changes

Staying flexible

The art of stable supply chains

What's driving the process industry

#2/24

Endress+Hauser

Resilience through collaboration

The doorway to world trade: Containers are used to transport just about every kind of freight. Flour, televisions, bananas, components for measuring technology – anything is possible. The art of stable supply chains is demonstrated by containers that arrive punctually and deliver precisely what was ordered – a challenge for companies in times of pandemic-related shutdowns, blocked waterways and geopolitical conflicts.

Closed borders and blocked sea routes, raw material scarcity and destroyed factories: Their impacts on global supply chains bear witness to just how complex and volatile our world has become in recent times. For many years, supply chains have been the conveyor belt for a global economy based on efficiency through division of labor. But their problems are growing in frequency and intensity. And even small hiccups can quickly build into major disruptions along the chain.

The new goal is therefore resilience, alongside efficiency and flexibility. Many companies in the process industry are working flat out to redesign their supply chains for reduced susceptibility to disruption. The aim is to identify bottlenecks earlier and better compensate for them. What this requires above all is transparency – about inventories, consumption, and the flow of goods and materials. Real-time information and forecasts help companies take fast action and avoid losses.

Transparency has been our métier for more than 70 years: Our field instruments deliver valuable insights everywhere raw materials or products are stored, transferred or distributed. That enables our customers to make better decisions. With digitalization, the data is readily accessible everywhere and may be linked and analyzed in a number of different ways. In addition, new technologies are facilitating the automation of more and more applications.

But to make our supply chains future-proof, technology alone won't suffice. More than ever, people are becoming the key factor. Because it is people who turn business into a relationship, grow trust and develop partnerships. That is why reliable supply chains thrive on collaboration. All the more so if we don't want to stop at resilience but drive onward to sustainability and a circular economy.

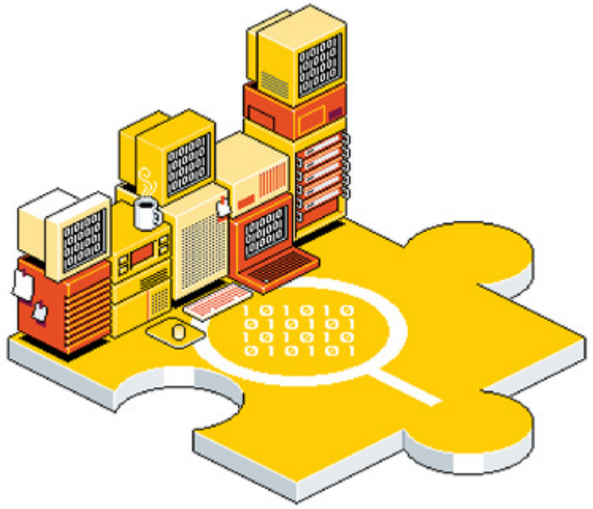
An enjoyable read awaits!

Dr Peter Selders
CEO of the Endress+Hauser Group

Reliable supply chains thrive on collaboration.

Read more *changes* stories online at **changes.endress.com**

The butterfly effect



Why the process industry has to stabilize its sensitive supply chains. **Page 8**

Hand in hand

The reasons behind the particularly resilient supply chains of family-owned businesses like Würth. **Page 14**

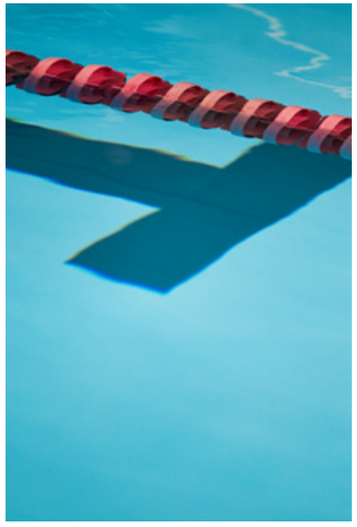
Delivered

A trading world full of containers and surprises. **Page 4**

Steady supply

How Endress+Hauser keeps supply chains efficient, flexible and robust. **Page 26**

Total transparency



Full visibility of mobile and decentralized storage tanks and silos. **Page 18**

Achieving more together

Peter Selders and Mats Gökstorp exchange views on the strategic partnership of SICK and Endress+Hauser. **Page 44**

Contents

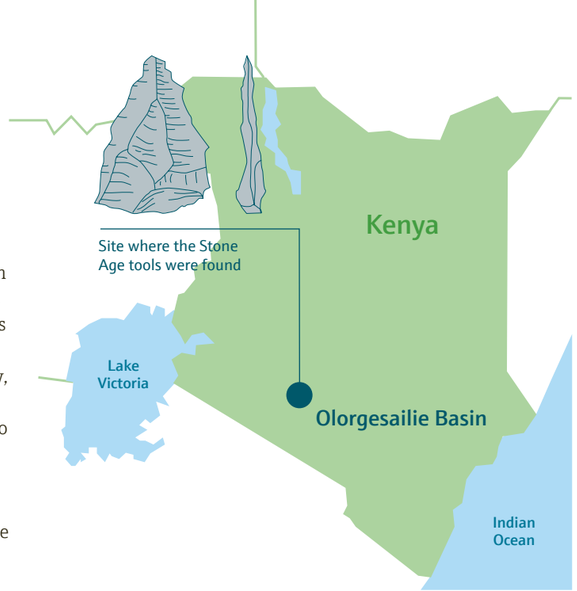
Delivered

Around 80 percent of all products move along global value chains that themselves provide a livelihood for more than 450 million people. Yet their delicate links tend only to be discussed when they are disturbed. It's time to take a look at this fascinating world.

Text: Robert Habi
Photography and illustration: 3st kommunikation, 3st kommunikation via midjourney, Shutterstock

World's oldest supply chain?

More than 300,000 years ago, people in the Olorgesailie Basin in southern Kenya advanced from primitive hand axes to making tools from obsidian, a volcanic rock glass. American paleoanthropologists working in the area have found such tools in large quantities, even though the obsidian sources lie up to 100 kilometers away, with many mountains in between. For this reason, researchers have ruled out the possibility that the tool makers 'commuted' to fetch their own raw materials. Instead, these were likely imported via a chain of people living in different localities, presumably in exchange for other goods. The obsidian finds from Olorgesailie are thus considered to be the world's oldest evidence of long-distance trade, dating back 80,000 to 100,000 years earlier than other examples.



From local to global

Pre-1900, supply chains were mainly organized at a local and regional level.

In the early 20th century, expansion of the rail network, the growth of steam shipping and the increased use of trucks meant that distances shrank. Pallets and forklift trucks found their way into logistics.

The mid-1950s saw the earliest containers come into use, which were standardized soon after.

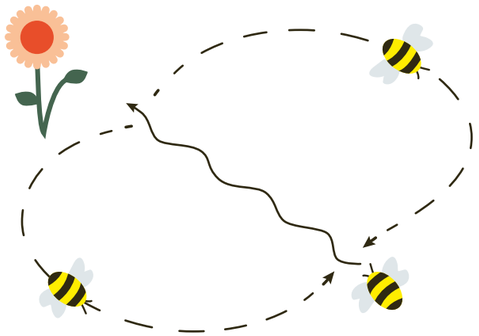
The mid-1960s saw the advent of computers in warehousing. The first real-time warehouse management system arrived in the 1970s, with barcodes replacing manual entry of product numbers.

1983 marked the coining of the term 'supply chain management'. PCs and software such as spreadsheets and route planners made supply chain management increasingly efficient.

In the future, artificial intelligence and machine learning are set to improve order management. Transparency in supply chains is proving an increasingly prominent factor for success.

Bottlenecks in world trade

According to credit insurance group Allianz Trade, the almost week-long blockage of the **Suez Canal** by a container ship that ran aground damaged global trade to the tune of US$6–10 billion a day. As many as 200 ships were backed up at the head of the canal in March 2021, with the result that raw materials and semiconductors failed to reach their destinations on time. The consequences of a blockade of the **Strait of Hormuz** would be even more extreme. Around 30 percent of the world's oil production is shipped through the 50-kilometer-wide strait between the Persian Gulf and the Gulf of Oman from suppliers such as Iraq, the United Arab Emirates and Kuwait. A fifth of global liquefied natural gas supplies also pass through the strait.



Humming experts

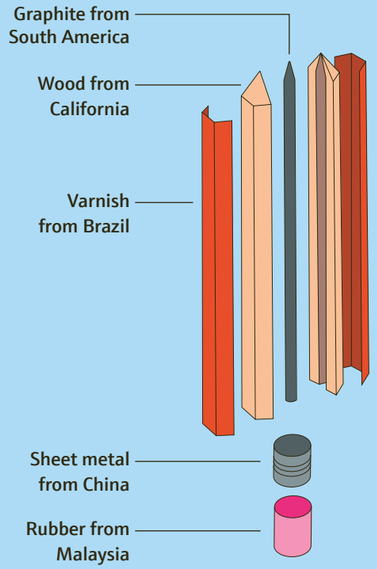
Bees are born logisticians in that they communicate precisely and act intelligently in a swarm. Say a scout bee discovers a feeding site: Back at the hive, it will perform a special dance to tell the forager bees about it. The dance communicates the exact location of the site as well as the quality and yield of the food source. Such information facilitates efficient transport of food material and thus ensures survival of the colony.

The optimal pub crawl

The traveling salesman problem is a classic logistical conundrum. Someone needs to travel through many places, before ultimately returning to their starting point. The aim is to find the shortest route. If the salesman needed to visit just 10 cities, he could choose from 181,440 different round trips. But the conundrum grows more extreme still: In 2018, researchers at Cook University of Waterloo in Canada determined the shortest route to visit all 49,687 pubs in the United Kingdom. The sheer number of options meant that algorithms and artificial intelligence alone were not enough; manual work and mathematical trial and error were crucial in coming up with an answer. It turns out that the optimal itinerary covers around 64,000 kilometers.

The miracle of the pencil

In summing up the invisible complexity behind everyday products, Milton Friedman famously said, “Nobody knows how to make a pencil.” The US Nobel Prize winner made highly entertaining use of the pencil example in a 1980s TV lecture to explain just what the economy is capable of. Making a pencil entails mining graphite, extracting rubber and felling wood in various regions of the world. Felling trees requires chainsaws, which in turn require steel, produced from iron ore as the main raw material, and so on. Summing up, there are countless steps and thousands of people involved in making something as seemingly simple as a pencil. That humble object is, in fact, a *tour de force* of global cooperation.



The measure of all things

Container volume trends in Shanghai, the world’s largest container port:

2013:
33.6 million TEU

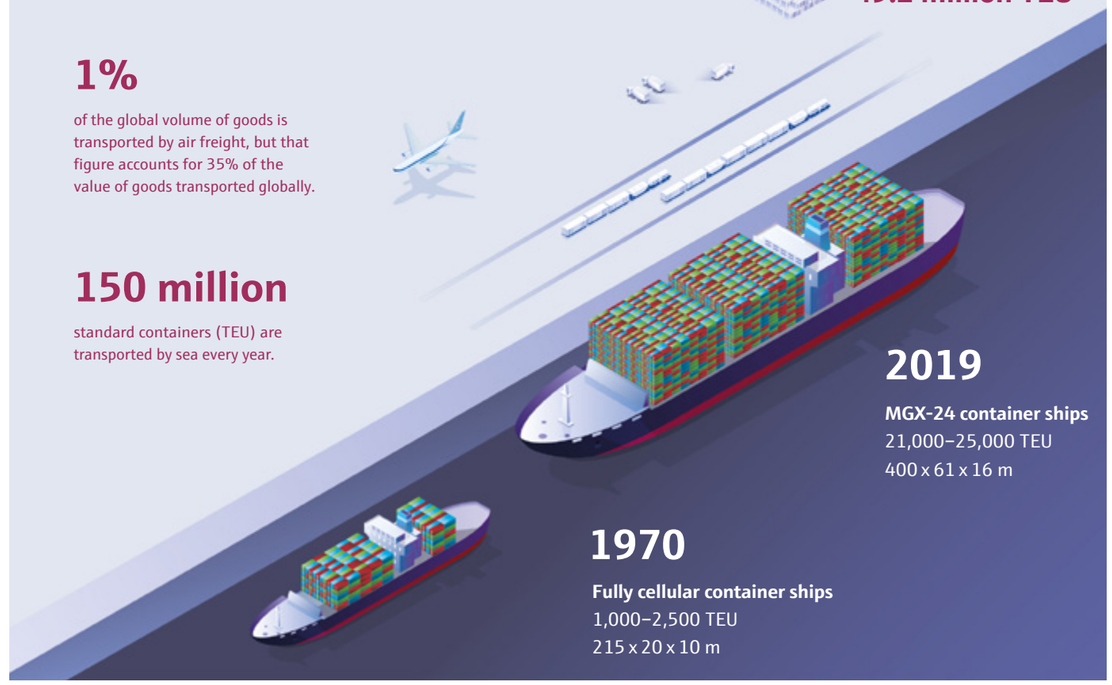
2023:
49.2 million TEU

1%

of the global volume of goods is transported by air freight, but that figure accounts for 35% of the value of goods transported globally.

