to find the appropriate target group and win them over with our products and the company. I particularly enjoyed designing campaigns and putting myself in the customer's position. The practical placement at the company helped me to get a better insight and to realize that I could see myself there in the future.

**Lea Weible:** Personally, it's purchasing that really surprised me. I hadn't considered it at all before. I especially liked interacting with suppliers and the fact that there are many different internal interfaces. I also enjoyed working so closely with the product.

### "My DHBW studies at Leuze gave me many opportunities that I would not have had in a regular study program."

### What big tasks or projects have you been involved in?

Lea Weible: We write a project each year. You are assigned a topic and must conduct empirical research. My first project was on purchasing. I wrote about supplier evaluation and also designed and assessed questionnaires. Depending on the topic, the research findings may also be needed in practice and may actually be used. It is great to see the work you have done not simply ending up in a drawer but actually being implemented and developed further.

**Elina Wagner:** I've written one project on human resources and I'm now writing the other one on digital sales. I've felt very well looked after in both departments. Even colleagues who weren't directly involved in the project showed an interest. Everyone was always happy to offer tips and advice.

### Now let's talk about the placement abroad. Your course of study includes theoretical and practical placements abroad. Where did you go/are you going?

**Elina Wagner:** I spent my theoretical semester abroad at the UCSB, the University of California in Santa Barbara. It lasted three months, from January to March. I mainly had international lectures on subjects such as global economics and international marketing. A semester abroad is, of course, an exciting experience. You get to know new people and other cultures and you also get a bit of independence. At Leuze, I have the opportunity to go abroad again. In September, I'm going to our subsidiary in Malaysia, which is still very new.

### What are you looking forward to most about being there?

**Elina Wagner:** I'm especially looking forward to interacting with my international colleagues.

Elina Wagner




During the semester abroad, there is also time to explore different places: Lea Weible in Ireland and Elina Wagner in San Francisco, California.

"The practical training at Leuze has helped me to look at various fields in a new light and to find out more about them."

#### Ms. Weible, where did you spend your semester abroad?

Lea Weible: I also studied theory abroad, in Dublin. It was a really cool experience and I'm glad I didn't miss out on it. During the three months I spent at Dublin Business School, I was also able to express myself a bit more creatively. For example, I studied digital content creation, in which I created websites by myself. And after that, I spent time at our subsidiary in Milan. I worked there for two months. It was exciting to see how the subsidiary in a different country collaborates with the company headquarters in Owen.

#### And what is involved in planning a placement abroad?

**Elina Wagner:** There is an excellent support system. We have to prepare learning agreements beforehand. To do so, you check what courses are available at the university abroad and the extent to which they meet our university's prerequisites for the fourth semester.

**Lea Weible:** Before you can set off, you have to book flights, find an apartment in the location and make all sorts of other arrangements. Leuze supported us every step of the way. The prior communication with the subsidiary, in Italy in my case, also went smoothly – the colleagues there were very enthusiastic right from the start. I was able to meet them in advance last year at the summer party, which was lovely.

Thank you for sharing your experiences with us. It sounds like your course of study is very varied. All the best for the future!

Interview by Simona Langlouis.

## We believe in the specialists of tomorrow!

Leuze offers students doing their bachelor's or master's degree as well as interns and student trainees interesting opportunities to put their theoretical knowledge into practice, gain their first experience of professional life and work on projects independently. And this applies to both technical and commercial areas. In Owen, Germering and Unterstadion.



Dorina Bosch (left) HR Specialist Learning and Development at Leuze

#### Ms. Bosch, what are the defining features of an internship at Leuze?

Young people want to have a look around and find out whether a job suits them, whether they are cut out for that job and whether they can imagine themselves doing precisely that job once their studies are complete. It is important to us to provide our interns and students with all-round, individual support, give them feedback and show them ways in which they can continue their development at Leuze – including after their studies.

#### How do you do that?

In each department, we have a mentor who looks after our interns and students, involves them in projects and, even at an early stage, assigns them projects for which they are solely responsible. And, of course, we have colleagues in HR who also check in with the young people regularly.



A lot of people not only complete an internship or student traineeship, but also write their degree thesis at Leuze. What is the likelihood that the students will be taken on permanently afterward?