150 million

standard containers (TEU) are transported by sea every year.



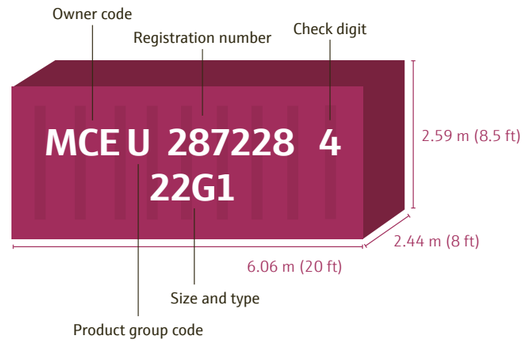
2019

MGX-24 container ships
21,000–25,000 TEU
400 x 61 x 16 m

1970

Fully cellular container ships
1,000–2,500 TEU
215 x 20 x 10 m

The 20-foot standard container (TEU)



Think of supply chains, and shipping containers automatically come to mind. For good reason, too: almost all trade goods travel around the world in these cuboid receptacles. Standardized container sizes make them easily stackable for optimal use of a ship’s carrying capacity. To transport more and more containers at ever lower costs, container ships have grown into ocean-going giants over time. Their load volume has increased tenfold over the space of 50 years. As such, they are a major driver of global trade.

So that no container goes astray on its travels, each has its own unique identifier, issued by the Bureau International des Containers et du Transport Intermodal.

The butterfly effect

American meteorologist Edward Lorenz brought chaos theory into the public consciousness with his notion that a butterfly flapping its wings in Brazil can set off a tornado in Texas. That same concept applies equally to supply chains, where even seemingly insignificant glitches can have major repercussions.

Text: Armin Scheuermann
Illustration: Totto Renna

Modern supply chains are optimized for efficiency. That means any disruption, however small, can quickly trigger an unpredictable chain of events. One such disruption occurred in the summer of 2022, when the war in Ukraine made natural gas so hard to come by and expensive in Europe that many fertilizer producers were forced to reduce or even shut down production at their ammonia plants using natural gas as a feedstock. Scheduled maintenance shutdowns of ammonia plants in the USA only exacerbated the situation. This butterfly wing flap in agribusiness precipitated a chain of events that ultimately took the fizz out of the beverage industry – literally and figuratively. Until the crisis, most industrial food-grade CO_2 used for bottling and carbonating soft drinks had been a by-product of ammonia manufacture. The resulting shortages drove numerous breweries, soft drink producers and mineral water bottlers to scale back their production.

FROM INTEGRATED PRODUCTION TO GLOBAL SUPPLY CHAINS

In the chemical industry, this type of interconnectedness – where the by-products of one process are used for other processes – is known as integrated production. Chemical giants like Dow and BASF have turned this kind of integrated supply chain into an art form that significantly enhances their production sites' resource efficiency, and hence economic viability. But there is a downside: a broken link in the chain can have unforeseen consequences for other processes, both at the plant in question and far beyond – as we have seen in the beverage industry example. What's more, a supplier who cannot guarantee supply risks losing revenue and market share, with the added sting that many customers may never return.

And yet, reliability of supply is just one among a growing number of challenges that companies must navigate in managing their supply chains. Indeed, while supply chain globalization has in recent years created new market opportunities and possibilities for cooperation, it has also driven an increase in complexity and vulnerability.

Supply chains across all industries – whether chemical, life sciences, automotive or machinery manufacturing – have been under pressure in recent times. Uncertainty and risks continue to grow. This upending of many things taken for granted by the big industrial players of the world came to a head during the pandemic years. As if the 2020 and 2021 closures of China's ports to halt the spread of the virus weren't enough, the Ever Given container ship ran aground in the Suez Canal, and most recently another one – the Dali – collided with a bridge in Baltimore. Suddenly, supply routes once considered reliable were anything but.

WHAT IS A SUPPLY CHAIN?

A supply chain encompasses all the steps involved in the production and delivery of a product, from procurement of raw materials to production through to distribution of the finished product to end customers. It is a network that connects companies, promotes efficiency and plays a part in product availability. Since the 1990s, when production steps became distributed across multiple countries and continents, supply chains have grown increasingly complex, long and fragmented. Problems can result from any disruption of the network and material flows caused by bottlenecks, outages or other changes. The Global Supply Chain Pressure Index (GSCPI) developed by the Federal Reserve Bank of New York gauges global supply chain conditions at any given time.

Meanwhile, the ongoing drought in Central America is causing a bottleneck in the Panama Canal shipping lane because there is not enough water available for the locks along the 80-kilometer waterway. Growing geopolitical tensions are also contributing to the uncertainty. Repeated attacks on merchant vessels in the Red Sea by Houthi rebels in Yemen, for example, have frequently made shipping companies divert cargoes to the significantly longer route around Africa. Shipping group Maersk estimates that this rerouting results in a 15 to 20 percent global reduction in freight capacity between Asia and Europe.

COMPLEXITY NEEDS STABILITY

This mounting uncertainty is particularly problematic for the manufacture of highly complex products that rely on numerous raw materials, intermediate products and specialized components. A stable, predictable and plannable supply chain is essential here, so the focus has shifted to risk management. Some pessimists are already predicting the end of globalization as the debate turns to localization, nearshoring and friendshoring, and logistics and supply chain managers increasingly concern themselves with supply chain resilience. The fundamental question here is how to make supply chains less vulnerable to disruptions. An increasing number of companies are recognizing that the answer lies in transforming existing supply chains. By doing so, they will be better placed not only to navigate complex supply chain challenges, but also to address the ever more exacting demands of customers and regulators.

Yet another challenge for the process manufacturing industry, with its energy-intensive operations, is to achieve sustainable production and a defossilized – if not decarbonized – value chain. Most companies in the industry are committed to the Paris Agreement target of achieving net-zero greenhouse gas emissions by 2050. In fact, many companies have set even more ambitious targets.

“The contribution of the supply chain for sustainability will be crucial.”

Dr Hanno Brümmer,
executive vice president of supply chain and logistics, Covestro

15%

to 20% of freight capacity between Europe and the Far East has been lost, according to Maersk, because merchant vessels are having to detour around the Red Sea due to ongoing attacks by Houthi rebels.

The greatest challenge for these companies is not the greenhouse gases emitted within their own operations, but the indirect emissions that arise in their value chains – known as Scope 3 emissions. The European Chemical Industry Council (Cefic) estimates that Scope 3 emissions account for more than 70 percent of CO_2 emissions in the chemical industry. And lawmakers around the world are continuing to apply pressure. As of January 2024, many companies in Europe are subject to the reporting requirements of the new EU directive on corporate sustainability reporting (CSRD), which obliges them to publish regular sustainability reports. Even the US Securities and Exchange Commission now requires companies to disclose climate-related risks and data. Similar regulations are also being advanced in the Asia-Pacific region.

ACHIEVING FULL VISIBILITY

There is an axiom in process automation that applies equally well to supply chains: If you can’t measure it, you can’t manage it. How much CO_2 is emitted in the production of raw materials and their packaging before they even arrive at the plant? How big is the carbon footprint of supplied electronics or housing components? Most producers have no ready answers to such questions. And that means taking a new approach to communications between suppliers and their customers.

2/3

of supply chain managers intend to invest in sustainability measures, according to a 2024 survey undertaken by Software Advice.

End-to-end visibility has thus become something of a buzzword among supply chain managers. They want to thoroughly understand their entire supply chain network. That involves conducting strict audits of their suppliers' operational practices and safety protocols. What's more, the audits are not confined to aspects like ability to deliver, sustainability measures and compliance with regulations such as the EU's recently adopted Corporate Sustainability Due Diligence Directive (CSDDD). Also under scrutiny is how well suppliers are protected against cyberattacks – an issue of increasing magnitude, as cybercriminals are now adept at sniffing out vulnerabilities among suppliers that could allow them to infiltrate further and penetrate the systems of their ultimate targets.

Security experts often cite the SolarWinds hack of 2020 as a textbook example of a supply chain attack. Cybercriminals infiltrated the IT management software of the American software company and were then able to spread malware via regular software updates, compromising thousands of corporate networks around the world. So it is hardly surprising that half of the companies polled in the 'Supply Chain Plans 2024' survey by Software Advice signaled plans to up their investment in cybersecurity. In 2023, a full 43 percent of the surveyed companies had experienced operational disruption as a direct result of cyberattacks.

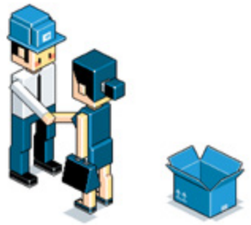
End-to-end supply chain visibility is also fundamental to achieving the much aspired-to circular economy, in which end-of-life products become raw materials for new products. To quote Dr Hanno Brümmer, executive vice president of supply chain and logistics at Covestro, speaking after a recent meeting of supply chain experts from the chemicals industry: "The contribution of the supply chain for sustainability will be crucial – both in terms of direct Scope 3 emissions and in enabling the transformation of the chemical industry to circularity." Speaking in a similar vein, Dr Thomas Schamberg, senior vice president of supply chain at Evonik, commented at the ChemSCM 4.0 Summit in Berlin: "In most of my conversations, it was clear that we must reuse our resources. And to make that happen, we must connect our supply chains even more."

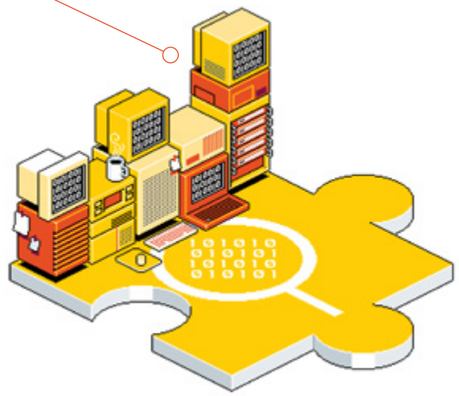
DIGITALIZATION IS THE KEY

Supply chain managers seeking end-to-end visibility will be pleased to know that the digitalization experts have their back. "With Industry 4.0, we see increasing interconnection of systems to achieve end-to-end supply chain automation," says Dr Felix Hanisch, president of the process automation users' association NAMUR. "For this we need solid metrics – both from production plants and the market." The point is that measurement data from warehouses and production facilities can be combined with logistics information to model supply chain and market behavior.

"A company that fails to stay on top of its supply chain will lose market share."

Oliver Blum,
corporate director of supply chain, Endress+Hauser





"We must reuse our resources. And to make that happen, we must connect our supply chains even more."

Dr Thomas Schamberg,
senior vice president of supply chain, Evonik

+4.31

points was an all-time high reached in 2021 by the Global Supply Chain Pressure Index, a measure of the intensity of disruptions to global supply chains, at the height of the Covid-19 pandemic. The historical average value is 0.

Digitalization and artificial intelligence play a key role in this process. They will increasingly enable agile responses by business owners to disruptions in the supply chain and help them realize digital business models. "We must continually rebalance the trade-offs between efficiency and resilience," explains Oliver Blum, corporate director of supply chain at Endress+Hauser, "because a company that fails to stay on top of its supply chain will lose market share." But from his perspective it's about more than risk management, and the measures and methods deployed: "The most important thing is to have collaborative partnerships with external suppliers and service providers."

Meanwhile, many brewers seem to have found a straightforward solution to the supply chain problem mentioned at the beginning of this piece. Instead of buying-in the carbon dioxide needed for their bottling processes, many now capture and reuse the carbon dioxide emitted during fermentation – a prime example of what is possible when process engineering and circularity work hand in hand.

About the author: **Armin Scheuermann** is a chemical engineer and journalist

Hand in hand

Crises, wars, pandemics: The challenges facing supply chains are enormous. We need to be bold in preparing for them, says Robert Friedmann, chairman of the Central Management Board of the Würth Group. With Matthias Altendorf, Endress+Hauser's Supervisory Board president, he discusses the advantages of family businesses and why it ultimately all comes down to people.

Questions: André Boße
Photography: Andreas Mader

Mr Friedmann, when was the last time you experienced a significant supply chain problem at the Würth Group?

Friedmann: We often experience shortages of various materials, especially plastics and metals. For us, the key question is what's causing them. The problem as we see it is that many companies are cutting capacity too quickly and too early. This was particularly so during the coronavirus pandemic, when many of our suppliers slammed on the brakes and slashed their inventories. The problem came afterwards, when it took three years to recover from such severe cutbacks. So, bottlenecks persisted well beyond the crisis that caused them.

How did you respond to the Covid crisis and the resulting market collapse?

Friedmann: At the time, we took advice from an economist who basically told us, "This lockdown won't last forever. Hang in there!" Holding out like that wasn't practicable in every case, but our general ambition was to stick it out for the longest time possible. Which paid off in the end. We made it through the crisis in good shape because we maintained product availability for customers. Although it needs saying that as a family-owned business, we have the financial strength necessary for such staying power.

Mr Altendorf, how does a company like Endress+Hauser brace itself for supply chain problems?

Altendorf: Some events are near-impossible to prepare for. Think of a pandemic closing Chinese ports, or a container ship getting stuck in the Suez Canal. But still, there are measures you can take to minimize risks and thus add resiliency to your supply chain. For instance, with upstream products we don't just rely on one supplier but have several spread across different economic areas. Then there's warehousing: here we don't seek to optimize from a purely financial perspective, but rather from our customers' point of view. And I agree here with Mr Friedmann that family-owned businesses do have certain advantages over publicly listed corporations.

Friedmann: As I see it, crises aren't likely to occur any less frequently in the coming years. We have to get used to the disruptions caused by political acts, wars, natural disasters and pandemics.

What does 'get used to' mean, exactly?

Friedmann: It means positioning ourselves to effectively handle potential disruptions. Which is far from easy to do, as supply chain management makes plain. The people who work on our supply chain have particularly challenging jobs.

How does Würth being a family-owned business affect relationships with your suppliers and customers?

Friedmann: This very encounter is a great example of that. Endress+Hauser is a long-standing customer of ours, placing thousands of orders every year. When Mr Altendorf and I get into discussion, it's not about key figures and prices, but rather values and what fosters our companies' unique cultures. It's not about the way things appear to be, but the way things really are.

Altendorf: I have an example to illustrate the relationship question. On a recent trip to India, I got into conversation with our suppliers. They had suffered a lot under Covid. And yet they kept on delivering. That benefited us and our customers. A number of these suppliers struggled with liquidity at times. They were close to going under, but we helped them out in ways like paying in advance for deliveries, trusting that we would receive the goods in due course. What I'm trying to say is that our supply chain is made up of partners. We know each other, we trust each other, we recognize that we can depend on each other, and we act accordingly.

How do growing sustainability demands affect supply chain management?

Friedmann: That's a question to examine from two perspectives. First, there is no denying that it falls to everyone to be more sustainable in the way we work, live and conduct business. The measures we take here need discussing in terms of their speed, appropriateness and efficiency. The second perspective considers the high regulatory requirements placed on companies in the EU. One of those is the Supply Chain Due Diligence Act. Operating under these rules requires a huge amount of effort that companies from Switzerland, China or the USA don't have to match. I take a critical view of the imbalance this creates.

Could things work just as well without rules?

Friedmann: I don't think we can achieve comprehensive change across entire economies just on the basis of well-meaning appeals. Getting there takes regulations – but these should apply to everyone.

Altendorf: The key thing for the transformation is to strike a balance between sustainability on the one hand and economic success and social compatibility on the other. Dogmatism and rushing things won't help. It's important to keep a sense of balance and moderation. Restructuring an economy within the space of a decade simply isn't possible. It's a task that will span generations.

"As I see it, crises aren't likely to occur any less frequently in the coming years."

Robert Friedmann, chairman of the Central Management Board of the Würth Group

CONTINUITY AND GROWTH

Robert Friedmann (born 1966) learned about working in family businesses at an early age when he trained as an industrial clerk at just such an employer, based on the shore of Lake Constance, Germany. He went on to study business administration in Germany and the USA. His first job took him to the Würth Group, which he joined as an assistant to the management team in 1992. From the outset, Robert Friedmann worked closely with Reinhold Würth, who appointed him managing director of a Würth subsidiary in 1997. Since 2004, he has been a member of the Central Management Board, the top decision-making body of the Würth Group, and has been its chairman since 2005. The Würth Group is the world market leader in the development, manufacture and sale of fastening and assembly materials. More than 88,000 employees handle over 54 million orders yearly, serving around four million customers. 2023 saw the Würth Group achieve sales above 20 billion euros for the first time.

One driver of the transformation is digitalization, where Endress+Hauser is heavily invested. So how are digital solutions changing supply chains?

Altendorf: As a good example, take our Global Logistics Operations Center in Ireland. There we can digitally track every package leaving an Endress+Hauser facility. And that's not all: We can steer packages around, correcting their route when necessary. This is an effective tool, especially in times of volatile goods transport chains.

At the Reinhold Würth Innovation Center CURIO, you are working on customized AI solutions to increase logistics flexibility. How far have you gotten with this?

Friedmann: All sorts of wonderful applications exist in theory. We're looking for applications that can help us right now. We've already had some successes: We can now use AI systems for more accurate prediction of customer behavior or to optimize the route a salesperson takes to visit their customers. Our planning team is also benefiting from the possibilities of AI. Logistics used to be a department that just dealt with existing systems. Today, the logistics people are also exploring the potential of machine learning. A lot has happened here.

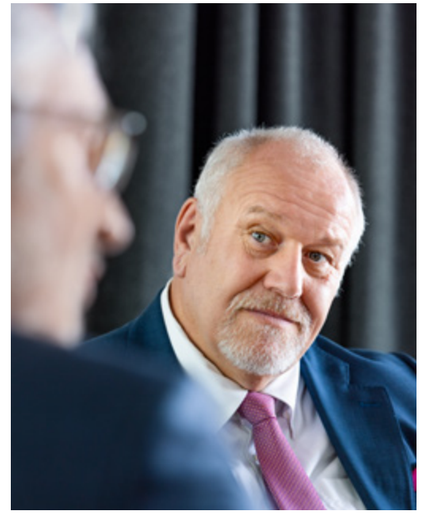
Altendorf: Job profiles in all areas of logistics have changed significantly and will continue to do so. I firmly believe that digitalization will not cost any jobs in the long run, but it will change almost every profession.

Around 44,000 people in the Würth Group worldwide work in sales. How important is the human factor in sales?

Friedmann: We still see our salespeople as crucially important; they are the ones who establish and maintain contact between the customers and us. For us it's only natural that sales has a big say on issues such as product availability and quality.

Altendorf: Selling is an emotional process, so friendliness naturally counts among Endress+Hauser's defining values, along with sustainability, commitment and excellence. Contact with customers via our sales force matters because that is our only means of discovering their motivations, where they use our products, how their business is developing and what they are trying to achieve. This makes our salespeople trusted confidants and advisors. For customers, they are the reassurance that what we sell actually works.

Friedmann: Our segment deals with a lot of craftspeople, who tend to like the human touch. Although these days it's essential to make use of digitalization, automation and AI, ultimately, the business we do is always between people.



"Our supply chain is made up of partners. We know each other, we trust each other, we recognize that we can depend on each other, and we act accordingly."

Matthias Altendorf, president of the Supervisory Board of the Endress+Hauser Group

Total transparency

For supply chains, transparency is key, and it starts with effective inventory management. Here, digitalization is driving solutions for a wealth of new applications – such as level monitoring in mobile, decentralized storage tanks and silos. The customer benefits range from efficiency gains to completely new business models.

Text: Marlene Etschmann
Photography: Matthias Haslauer, Christoph Fein

1

2

3

1
Clean swimming pool water is a question of the right chemistry.

2
For Kenneth Laursen, providing customers with top-notch service is a key benefit that comes from deploying Micropilot FWR30.

3
Color indicators show whether the water has the optimal pH and sufficient free available chlorine.

The skies are clear but for the occasional puff of cloud, and the outdoor water slide at the Vestbadet aquatic center in the Danish town of Viborg sparkles blue in the sunshine. On this perfect summer's day, three children are racing each other down the slide's triple lanes, reveling in the 25°C warmth of the pristine water. If it were up to him, Kenneth Laursen would be cooling off in the pool, too. A dip would be just the thing – provided, of course, that the water is the right temperature, has a pH of between 7.0 and 7.6 and contains at least 1 mg of free available chlorine per liter.

A CLEAN POOL IS A SAFE POOL

Kenneth Laursen knows all about swimming pool water. His company, Cabola ApS, supplies close to 300 sites all over Denmark with the chemicals they need to provide clean swimming conditions for several hundred bathers at a time: primarily sodium hypochlorite solution and sulfuric acid, along with hydrochloric acid and cleaning agents. In water, sodium hypochlorite dissociates into hydroxide ions and free available chlorine. The latter not only inhibits algal growth but also oxidizes the dead skin cells, sweat and sunscreen washed from swimmers' bodies – a chemical reaction that produces chloramines, the compounds that give swimming pools their characteristic 'chlorine' odor.

How frequently these chemicals need replenishing depends on multiple variables: temperature, the level of solar radiation and the number of people in the pool. Kenneth Laursen: "It also makes a big difference to chlorine consumption whether swimmers shower before entering the water." That means the daily amount of sodium hypochlorite added may vary between 10 and 20 ml per cubic meter of pool water. As a result, Cabola's customer resupply intervals are rather variable, which can lead to logistical inefficiencies. "Whenever the Vestbadet pool used to order from us, we'd phone around our other customers in the Viborg area to see

“Having good, long-term relationships with my customers matters more than short-term sales.”

Kenneth Laursen, director, Cabola ApS

1

3

2

if they needed anything,” Laursen explains. “But even then, our delivery truck would often leave the depot half full. That’s something I wanted to change.”

Kenneth Laursen initially sought a solution by fitting his customers’ storage tanks with remotely monitored gauges. But this proved too expensive, and the immersion probes they used couldn’t withstand the corrosive chemicals. In the end, he found the solution to his problems at Endress+Hauser. Now there is a dashboard that gives Cabola employees 24/7 visibility into their 300 customers’ chemical inventories and consumption rates, providing the key to tailored replenishment.

4

1
Micropilot FWR30 is battery-powered, compact and ready for action in mere minutes.

2
Cabola’s trucks use almost 10 percent less fuel thanks to optimized route planning.

3
The sensor is mounted on the tank and measures level contactlessly by sending radar waves through its plastic wall.

4
Intermediate bulk carriers (IBCs) are widely used in industry as an efficient way of transporting and storing liquids.

VALUABLE INSIGHTS

“The Cabola example shows how transparency can optimize logistics and inventory processes,” explains Christian Reichert, director of engineered solutions at Endress+Hauser. Transparency-enhancing solutions have indeed been widely used for many decades. “Financial performance and competitiveness in the process manufacturing industry are highly related to effective inventory management around materials storage, transfer and distribution,” Reichert says. High inventory levels improve suppliers’ ability to meet demand but tie up a lot of capital. Lean inventory levels, on the other hand, cut costs at the expense of the ability to deliver on demand. “That’s why companies use inventory management solutions: to find the right balance. It’s about making their processes more efficient and boosting productivity.”

For a long time, though, such solutions were not an option for operators like Cabola where the storage units are intermediate bulk carriers (IBCs) – stackable plastic containers with capacities ranging from 300 to 3,000 liters. Used in many industries for transporting and storing liquids, IBCs tend to be relocated frequently, often in quite far-flung places. “Conventional wired measuring systems are generally too complex and pricey for small installations or applications that don’t have overly stringent safety requirements,” explains Christian Reichert. “So, there was no cost-effective way to automate their measuring processes.” Gauging fill levels in smaller IBCs that move around basically meant making do with visual checks, periodic sampling or estimates.

But now, electronics miniaturization and cloud technology have come to the rescue. In 2019, Endress+Hauser launched its Micropilot FWR30 – a compact level sensor that sits on the tank’s exterior and sends radar waves through the plastic wall into its interior. The technology determines the level contactlessly using time-of-flight measurement. Power for the sensor comes from a lithium-ion battery that can last up to 15 years depending

1

2

on measurement interval. The instrument has an inbuilt SIM card enabling access to the cellular network, which is used to transmit measurement data to the Endress+Hauser Netilion cloud – no gateway involved. From there, digital services visualize the data, so authorized users can monitor fill levels from any tank gauge out in the field.

DATA FROM THE OUTBACK

This same solution also works in remote locations like the vast countryside that Australians call the outback, as Endress+Hauser international business development manager Volker Schulz explains. The customers he supports on this sparsely populated continent include a company that produces and supplies concrete additives to construction sites. The logistics of this can be quite challenging. "If the concrete plasticizer runs out, the building site grinds to a halt until fresh supplies arrive from a thousand kilometers away." On the other hand, early reordering just to be sure can be equally problematic, because every truck trip into the outback for anything less than a full tanker load of chemicals is bad for profitability and sustainability.

The company now has several hundred FWR30 sensors in use across various countries and uses the Endress+Hauser SupplyCare cloud-based inventory management platform to give its customers 24/7 access to dashboard maps revealing information about each of their tanks. This digital service does more than monitor tank levels; it also tells the customer whether the stored product has been withdrawn from a tank and processed at the right temperature – an important parameter in places where temperatures can rise to 50°C. Additionally, the system generates short-term forecasts based on monitored changes in tank levels. "Any fall below a set level will trigger an alert or automatically initiate a replenishment order," Schulz explains. This eliminates the risk of empty tanks and stop-start construction work.