It's very likely. To this end, we hold regular feedback meetings and openly discuss possible opportunities for further development and prospects within the company with our students.

#### That sounds good. Can you give us an example of the opportunities available once they have completed their studies?

One example is that we are currently creating a trainee program for students about to complete their master's degree. It provides an even deeper understanding of content related to the desired area in the respective departments. But in certain circumstances, it is, of course, possible to join the company directly as a junior, as long as the person's skills are a good match for those of a vacant position.

#### How do you encourage young people to stay at the company? After all, there is stiff competition in the "war for talent"...

Our efforts are not limited to giving them an understanding of the specialist content and showing them prospective roles. It is important to us that our young people feel happy at our company, know each other, build networks and soak up the Sensor People culture.

#### How have you managed this?

For example, we offer frequent meetups for students. It helps them to share their experiences regularly and encourages them to spend time together, even outside working hours. In addition, the students are fully integrated in their departments, participate in meetings and have their own projects and tasks.

It almost makes you want to be a student again. Thank you for the interview, Dorina Bosch.

Interview by Martina Schili.

# My degree thesis at Leuze



Joshua Uhl Technical computer science student, seventh semester

"Applying to Leuze is a good decision – whether it's a speculative application or for an advertised position."

Straight after graduating from high school, I began studying technical computer science at Esslingen University of Applied Sciences. The basic studies covered in the first two semesters focused primarily on mathematics, physics and electrical engineering. Subsequently, I studied subjects including digital, regulation and software technology. The latter encompassed traditional computer science and programming tasks. Finally, most students on my course wrote their bachelor's thesis at a company. However, it is also possible to write a degree thesis at the university.



Image: NicoElNino/1448152453/istockphoto.com

My first encounter with Leuze was at Esslingen University's Industrietag career fair in 2022. Leuze had a booth there. I liked how the company was presented and the way it took time for us students. I remembered this positive experience six months later when I was looking for a company that would support me through my bachelor's thesis. I am especially interested in topics relating to artificial intelligence (AI). At that time, Leuze wasn't advertising any AI topics as a degree thesis, so I tried my luck and submitted a speculative application anyway. I soon received a reply from the person who is now my mentor. He suggested a specific topic and I decided to choose it.

My topic is the "ability of neural networks to improve image data." It's about images of codes, such as Data Matrix codes, recorded by sensors. Such codes are sometimes illegible, for example because the distance between the sensor and the code is not optimal. As a result, the image is blurry. My job is to find out whether neural networks, i.e. a certain type of AI, are able to rectify this blurriness and similar problems. In the meantime, I have already used AI – the result is very promising. Of course, using the technology in applications is not the aim of my work. First, I must carry out tests to discover the extent to which the image data can be improved.

In my department, there is a lot of interest in the results of my degree thesis. It pleases me when someone asks about it specifically. During my work, it has become even clearer to me how important it is to choose a topic that is a good fit for you. That is the case for me – I find my topic a lot of fun and I also like my environment a lot.



### A worthwhile experience! Working in Malaysia

Catena Granata, production employee, C-series at Leuze



I've often been asked, "How do you end up working in Malaysia on the spur of the moment? Especially as an employee in a product-related area!" The best prerequisite for this is working at an international company, being an old hand, curious and open minded, and having a big mouth – just like me. When our supervisors told us that production lines were to be built for use in our new Leuze plant in Malaysia, some of us were initially worried that we here in Owen would no longer be needed. Of course, that was rubbish because our existing lines were duplicated rather than replaced and all this is the result of Leuze's significant growth!

But without thinking, I cried out, "If our production lines are going to Malaysia, I'm going too!" This idea initially vanished into thin air. At our prototype factory in Owen, experienced colleagues, including me, built the systems and tested them extensively so that they could soon be used in Malaysia. Not long after, the first four new shift managers from Malacca came to Owen. It was a lot of fun training the new Sensor People to work with the machines and C-series that we know so well.