1
Construction sites need sufficient stocks of concrete plasticizer on hand at all times, otherwise work grinds to a halt.

2
SupplyCare gives customers visibility into their inventory levels from anywhere, at anytime.

"Micropilot FWR30 brings transparency to a whole host of new applications and improves decision-making."

Volker Schulz, international business development manager for inventory management solutions, Endress+Hauser

15 years

– Micropilot FWR30 level sensor's maximum battery life, depending on measurement interval.

THE PANDEMIC AS A CATALYST

The pandemic has driven further refinements to this technology. Christian Reichert: "The delivery problems encountered during the pandemic and growing expectations around sustainability have made companies even more aware of transparency as a factor. Customers now also want the ability to monitor their supply chains, from small segments to the entire thing. We're seeing strong demand here, particularly in the construction materials sector." Endress+Hauser responded by working closely with users to extend Micropilot FWR30's functionality. The instrument now has a process connection for metal tanks and silos – to allow for the fact that radar beams can't penetrate metal walls. In addition, it can now measure bulk solids and has location-tracking capability.

One of the customers involved in developing all these innovations was Profibaustoffe Austria GmbH, a company that processes limestone from its own quarry into cement, mortar and render for walls, floors, facades, gardens and road construction. Supplies of these materials leave the company base in Ernstbrunn, Austria, destined for construction sites around the country and across the border in Eastern Europe from its base in Ernstbrunn, Lower Austria. The transport containers are cylindrical steel silos that can be swapped out or refilled as required. Even empty, the silos are quite valuable, so it's worth knowing their location at any given time. And that's where Micropilot FWR30's GPS function comes in. The technology also helps with route planning.

FROM LIQUID TO SOLID

But first things first: before the cloud-based sensor could be any use at all to Profibaustoffe, it had to be adapted for solid construction materials. While radar technology is ideal for gauging the level of liquids, it doesn't work so well with solids like dry building mixes because the reflected signal is weaker. Measuring values can be further skewed if the silo contents form a crater when material is removed, or a cone when material is topped up. So, using measurement data from field tests, the Endress+Hauser team linearized the signal and optimized the sensor for measuring bulk solids. Using material-specific conversion factors, the system's software automatically processes the resulting level data to calculate how many tonnes of mortar or mix are in the silo.

Christian Kreitzer, shipping director and deputy sales manager at Profibaustoffe Austria GmbH, is delighted with the outcome: "Together with Endress+Hauser we developed and implemented the perfect solution for level

1

15 meters

– the sensor's maximum measuring distance.

2

1
Measurement data is uploaded via cellular network to the cloud, where it is available 24/7 even to people on the go.

2
For metal silos, the sensor attaches using a process connection.

monitoring in silos. The cooperation worked really well, and we are very satisfied with the result." Thanks to the solution's web-based inventory management software, the company always has total transparency across all stages of its supply chain, from production and distribution through to storage on construction sites. This makes for optimized delivery routes, which in turn lower operating costs and reduce the company's carbon footprint. The FWR30 has a further function that the team at Profibaustoffe Austria really likes: a sensor that can track changes in silo orientation. This is useful because the silos are transported horizontally and tipped to vertical on arrival at the construction site. In effect, the sensor provides definitive documentation of the company's on-time delivery performance.

IMPROVED RELATIONSHIPS WITH CUSTOMERS

Thanks to Micropilot FWR30, the producer and supplier of concrete additives in Australia has even developed a new business model. The company now manages its customers' inventory, guaranteeing that they will always have enough plasticizer in their storage tanks. And in Denmark? Kenneth Laursen has achieved his goal of optimizing truck capacity utilization, cutting fuel consumption by almost 10 percent. And he, too, is leveraging this new technology to strengthen relationships with his customers: "If outdoor swimming pool operators contact me to order replenishment chemicals in late summer, I'll gladly advise them against that if their current usage patterns indicate that existing stocks will last through to the end of the season," he explains. "My customers really value that. For me, having good, long-term relationships with them matters more than short-term sales."

Anytime, anywhere

Christian Reichert is responsible for Endress+Hauser's inventory management solutions business. In this interview, he talks about optimizing measurement technology and IT solutions so customers can get more out of their level data.

Questions: Christine Böhringer
Photography: Christoph Fein

"Supply chain managers want to know more about their supply chains – both internal and external."

Christian Reichert, director of engineered solutions, Endress+Hauser

In recent years, businesses have been paying more attention to their supply chains. What challenges are they currently encountering here?

Companies want full transparency across their supply chains. They want the ability to track their products and materials: quantities, consumption and location. Why? So they can make better decisions. That has always been the point of inventory management, obviously. But the pandemic, rising sustainability requirements and the skills shortage in logistics have brought transparency to the forefront of everyone's minds. The other driver is digitalization: it makes inventory data readily accessible from anywhere, and data visualization has vastly improved.

In what ways is Endress+Hauser helping companies with inventory management?

Our comprehensive portfolio and decades of expertise mean we can provide measurement solutions for pretty much any application, however complex. That's everything from level monitoring in tanks, silos and containers to custody transfer metering at tank farms and terminals, to the control of loading and unloading operations involving oil, gas and other fuels. On top of that, we help companies optimize their supply chains by providing them with inventory management software solutions. Those may run on hardware provided by Endress+Hauser, or on customers' own existing IT infrastructure – it's their choice. We even offer software-as-a-service options where we take care of all aspects of the application. The data used by these solutions is transferred via secure gateways. There are also standardized interfaces for integration with ERP systems.

How do you decide what new solutions and features to add?

By resolutely focusing on our customers' needs. For example, when we saw that companies wanted more comprehensive monitoring of their supply chains, we responded by developing the FWR30 cloud-based level sensor. It has sparked intense interest in new use cases, so we're expanding the range of applications covered. We're currently working on a new, responsive web design for SupplyCare – to make the software more user-friendly across a wide range of devices. And in other trends, we're noticing more and more customers seeking to extract greater value from their measurement data. This is especially true of data on consumption patterns, with its potential to offer a wealth of insights into things like overall demand and process efficiency.

Steady supply

Global supply chains are under mounting pressure from geopolitical tensions, complex regulatory landscapes, resource shortages and production bottlenecks. Endress+Hauser counters these challenges with end-to-end transparency to deliver efficiency and stability – for customers and in its own operations.

Keeping the wheels turning

For process industry companies to keep a grip on their supply chains, they need reliable partners. Corporate director of supply chain Oliver Blum explains how Endress+Hauser makes sure that it can deliver the right products in the right quantities at the right time, even in difficult circumstances.

Questions: Christine Böhringer
Photography: Andreas Mader

RESILIENCE

Many supply chains have buckled under the crises of recent years. So, what's the secret at Endress+Hauser? How does the company ensure fast, reliable delivery when virtually every instrument is unique and order volumes are increasing?

Our supply chain is remarkably efficient and robust despite its complexity and growing external pressures. A lot of that comes down to Endress+Hauser being a family-owned business. As such, our commitment to sustainable, long-term growth drives us to invest the bulk of our profits back into the business – and that includes our integrated supply chain. Thus we have expanded and optimized our supply chain infrastructure and IT over the course of many years, digitalizing and standardizing processes, making them transparent. Then there are our values, driving us to pursue long-term partnerships with our suppliers and service providers based on mutual trust and respect. All of this adds up to a solid foundation for our resilience – our ability to withstand disruptions and cushion their impact.

What does this resilience look like?

Through the crises of recent years, we were generally always able to deliver. Even in 2021, when the global shortage of raw materials was at its worst, we got over 90 percent of all deliveries to our customers on time. We always had air freight capacity. We held sufficient inventory to ride out materials shortages. And, thanks to our global transportation and logistics network, we always had sufficient last-mile capacity to balance out any production delays. Today, on almost all continents where we have a production footprint, our products are distributed regionally via logistics hubs. This is where we initially ship our dispatch-ready goods. From those hubs, we use algorithms to manage final shipment and find the right transport provider for each delivery. The time-critical ones are assigned the highest service level automatically, every time.

DRIVING CONTINUOUS IMPROVEMENT

Oliver Blum (47) and his team coordinate the Endress+Hauser Group's global supply chain and are responsible for its ongoing development. Blum holds a degree in business administration and has been with Endress+Hauser for 20 years. A 'numbers guy', he is a big fan of measurement as a creator of transparency, which in turn is the key to optimization. Continuous improvement is also part of the supply chain expert's personal philosophy. Outside of work, it finds expression in his passion for playing soccer. And at a professional level, it is evident from his having just completed a further training course at MIT Sloan with a syllabus that included agile methods.

> 2.9 million

sensors and systems were successfully delivered by Endress+Hauser in 2023.

How do you reconcile the twin demands of efficiency and resilience in your supply chain?

By putting our customers' needs at the center of everything we do. Our customers want short delivery times and a reliable, local service. They also want total transparency about the status of their orders. For continuous improvement on both counts, we track global key performance indicators, gather findings from across the worldwide Endress+Hauser network and request customer feedback after each delivery. From there we use agile methods to have all these insights actioned immediately in our supply chain. This is our approach to improving its efficiency, continuity and sustainability. It also gives us the flexibility to respond to unforeseen situations.

How much of a help is digitalization here?

Digitalization and AI are already important drivers in global supply chains. And their importance will only grow in response to factors such as increasing risk and new regulatory requirements. Digitalization helps us, for example, to automatically check offers and proposals for compliance before submitting them. We use software to examine new regulations for elements of relevance to our business. And we use a special IT platform to monitor our supply chain for operational, financial and legal risks, not least as they pertain to Germany's Supply Chain Due Diligence Act.

What will be your prime areas of focus in coming years?

Our goal is to achieve delivery reliability of over 96 percent by 2027 while scaling up our supply chain to keep pace with growth. Sustainability will also be high on the agenda. As an example, Endress+Hauser has set its sights on net zero greenhouse gas emissions by 2050. One of the challenges here is that our instruments use a lot of steel and aluminum, which in turn means a lot of Scope 3 emissions from procurement of those materials. Here, too, digitalization will have a key part to play. Partnership will also be vital, because climate neutrality is not something that can be achieved overnight; getting there requires long-term cooperation.

Full steam ahead

The global maritime cargo fleet constantly traverses the seas, playing a vital role in the world's supply chains. And while there are moves to make cargo ships more environmentally and climate friendly, the alternative fuels this requires pose new challenges for bunkering.

Text: Christine Böhringer
Photography: Shutterstock

Change of course: Ships crossing the world's oceans are increasingly being required to adopt lower-emission fuels.

BUNKERING

Cargo ships are the lifeblood of our global supply chains. There are some 58,000 of them crossing the oceans, moving about 90 percent of the world's trade in goods – containerized products and bulk cargo such as crude oil, chemicals and grain. But there are challenges on the horizon. Under standards mandated by the International Maritime Organization (IMO) and many national regulators, these vessels are required to become progressively more sustainable in their operation. There are already strict limits on the sulfur content of fuel. Then there's the push to reduce greenhouse gas emissions by at least 20 percent from 2008 levels by 2030, and even further by at least 70 percent by 2040. The ultimate aim is to make cargo ship operations climate neutral by 2050.

"That means the shipping industry will either have to separate, store and use CO_2 or switch from heavy fuel oil and marine diesel to alternative fuels," explains Michael Kaiser, who is in charge of flow management solutions at Endress+Hauser Flow. Ideally, he notes, that would mean using green methanol, ammonia and green hydrogen. But industrial-scale production of these fuels still lies some way in the future. "Hence the growing use of liquefied natural gas as a transitional technology. Although LNG is still a fossil resource, it beats heavy fuel oil in that it contains zero sulfur. What's more, its combustion releases 20 percent less CO_2."

> 400

LNG-powered oceangoing vessels are currently being built.

Nonetheless, the switch to LNG poses challenges for all stakeholders. Shipping lines will have to convert and replace their fleets, not to mention put in place the port infrastructure needed to fuel their ships via terminals, trucks or bunker vessels. And because these custody transfers involve thousands of cubic meters of LNG changing hands – not to mention vast sums of money – the bunker quantities exchanged need to be measured with absolute precision. On this point, Stephan Natter, principal expert business development at Endress+Hauser Flow, explains: "Endress+Hauser, in partnership with customers and regulators, has developed a solution specifically for the purpose. It's a world first because it can determine both the quantity and the composition of the transferred LNG in real time. This makes it possible to calculate the total energy transferred, and thus the LNG's transactional value."

DIRECT IN-LINE QUALITY MEASUREMENT

The solution centers on two components optimized specifically for the cryogenic conditions (around −162°C) needed to keep natural gas in liquid form. Stephan Natter explains: "Our Proline Promass Q Coriolis flowmeter provides precision measurement of LNG quantity, while the LNG's composition is analyzed by a system based on Raman spectroscopy, an alternative to conventional gas chromatography." Gas chromatography first requires vaporizing LNG back into its gaseous state, a time-consuming and complex process. In addition, the vaporizers require intensive maintenance. The Raman system, on the other hand, comprises a probe located directly in the LNG line and connected via a fiberoptic cable to an LNG-optimized Raman analyzer. It uses a light-scattering technique to build a chemical profile of the measurement sample. "All this makes the Raman system fast, reliable, efficient and less demanding of specialist knowledge to operate," says Stephan Natter.

This Endress+Hauser solution is certified for custody transfer and is already in use on several LNG bunker vessels. These mobile bunkering stations are becoming steadily busier as more LNG-powered ships come on stream. At present, only 1 percent of all vessels worldwide can run on LNG, but this is changing, as Michael Kaiser explains: "The Det Norske Veritas (DNV) classification society is registering a shift in the order books towards new-built ships powered by alternative fuels. There are currently over 400 oceangoing vessels with LNG propulsion on order." And where does Endress+Hauser fit into this? Stephan Natter: "We're already working on the next wave of innovations – including for green methanol, the rising star on the horizon – to further support the shipping industry's energy transition."

3 questions for Michael Kaiser

Michael Kaiser, an information systems engineer, heads Endress+Hauser's flow management systems business.

The first LNG bunkering systems from Endress+Hauser are being used in Singapore. Is that a coincidence?

No. Singapore is already the world's largest bunkering port and aspires to leadership in LNG bunkering as well. Moreover, its regulators are committed to quality and reliability because of the colossal sums of money involved. That's why, in 2017, Singapore became the first jurisdiction in the world to mandate the use of high-precision Coriolis technology in heavy fuel oil bunkering. Our Coriolis metering solution subsequently became one of two such systems certified for this new custody transfer process. Today we lead the market and have amassed a great deal of bunkering experience.

What difference has the introduction of this flow metering solution made?

Previously, measurement was mostly manual, with methods like tank gauging tapes used to read fill levels. That made measurement processes imprecise and error-prone. And unlike our systems, those processes couldn't detect whether volumetric readings were artificially inflated by entrained air. More ports are now mandating the use of Coriolis technology for bunkering. In custody transfer operations, we're noticing a general push for greater transparency – not least in terms of measurement quality.

What other trends do you see on the horizon?

Concerning transparency, digitalization is another growth area. In Singapore, for example, cloud availability of bunkering data is set to become mandatory. By integrating cloud-based measurement data, digitalization will give customers greater insights into the bunkering process and hence new optimization scope, for example in terms of energy efficiency.

A novel spin on beer testing

Are there bacteria in the fermenter that will spoil the beer? Laboratory analysis can answer this question, but it takes time. Now, a new system developed by Endress+Hauser enables on-site testing that is both quick and incredibly simple.

Text: Christine Böhringer
Illustration: 3st kommunikation

HOW THE ON-SITE TEST WORKS

1

Brewers use a special kit to draw a 100-milliliter sample of their beer and concentrate it using a two-step procedure they can easily perform themselves.

2

The sample is transferred to a single-use microfluidic cartridge shaped like a semi-circular disc, with all the necessary reagents inside. Each test run can be carried out with two cartridges.

3

The cartridge goes into the processing unit. It runs a DNA or RNA extraction followed by a multiplex real-time PCR test, all at the touch of a button.

4

Rapidly spinning the cartridge subjects the contained liquid to centrifugal forces that steer it through internal channels connecting the reaction and analysis chambers.

5

Analysis algorithms interpret the results of the real-time PCR test, which are displayed on screen. It is thus possible to establish the presence of up to 18 bacteria or types of yeast.

QUALITY ASSURANCE

Compared to water, beer is a safe drink. Its five percent alcohol content, slightly acidic pH value and near-zero oxygen content mean salmonella doesn't stand a chance. But there are other bacteria and yeasts that have adapted to those conditions. Microorganisms that can spoil the beer may find their way in during the brewing process via ingredients, through contact with plant components or at the bottling stage – and compromise product quality over time. The result can be a beer that tastes or smells different, and may become cloudy, sour or unpalatable due to unpleasant aromas.

Breweries are keen on early detection of these impurities. Thus they run microbiological quality controls to prevent the spread of germs, the loss of entire batches or even product recalls. PCR laboratory analysis familiar from Covid-19 times represents the gold standard. "The lab procedure takes three and a half hours, using numerous machines in different rooms. Add to this the time needed to transport the sample, and two days can pass between extraction and result," says Dr Nicholas Krohn, managing director of Endress+Hauser BioSense. The company is now helping brewers get there faster with a new PCR analysis system. With it they can test samples themselves, on site, for up to 18 beer-spoiling bacteria or yeasts. The small device is simple to operate and delivers results in under 90 minutes.

Centrifugal microfluidics is the core technology of this system. It allows minuscule amounts of liquid to be handled in the tiniest of spaces. "This means a single cartridge can carry out entire laboratory processes automatically at the touch of a button, without manual intervention for reagent handling. These lab-on-a-disc applications are already widespread in medical diagnostics. What we have done is transpose them into industrial process and laboratory automation," says Nicholas Krohn. Another key element was an innovative sample concentration method developed by IST Innuscreen, an Endress+Hauser Group company. "The process doesn't require centrifugation, filtration or flocculation, so it needs no special equipment or training. Any employee can prepare a sample for analysis in just a few simple steps," Krohn is convinced.

Great access

More and more customers are using endress.com to purchase and manage their instrumentation online. The digital platform evolves with the needs of its users.

Text: Christine Böhringer
Photography: Endress+Hauser

2

1

DIGITALIZATION

Ivan Larionov has a lot on his plate as head of industrial automation at Silumin-Vostok LLP. The engineering company from Kazakhstan develops technical solutions for process automation and power distribution for numerous industries. It also manufactures its own automation cabinets, electrical distribution cabinets, cooling systems, pumps and shut-off valves. "I get a lot of inquiries every day, including about the selection and design of system control and measuring devices," says Larionov. "Our department's main job is to find the best technical solution for every customer need and to process incoming inquiries quickly."

Silumin-Vostok LLP has relied on Endress+Hauser for measurement technology for many years. "The measuring devices cover 98 percent of our field," says Larionov. The team uses endress.com to find and order the right instruments. Customers can carry out transactions themselves quickly and easily on the platform. For example, they can select products, check prices and delivery times, generate quotes, place orders, track deliveries, download documents or view order histories. Having a tool that helps find and design the most suitable product is particularly important for the Silumin-Vostok team: "We use it all the time because it allows us to select a device quickly and confidently, while taking all the subtleties of the application into account," says Larionov.

"With endress.com, we are creating transparency in the supply chain and helping our customers to be more productive," says Vincent Dessus, head of digital business development at Endress+Hauser. These factors all contribute to a real success story: "In 2023, we had over 10 million website visits and online sales are growing steadily," says Dessus. Digital specialists and technical experts are continuously developing the platform with the support of customers and information from users' surfing and purchasing behavior. "We roll out adjustments quickly and are constantly reviewing their added value," says Andreas Camenzind, head of digital product development. "Most recently, we optimized the user interface, created new self-service functions and established a support area."

Ivan Larionov also values the increased convenience, especially when it comes to online ordering for engineering: "There's no bureaucracy, no delays and no additional paperwork. A few clicks and the order is on the way."

3

1
Digitally connected: Ivan Larionov of Silumin-Vostok LLP uses endress.com for day-to-day business.

2
Oil & gas, chemicals or mining: An online tool helps find and select the best device for the application before ordering.

3
From quotes to operating instructions: All documents and current information on measuring devices are always accessible in the portal.

Reaching our goal together

Supply chain decarbonization is a must for Endress+Hauser to achieve its aim of climate neutrality by 2050. Sustainability expert Janaina Fagundes explains how everyone involved is working together to achieve this objective.

As told to Kirsten Wörnle
Photography: Kristoff Meller

SUSTAINABILITY Like the entire manufacturing industry worldwide, Endress+Hauser has embarked on a journey towards greater sustainability. We want to pivot away from fossil fuels and shape our business and production processes to be more climate friendly. We and many other companies have realized that the largest share of our carbon footprint comes from greenhouse gas emissions along upstream and downstream value chains in Scope 3. Materials procurement alone accounts for one third of the footprint, because a lot of steel and aluminum goes into our measuring instruments.

So for us to become climate neutral by 2050, every other stakeholder in the supply chain must similarly reduce their emissions to net zero. By 2034, we aim to emit 35 percent less CO_2 in Scope 3, where our suppliers also contribute. Endress+Hauser Flow, the competence center for flow measurement technology, has accordingly approached suppliers whose goods reach us carrying a particularly high emissions load. We are currently finalizing agreements with them on the percentage by which they can reduce their carbon footprint by 2034 and drawing up joint action plans. Those include suppliers reporting specific measures being taken – for example, whether they are switching to renewable energy, implementing process improvements or setting up closed-loop heating systems.

CREATING TRANSPARENCY

Like all the other Endress+Hauser competence centers, we will have calculated the carbon footprint of our top products by the end of this year. This involves taking stock of the impact of the individual components. It is a highly complex procedure when one considers an instrument such as Prowirl F 200, a vortex flowmeter. 425 parts from 69 direct suppliers and many subcontractors go into its manufacture. Due to the high complexity and variety of data, calculation inaccuracy is likely to be 40 percent. Nevertheless, this product-related footprint becomes a valuable tool: we can see which components have a particularly high CO_2 load and hence what our priorities should be in terms of materials procurement and product design.

In our company, as in the manufacturing industry as a whole, we are experiencing the transformation day by day. Sustainability is becoming a key factor for successful business, not least because of the reporting requirements incorporated into various pieces of legislation. Moreover, under the EU Carbon Border Adjustment Mechanism there will be levies on imports of CO_2-intensive goods starting in 2026. This means companies that have not cut back on CO_2 in their manufacturing will lose competitiveness.

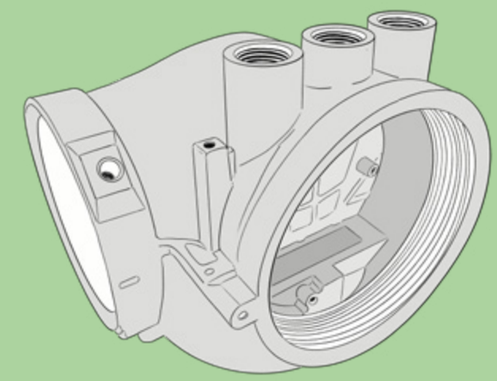
Europe, India and China have industry forums at which we discuss these issues with our suppliers in person. It is about learning and progressing together. Our long-standing focus on dependable relationships gives us a good starting position. I see some pleasing momentum here: At the beginning of 2023, many suppliers still did not have this topic on their radar. Now, just one year later, I feel things in motion. It's like a stone dropped into water, creating ever-wider circles.

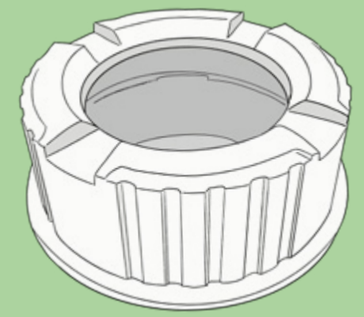
As senior expert for corporate social responsibility, **Janaina Fagundes** is in charge of sustainability activities at Endress+Hauser Flow in Reinach, Switzerland.

Less is more

Procurement offers great leverage towards achieving climate neutrality. That's because with high production volumes – of instrument housings, for example – even small material savings can make a difference.

Text: Marlene Etschmann
Graphic: 3st kommunikation





CO_2 REDUCTION Endress+Hauser groups several flowmeter product families under its Proline instrument concept. One variant of Proline 300 alone ships in quantities of around 50,000 units per year, all with identical housings. This is where strategic buyer Roger Tschudin sees huge potential for saving material through design. "We already had experience from redesigning another housing cover, a relatively simple affair. But this housing presented a considerably greater challenge because the instrument inside is used in explosion protection areas with their own special requirements."

Carbon footprint analysis of flowmeters shows that their mechanical components account for around 85 percent of the total because they contain a lot of steel and aluminum. "In principle, the steel sensor components offer most scope for saving material and thus emissions, but it would be very difficult to make changes here," says Fabian Dreier, head of supply chain management at Endress+Hauser Flow. "The pipes are under pressure and there are norms and standards to be met." It is more practical to adapt the housing and cover of the transmitters. While these account for around 30 percent of the carbon footprint, they still cannot be redesigned instantly.