And suddenly, the moment that I was no longer expecting arrived: My production manager asked me, "Would you still like to go to Malaysia?" I looked at him with astonishment. Of course, I wanted to go! A week later, my colleague Kanokrat Haese and I were on the plane. A 14-hour flight. A stopover in Turkey. Ready for a new challenge and task: We were to spend five weeks on site, each training eight new Malaysian colleagues to work with the C-series. The new plant was still a big construction site. Equipped with a hard hat, reflective vest, protective clothing and mask - because some coronavirus restrictions were still in place - we set to work. We weren't used to the high air humidity and high outside temperatures, but luckily there was already a regulated air-conditioning system in our new plant :-) We trained our new colleagues to handle lenses, circuit boards and electronic components and taught them what they needed to take into account. Sometimes, we had to use our hands and feet and Google Translate because only a few of the local people spoke English - and, of course, we didn't speak any Malay. Naturally, one or two lenses broke at the beginning, but we were amazed by how fast, capable and dexterous our new Sensor People were! We all enjoyed working together. And even outside of work, our Malaysian colleagues were excellent hosts and looked after us well. From food to excursions.

My personal highlight outside of work was visiting Phuket and Singapore. The other Sensor People became true friends of ours, so it was really difficult to leave. Coincidentally, the new plant canteen opened on our last workday in Malacca, so we were able to provide cake for the entire team – and here's a tip for anyone who goes to Malaysia: The people there love German chocolate!







#### Interview

### A strong employer needs a strong works council

Mr. Höflinger, you are a long-standing Leuze employee and have already been part of the Leuze works council for over 20 years ...

That's true. I worked for Leuze in strategic purchasing for 40 years. Since 2002, I have been a member of the Leuze works council. For the last ten years I have been its chairman.

#### Do you still have time for strategic purchasing?

Not really. For a little over a year now, holding the position of chairman of the works council has made me exempt from my duties. As the company has grown and expanded worldwide, more and more topics have become my responsibility. And association work also takes up quite a lot of time.

#### I can imagine ... What challenges do the increasing size and globalization of the company pose?

It is important to establish clear rules that all can rely on and that are binding for everyone.

#### For example:

One example is working time rules. Despite all flexibility, a clear framework must be established even in this case. Another example is mobile working. In this case too, rules have been decided upon that take into account the interests of the company as well as those of our employees.

#### How flexible are the working hours at Leuze?

In my opinion, they are very flexible. We have not introduced any core hours. Instead, we have defined a period during which the function area must be sufficiently staffed to be able to provide information to others. In addition to mobile working, Leuze employees



can accrue overtime in working time accounts – for example, so that they can take a longer break, whether to have a longer vacation, care for family members or even retire earlier. We are currently discussing precisely how this will work in the future.

#### Which topics are the main focus for the works council at the moment?

In the war for talent, the difficulty is recruiting suitable employees and keeping existing ones.

#### How is Leuze addressing this problem?

In the works council, we are talking a lot about what makes us attractive in comparison to other employers. What can we and what do we want to afford to do? What are others doing? What makes us more attractive?

#### What is your position on company health management?

That is also an important topic. We support and promote the fitness and health of our employees. Whether that's through opportunities for regular check-ups or vaccinations. In addition, Leuze offers various company sport groups that promote both the health and the togetherness of the Sensor People.

#### To what extent are the employees loyal to the company in your opinion?

Leuze is a family business. Many employees have been part of our Sensor People team for years and years. In some cases, their parents or grandparents already worked for the Leuze Group. For example, that was also the case for me. And even the Leuze families get involved as partners and are present in the company, on the supervisory board and also at our company parties.

#### That must have a positive effect on the company culture at Leuze ...

Definitely! Appreciative and respectful cooperation and this feeling of togetherness among the Sensor People are important to us as values of collaboration. They are also particularly important for young people who are just starting out in their careers ...

#### After all, Leuze trains people ...

Yes, it's great that Leuze has more than doubled the number of apprenticeships and dual study spots both in the commercial area and in the technical area. Encouraging the next generation and its continued development is very important to us. For example, young people have their own council, the youth training council, which supports and promotes their interests.

#### Your statement about the young people is a great way to finish! Thank you for the interview.

Interview by Martina Schili.



#### We are delighted to welcome our new recruits!

Training and studies start at Leuze on September 1, 2023.

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