It took three years of close cooperation between engineering and suppliers before Fabian Dreier was able to announce the results: reducing wall thickness from 9 to 7 millimeters makes the housing and the cover 12 and 19 percent lighter, respectively. This saves more than 15 tonnes of aluminum per year, or the equivalent of 160 tonnes of CO_2. Reinforcements at other points compensate for the reduced wall thickness. The challenge was that the assembly inside could not change too much, because the electronics remain the same and need sufficient space.

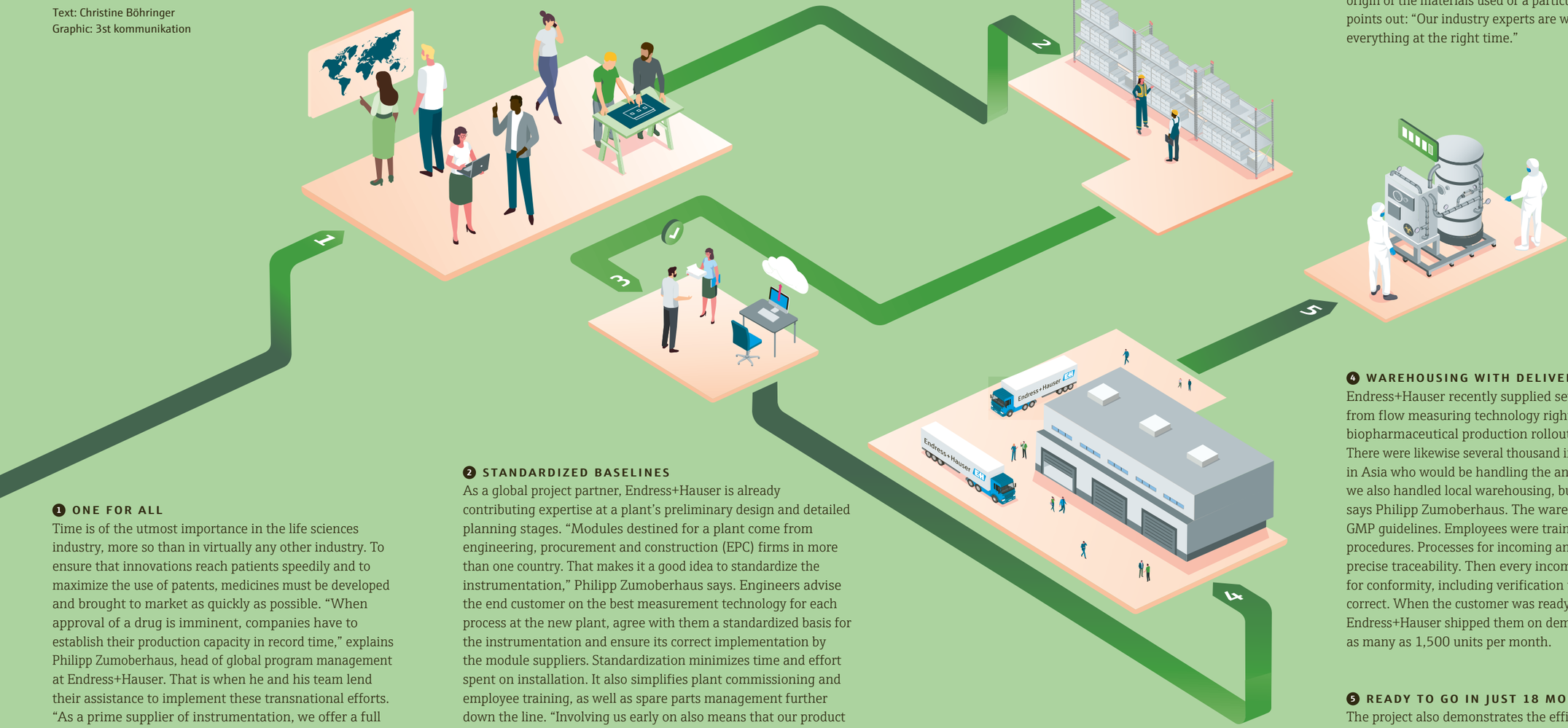
"We developed the eco-design for the new housing using numerical simulations. This saved us a lot of time and testing," says Andre Brygadin, an expert in casting processes at Endress+Hauser Flow. "The external certification and the pressure test for explosion protection took the most time." There were also adaptations to the manufacturing process, as he again explains: "High-pressure aluminum casting is faster and more precise than low-pressure casting. Parts emerge from the mold close to their final quality and barely need any finishing." The housings are supplied complete with powder coating, which removes a step from Endress+Hauser's supply chain and makes customers' supply chains correspondingly shorter. The new housings are currently being introduced.

GLOBAL PROGRAMS

Perfectly coordinated

With complex international projects, Endress+Hauser also handles customers' supply chain management. From the life sciences industry comes a demonstration of the immense difference this makes.

Text: Christine Böhringer
Graphic: 3st kommunikation



1 ONE FOR ALL

Time is of the utmost importance in the life sciences industry, more so than in virtually any other industry. To ensure that innovations reach patients speedily and to maximize the use of patents, medicines must be developed and brought to market as quickly as possible. "When approval of a drug is imminent, companies have to establish their production capacity in record time," explains Philipp Zumoberhaus, head of global program management at Endress+Hauser. That is when he and his team lend their assistance to implement these transnational efforts. "As a prime supplier of instrumentation, we offer a full spectrum of measuring technology to the industry. In addition, with our global program we organize the entire supply chain side of things and coordinate everyone involved. That means our customers can focus completely on their core business and medicines become available earlier."

2 STANDARDIZED BASELINES

As a global project partner, Endress+Hauser is already contributing expertise at a plant's preliminary design and detailed planning stages. "Modules destined for a plant come from engineering, procurement and construction (EPC) firms in more than one country. That makes it a good idea to standardize the instrumentation," Philipp Zumoberhaus says. Engineers advise the end customer on the best measurement technology for each process at the new plant, agree with them a standardized basis for the instrumentation and ensure its correct implementation by the module suppliers. Standardization minimizes time and effort spent on installation. It also simplifies plant commissioning and employee training, as well as spare parts management further down the line. "Involving us early on also means that our product centers can plan better. And that ultimately guarantees high reliability of supply, helped along by the sales centers responsible for individual EPCs and by our global logistics network," Philipp Zumoberhaus explains. A project schedule provides transparency and keeps everyone in the project coordinated worldwide, not least in the event of new requirements arising.

3 DOCUMENTATION AT THE READY

"What also makes global life science projects so extremely complex is that they operate in a highly regulated environment," Philipp Zumoberhaus states. For a company to obtain market approval, it must fulfill the Good Manufacturing Practice (GMP) guidelines in place to ensure that medicines are produced consistently according to stipulated quality standards. Qualification of plants and validation of processes are integral to that. Measurement technology likewise has standards to comply with. Here, the global program ensures that EPCs and end customers receive the complete and traceable documentation they will need for factory acceptance tests and inspection by government agencies. Included in the scope are a variety of certificates concerning, for example, the origin of the materials used or a particular surface roughness. Philipp Zumoberhaus points out: "Our industry experts are well-versed in the requirements and action everything at the right time."

4 WAREHOUSING WITH DELIVERY ON DEMAND

Endress+Hauser recently supplied several thousand instruments – everything from flow measuring technology right up to Raman spectroscopy – for a new biopharmaceutical production rollout that involved EPCs in multiple countries. There were likewise several thousand instruments sent directly to end customers in Asia who would be handling the ancillary processes. "On the customer's behalf we also handled local warehousing, building storage capacity for that purpose," says Philipp Zumoberhaus. The warehousing facility was validated according to GMP guidelines. Employees were trained in compliance with standard operating procedures. Processes for incoming and outgoing goods were digitalized to ensure precise traceability. Then every incoming measuring instrument was checked for conformity, including verification that its documentation was all present and correct. When the customer was ready to have measuring instruments installed, Endress+Hauser shipped them on demand to the plant construction site – at times as many as 1,500 units per month.

5 READY TO GO IN JUST 18 MONTHS

The project also demonstrates the efficiency benefits that the Endress+Hauser global program delivers: "It took just a year and a half from the initial customer meeting to plant handover, with five Endress+Hauser product centers and six local entities involved," Philipp Zumoberhaus reports. Throughout this time, his team kept an eye on progress and costs, implemented changes quickly and provided advice to everyone involved. It was the kind of collaboration that convinced the customer to involve Endress+Hauser again when they construct more plants.

Every millimeter matters

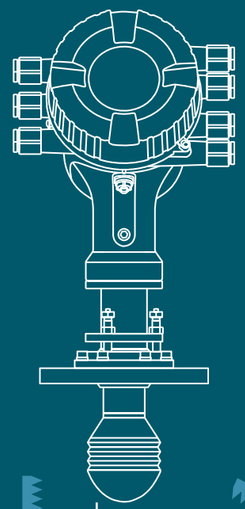
How much oil is in the storage tank? In international trade, only calibrated measuring devices can deliver an acceptable answer. Calibration can be done laboriously on site or directly at the factory, as Endress+Hauser does. And this is all thanks to a unique calibration rig.

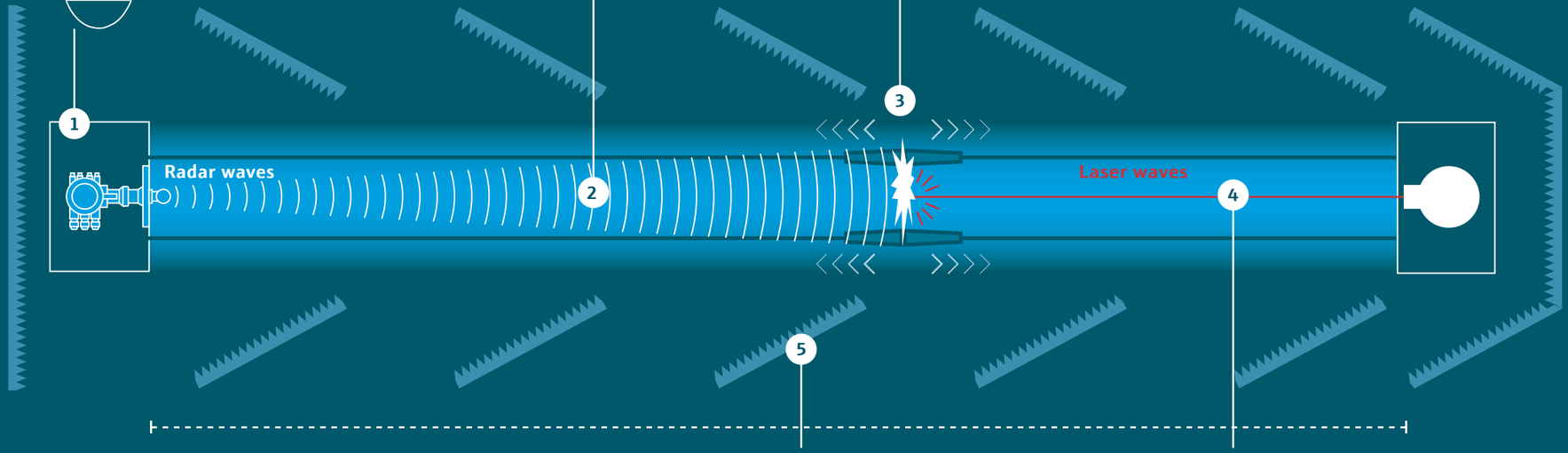
Text: Robert Habi
Illustration: 3st kommunikation

Oil and gas surpass all other commodities in terms of the volume that gets moved around. Every day, some 90 million barrels (14.4 million tonnes) of crude oil and natural gas are extracted, filled, stored temporarily and transported onward around the world. “In large storage tanks, every incorrectly measured millimeter of fill level could make a difference of several thousand euros straightaway,” Daniel Hoy from Endress+Hauser Level+Pressure explains. That is why measuring devices on large oil tanks must be calibrated verifiably according to internationally recognized standards such as OIML R85 or API 3.1B.

There are two options for verifiable calibration: In the first and most frequent one, a verification officer stands on the tank and measures the fill level with a measuring tape. The results are compared to those from the level sensor installed on the tank. The maximum permissible discrepancy is four millimeters. Obtaining various benchmarks involves emptying or filling tanks – expensive procedures that often take several days. Customers can save all this time and effort by choosing the second option, factory calibration. This requires a complex calibration rig, like the one Endress+Hauser has developed at the competence center for level and pressure measurement in Maulburg. “We precisely calibrate every radar sensor ordered for tank gauging on the rig. With multiple measuring positions along its 50-meter length, that takes at most an hour and a half,” says Daniel Hoy. The calibration rig stands in an elaborate purpose-built room and is the only one worldwide able to calibrate radar level sensors for tanks and stilling wells to an NMI-certified standard. The devices are allowed to be out by no more than one millimeter, as stipulated by the generally accepted OIML R85 recommendation.

Endress+Hauser built the rig in response to industry developments: In the USA and in Europe especially, space at ports is becoming scarcer and so their storage tanks are being built taller. Gas tanks 50 meters high are not unusual. The diagram shows a simplified birds-eye view of how factory calibration of the radar sensors works.





1
The **instrument under test** is a Micropilot level sensor using radar measurement technology.

0.5 mm
within the measurement range of up to 50 meters is the maximum measurement discrepancy of the device under test after calibration.

2
Radar waves beam out into free space and some hit the reflector, from where they bounce back to the sensor on the measuring instrument. The distance between the sensor and the reflector is determined based on the signal’s time of flight.

3
The two-sided **reflector** runs on rails. Placing it at various positions between the laser and the level sensor provides a series of measurements.

50 m
is the maximum calibration distance. Thus the rig covers many tank sizes.

5
Partitions made of special foam absorb stray radiation, as it is primarily the straight beams that are to be measured.

4
The **laser** measures the distance to the device under test and to the reflector with micrometer precision. After calibration, the sum of those distances corresponds to the exact overall length of the rig. Thus, the laser is the high-precision reference for measuring the instrument under test.

CONTROLLED CONDITIONS

The floor is specially constructed to minimize vibrations, for example from local industrial activity or road traffic.

Air pressure and humidity are monitored since they can have a minor effect on the radar signal.

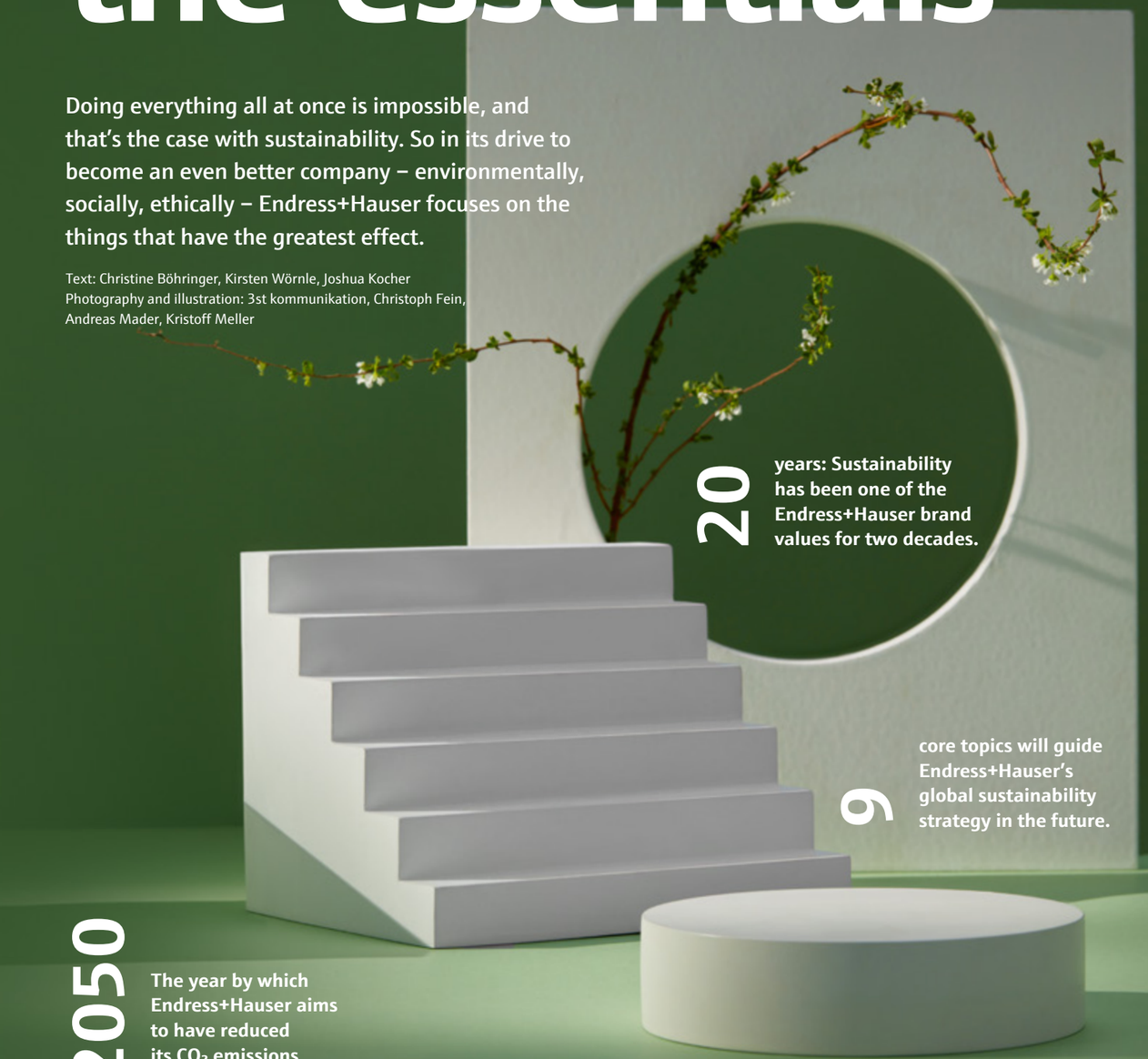
A special structure shields out potential signal interference from electromagnetic waves.

Ambient temperature is kept at a constant 20°C. That prevents thermal expansion effects, for example in the metal rails on which the reflector runs.

Focusing on the essentials

Doing everything all at once is impossible, and that's the case with sustainability. So in its drive to become an even better company – environmentally, socially, ethically – Endress+Hauser focuses on the things that have the greatest effect.

Text: Christine Böhringer, Kirsten Wörnle, Joshua Kocher
Photography and illustration: 3st kommunikation, Christoph Fein, Andreas Mader, Kristoff Meller



20 years: Sustainability has been one of the Endress+Hauser brand values for two decades.

9 core topics will guide Endress+Hauser's global sustainability strategy in the future.

2050 The year by which Endress+Hauser aims to have reduced its CO_2 emissions to net zero.

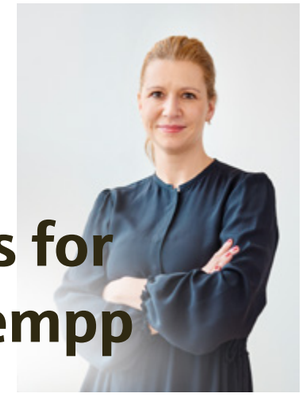
The things that matter

Endress+Hauser is a family business that aims to operate sustainably. This means combining commercial success with environmental and social responsibility. To be certain of continuing to set the right priorities, Endress+Hauser has now conducted a double materiality assessment together with an independent consulting firm. This analysis identified nine sustainability topics of particular relevance – either because Endress+Hauser has major influence on them, or because they matter greatly to the company's success. "These topics will form the basis for the direction of our sustainability strategy and our future sustainability reporting," says Julia Schempp, the Group's corporate sustainability officer.

For the analysis, various stakeholder groups rated 37 topics relating to the environment, social affairs and company management. Corporate culture, where business ethics are deeply rooted, was rated as the most important topic for Endress+Hauser. Combating climate change came in close second. In 2023, Endress+Hauser joined the Science Based Targets initiative with the objective of cutting greenhouse gas emissions to net zero by 2050. With its process automation expertise, Endress+Hauser also supports the sustainable transformation of the process industry.

It follows that energy management, handling of hazardous substances and use of resources in the circular economy were also considered crucial environmental factors. In social affairs, key topics are working conditions, diversity and human rights of the Group's employees. High standards in product safety and thus customers' personal safety are also major points.

3 Questions for Julia Schempp



As corporate sustainability officer and human rights officer, Julia Schempp is responsible for the Group's sustainability strategy.

The double materiality assessment means you now know which sustainability topics are particularly relevant for Endress+Hauser currently. Were there any surprises?

A surprising thing was the consistency with which the 37 topics were rated among the various stakeholders within Endress+Hauser, from top management to the specialists drawn from various countries, entities and functional departments. This shows our long-standing focus on sustainability topics that matter to the company and in our business.

Corporate culture emerged as the foremost topic. What's the reason behind that?

Our corporate culture was and remains strongly influenced by the shareholder family. It ranked so highly because it is the foundation of Endress+Hauser's sustainable success. It puts people at the center of our business and aligns with the four brand values of commitment, excellence, sustainability and friendliness. That leads to close relationships with customers, strong innovative power, good cooperation and the will to change things for the better in the long term. The analysis demonstrated yet again the importance of strengthening and nurturing this foundation.

Where do we go from here?

For each of these nine key topics we are currently investigating ways to embed them even deeper into how the company is run, and into individual processes and functional departments across the whole Group. Moving forward, we will regularly update the double materiality assessment and check other topics for relevance.

A guest house with a history

Endress+Hauser has converted the former home of company founder Georg H Endress and his wife, Alice, into a guest house. It is intended both for overnight stays by visiting company employees and members of the shareholder family, and as a seminar venue. Sustainability figured large in the choice of materials, and a photovoltaic system supplies renewable energy. Interior spaces have a bright atmosphere, with high-class finishings. This is corporate culture made visible: Georg H Endress always took pains to create a good environment for his employees.

Promoting diversity

The Endress+Hauser Women's Integrated Network (WIN) is celebrating its fifth anniversary in 2024. Since getting started, the initiative has successfully driven the advancement of women at Endress+Hauser and contributes to diversity and inclusion within the company. Group entities where topics like these have taken particular hold are already demonstrating measurable successes. By 2030, 40 percent of roles in the global workforce and 30 percent of key positions are set to be held by women. Achieving these goals will be helped by a balanced and diverse working environment.

600

native tree and shrub saplings form the basis for Wrocław's Miyawaki forest, an initiative of the Endress+Hauser Poland team. The miniature forest covering just 200 square meters stems from the idea of Japanese botanist Akira Miyawaki. Using an efficient reforestation method, Miyawaki forests grow fast and have a high planting density – thus contributing to climate protection. This miniature green lung in the urban landscape draws carbon dioxide from the atmosphere, filters dust and pollutants, stores water and provides a habitat for birds and insects.

"The project is more than our contribution to improving quality of life for people in the city; it is also a way to promote community and environmental awareness."

Maciej Turkiewicz, head of sales at Endress+Hauser Poland

The best of partners

In Reinach, immediately next door to Endress+Hauser Flow, a rehabilitation center has set up shop. Called promonta, it is run by the non-profit organization Eingliederungsstätte Baselland (ESB). People with physical and learning disabilities and mental health conditions work there. What connects the two companies? Flowmeters. Endress+Hauser manufactures them, and one of the things promonta does is assemble casings ready to have their electronics fitted inside.

"Our objective is giving people in need of support the opportunity to develop their capabilities, take on responsibility and feel empowered to participate in work of value," says long-serving promonta factory manager Nikola Kafadar. Endress+Hauser has been supporting this social mission over the 30-plus years since ESB workshops were awarded the first orders. The number of flowmeters produced rose steadily over time – and order volume grew to the point where ESB finally established promonta as an independent manufacturing operation in 2007.

FOSTERING POTENTIAL

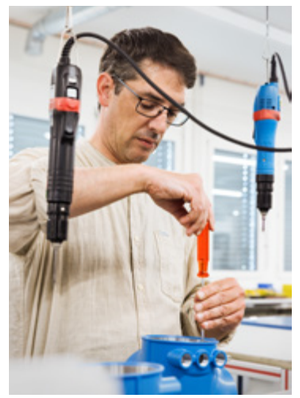
Today there are around 90 employees delivering 750,000 assemblies every year to Endress+Hauser Flow production centers worldwide. Quality control and logistics roles are also included. Workplaces are state of the art, and the entire factory is tightly integrated with Endress+Hauser's production systems. Meanwhile, the promonta employees work in a protected environment under close supervision. "We offer tasks of all kinds, with various levels of difficulty. Thus we can create work specifically tailored to the needs of people requiring support, which aids their participation in the workforce and personal fulfillment," says Nikola Kafadar.

This approach also ensures that promonta delivers the assemblies as Endress+Hauser expects. "In terms of quality, reliable delivery and costs, we don't notice any difference compared to other partners," says Manfred Bieli. A veteran factory manager, it was he who launched the collaboration with ESB back in the day. Today's promonta is an A-list supplier and preferred recipient of orders. "Our employees are proud to be working so closely to industry," says Nikola Kafadar. promonta people regularly get hired by Endress+Hauser Flow, with a job there being a springboard for other opportunities in the labor market. "This model brings us a good step closer to inclusivity," says Nikola Kafadar.

1

2

3



1
Pioneers:
Manfred Bieli (left) from Endress+Hauser and Nikola Kafadar from ESB have made their mark on the collaboration.

2
Quality: promonta is now an A-list supplier to Endress+Hauser.

3
Concentration: Employees assemble casings ready to have their electronics fitted inside.

Joining forces

1

Whether it's efficiency, compliance or decarbonization, companies in the process industry are facing an array of challenges. Endress+Hauser and SICK have entered into a strategic partnership in process automation to provide customers with even better support.

Text: Martin Raab
Photography: SICK, Endress+Hauser

More than a year ago, German sensor specialist SICK and Endress+Hauser announced their intention to join forces in the field of process automation. In summer of this year, representatives of the two family-owned businesses concluded an agreement to this effect. Subject to approval of the transaction by antitrust authorities, the strategic partnership can come into effect at the turn of the year 2024/2025.

Essentially, the aim is to sell SICK's process analysis and gas flow measurement technology exclusively via Endress+Hauser in the future. To that end, around 800 specialized sales and service employees in 43 countries are set to transfer from SICK to Endress+Hauser at the turn of the year. At the same time, production and development of devices will be taken over by a joint venture in which each partner intends to hold a 50 percent stake. It will employ over 730 people at several German locations.

BROADER PORTFOLIO, BROADER EXPERTISE

The two companies' process technology product portfolios complement and augment each other. SICK's process analyzers and gas flowmeters are used primarily in waste incineration plants, power, steel and cement plants, in the oil & gas industry, in chemical and petrochemical plants, and in maritime operations, including applications such as measuring the flow of natural gas and hydrogen or measuring emissions from flue gas scrubbing.

The partnership's aim is to provide customers in the process industry with even better support to improve efficiency and sustainability. They will benefit from a broader range of solutions and a faster pace of innovation. The two companies have already cooperated on an order, project and customer basis. In the future, the global Endress+Hauser sales network will enable the partnership to handle additional customers, reach more industries and develop new areas of application. To drive innovation and leverage synergies, the joint venture for production and development will be closely interlinked with Endress+Hauser's competence centers.

PARTNERS WITH MUCH IN COMMON

As family-owned businesses, SICK and Endress+Hauser share a similar set of values, a people-focused corporate culture and a long-term strategic stance. Both companies see business opportunities in the process industry's transition to sustainability. Together, they aim to support their customers in key areas such as energy and resource efficiency and help them decarbonize their production processes in the long term.

Both sides are currently working at high priority to prepare for a seamless transition of business. Until the deal is closed, SICK and Endress+Hauser will continue to support their process automation customers independently. SICK's strong core business of factory and logistics automation will be unaffected by the partnership with Endress+Hauser and will benefit from a stronger focus.

2

1
Process analyzers and gas flowmeters from SICK are to be distributed solely by Endress+Hauser from 2025.

2
Many customers in the process industry already use both SICK and Endress+Hauser products to increase their efficiency.

INTELLIGENT SENSOR SOLUTIONS

Light, combined with precise optics and intelligent electronics, can be used to perform a multitude of tasks. Dr Erwin Sick saw this potential early on and founded his own company in 1946. One of its first products was a safety light curtain that prevented accidents around machinery in operation. From those beginnings, SICK has developed into one of the world's leading providers of intelligent sensors and solutions for industrial automation. Today's company, based in Waldkirch in Germany, is among the technology and market leaders. It has a presence around the globe with 60 subsidiaries and holdings, plus numerous agencies. SICK employs more than 12,000 people worldwide and generated consolidated sales of 2.3 billion euros in the 2023 financial year. At the core of the business is factory and logistics automation, where SICK generates over 80 percent of its sales.

2023

OCTOBER
Memorandum of understanding is signed between SICK and Endress+Hauser on a strategic partnership in process automation.

The possibility of close cooperation is examined; a business model is designed for marketing process technology via Endress+Hauser.

2024

JULY
Following approval by their respective supervisory bodies, SICK and Endress+Hauser sign a strategic partnership agreement.

Systems and processes are readied for integration; a production and development joint venture is formed.

2025

JANUARY
The joint venture commences operations; process technology sales are handled exclusively by Endress+Hauser.

Achieving more together

Why are SICK and Endress+Hauser joining forces on process automation? What is the benefit to customers? And what is required for this partnership to be a success? Mats Gökstorp and Peter Selders take the time to answer our questions.

Questions: Martin Raab
Photography: Benedikt Ruf

Dr Gökstorp, what prompted you to team up with another company on process automation?

Gökstorp: Many industrial companies are seeing rapid global change. High energy costs, mandatory sustainability goals, political and societal expectations, all those are drivers of sweeping transformation processes. That's why companies want and need to restructure their production processes to make them more energy efficient. And yet, for such transformation to be a success, companies cannot afford to lose sight of their profitability. This is where we see a major market opportunity. Process automation is a relatively small part of SICK's business. Our core fields are factory and logistic automation, which together account for more than 80 percent of our revenue. That's why we have come to the conclusion that a strategic partnership makes sense from both a technological and a sales perspective. We know that with a suitable partner, we can better support our customers and benefit more from growth opportunities.

What made Endress+Hauser stand out in your search for a partner?

Gökstorp: It was an obvious choice for at least two reasons: First, like SICK, Endress+Hauser is a technology leader in its field of activity, and our respective product portfolios match up very well. Second, there are a lot of similarities between our two companies. So, I was sure from the start that this would be a good fit in terms of technology, culture and people. And this turned out to be the case when we set about establishing our partnership.

ADVANCING WITH FARSIGHTED VISION

Physicist **Dr Peter Selders** (54) took over as CEO of the Endress+Hauser Group in 2024. He previously worked for 20 years at the Group's product center for level and pressure measurement in Maulburg, Germany, serving as managing director from 2019. Paraphrasing the mountaineer Rainer Petek, he says, "We overestimate our ability to plan for things and underestimate our ability to deal with uncertainty." Yet as a keen hiker himself, he knows how essential good preparation is, and not just up in the mountains.

Dr Selders, why does it make sense for Endress+Hauser to go down this path of partnership?

Selders: Quite simply, because here is a case where we are more than the sum of our parts. After looking carefully at the potential of close collaboration, we have concluded that pooling our strengths in process automation will bring great benefits to both sides. This strategic partnership opens up opportunities for growth and development. Together, we can achieve more, and faster than either company could on its own.

Endress+Hauser and SICK are no strangers to working together on orders and projects, with mutual customers. What does the partnership mean beyond that?

Selders: We at Endress+Hauser have always seen partnerships as opportunities to build something new together. That isn't possible with ad hoc collaboration. So in this partnership we want to grow in tandem and continue our long-term development, adding value for our customers through cooperation, networking and interaction between people. Technology and products matter – they are what our business is based on. But people are crucial. They make the difference. They contribute their knowledge, skills and personality. This is what we're looking forward to!

Gökstorp: Our common goal is to give customers the best possible support all along the value chain. Together, we want to offer first-class technologies and services that will best address our customers' challenges. Parallel to this, we put special emphasis on our employees. My goal has always been to find good solutions for them. Only then can our partnership be successful.

"We want to grow in tandem in this partnership and further evolve over the long term, adding value for our customers through cooperation, networking and interaction between people."

Peter Selders, CEO of the Endress+Hauser Group

A PASSION FOR INNOVATION

Computer scientist and engineer **Dr Mats Gökstorp** (59) attended university in his native Sweden and in the USA. He began his career at a Swedish start-up that was acquired by the sensor specialist SICK in 2003. Since 2007, he has worked for the group in Germany. In 2013 he was appointed to the Executive Board of SICK AG and has been chairman since 2021. The company has retained the spirit of a start-up, he says: "We are developers. We are passionate about using technology for good."

The partnership will expand Endress+Hauser's offering to include process analysis and gas flow measurement technology from SICK. How will customers benefit?

Selders: Our customers are interested in improving their processes and increasing their efficiency. Being able to purchase more products from a single source will make their lives easier. For instance, SICK's gas flowmeters make it possible to switch to low-emission and non-fossil energy sources; emissions can be reliably monitored with their process analyzers. These products ideally complement our own portfolio. Their products, like ours, are high quality and lead the field in their respective applications.

A joint venture will handle the production and further development of SICK process technology. What can customers expect from this partnership?

Gökstorp: Customers will experience a professional partner combining the strengths of Endress+Hauser and SICK. They will benefit from a series of new solutions in emissions monitoring and flow measurement, plus expert advice on the best one for their needs.

Selders: The joint venture will be integrated into our innovation, production and logistics networks. Medium term, we are looking to gain momentum and leverage synergies through exchange and collaboration. But the current focus is on integration into the new structures. It's about getting to know each other, making contacts, building trust. We are embarking on a journey together.

In the future, it will be Endress+Hauser handling sales and service. What prompted you to bring the sales and service teams into the partnership?

Selders: A joint sales organization offers many opportunities. Through our global network, we can reach new customers for SICK's process analyzers and gas flowmeters, gain access to more industries and open up new application areas. In addition, we envisage SICK process technology bringing in more opportunities for our current portfolio. This entails all of the various product specialists working very closely together, exchanging ideas, coordinating their activities. Which in turn calls for an overarching organization and a shared IT infrastructure. Wherever you look, digital platforms and seamless service feature increasingly in customer interactions. So deep integration on the sales and service side makes a lot of sense.

Gökstorp: Pooling sales and service is important and the right thing to do. Only then can we truly combine the immense expertise of both companies and provide yet more comprehensive advice and support to our customers. They in turn will reap the benefits, especially in light of all the new applications that the industry needs.

The contract was signed in the summer. What tasks and challenges are there still to overcome before the deal is finalized?

Gökstorp: First of all, I am very grateful to the many colleagues on both sides who got things ready for the contract signing. Now it's a matter of taking the steps necessary for the joint venture to start operations. The present focus is shifting to very specific issues like the design of the joint venture's IT landscape. In customers' best interests, we are doing everything possible to ensure seamless continuation of business. And of course, we are getting ready for the transfer of our sales and service experts to Endress+Hauser. It is of personal importance to me that this changeover goes smoothly for the people involved.

"The fact that our product portfolios are complementary was a basic premise for our partnership. But we would never have come together without a foundation of shared culture and values."

Mats Gökstorp,
chairman of the Executive Board of SICK AG

Both companies are breaking new ground with this partnership. What convinced you that teaming up would be successful?

Gökstorp: As I mentioned, Endress+Hauser and SICK have been collaborators for many years. The fact that our existing product portfolios are complementary technology-wise was a basic premise for our partnership. But we would never have come together without a foundation of shared culture and values. Ultimately, it is people who shape partnerships like this one and steer them to success.

Selders: Our companies have so much in common. Not least a shared conviction that our work contributes to solving major societal challenges. SICK and Endress+Hauser both see sustainable transformation as an opportunity. What's more, we are joining forces from a position of strength. Both companies are market successes in their own right. But we are convinced that together we can achieve more: for our customers, for our employees and for our respective companies. This has been reinforced by our consistently constructive and forward-looking work together in the lead-up to the contract signing, notwithstanding the challenges.

Assuming we meet again in five years' time – what do you hope you will be able to say about the partnership?

Selders: I hope that we'll look back and say that we made the right decision back then, that we acted at the right time to guide our customers effectively into a sustainable future and that together we resolved the issues that we faced in our partnership.

Gökstorp: I want to be able to say that we made a progressive, farsighted decision in the interests of our customers as well as the employees at SICK and Endress+Hauser. By making the most of the available market opportunities, we aim for customers, employees and society as a whole to reap the benefits of our strategic partnership in the long term. And I am convinced that we will achieve this together.

Imprint

changes
The Endress+Hauser magazine

Contact
Endress+Hauser AG
Kägenstrasse 2
4153 Reinach BL
Switzerland

Publisher
Dr Peter Selders

Editorial team
Christine Böhringer (editorial management), Marlene Etschmann, Robert Habi, Martin Raab (project management)

Art direction
Maria Oestringer, Teresa Wagner, Josephine Weier

Project team
David Bosshard, Corinne Fasana, Sereina Manetsch, Kristina Rodriguez, Sandra Rubart, Sascha Stadelbacher

Contributors
André Boße, Joshua Kocher, Armin Scheuermann, Kirsten Wörnle

Translation, language adaptation
Geraldine Diserens, Christian Geiger, Daniel Hawpe, Down Under Translation, Lennon Language Solutions, Jan Sinstadt, Helen White

Photography
Endress+Hauser, Christoph Fein, Matthias Haslauer, Andreas Mader, Kristoff Meller, Benedikt Ruf, Shutterstock, SICK, 3st kommunikation

Graphics
Totto Renna, 3st kommunikation

Design, production, picture editing
3st kommunikation GmbH, Mainz, Germany

Printing
+siggset+ print & media AG, Albbruck, Germany

changes is published in Chinese, English, French, German and Spanish. Please order additional copies by emailing changes@endress.com.

Read more ***changes*** stories online at changes.endress.com

Climate-neutral printing

MIX
Paper from responsible sources
FSC® C099996
www.fsc.org

People for Process Automation

Endress+Hauser

CH01010Z/60/EN/02.24