# changes

Market Mexico's economy on the move Know-how The IIoT enters existing plants

Food & beverage industry

# More than nourishment



# A strong partner worldwide

Ξ

Customers around the world gain valuable knowledge from their processes by using our products, solutions and services.

Based on our industry expertise we find, in cooperation with our customers, the best solution for every application.

Infographics: Pia Bublies

As a family-owned company since 1953, we are a **reliable partner** for our customers, employees and shareholders.



Watch our corporate video to learn more about the People for Process Automation.

Endress+Hauser



Market: Mexico Follow us on a journey to a growth market in transition Page 28

Insights Learn more about the development of the Endress+Hauser Group Page 62 **EDITORIAL** 

# According to our customers' tastes

Dear reader,

This edition of 'changes' magazine focuses on the food & beverage industry, a branch whose business is driven by a constantly growing world population and increasingly prosperous consumers with rising demands. The industry, including the market leaders, is nevertheless under pressure. Magdi Batato, Nestle's Head of Operations, explains which strategy the world's largest food company is pursuing, and why it's essential for the company to maintain control of the entire value chain. He also discusses the significance of the partnership with Endress+Hauser. Our recipe is products, solutions and services that help the industry tie productivity, quality and conformity together.

Mexico grew from a developing to an emerging country within a span of only four decades. The country is now striving to join the ranks of the industrial nations. Mexico's domestic manufacturers have long recognized that low wages alone are not enough to compete on the global stage. Automation technology will thus play a key role in the next chapter of the country's development. From a sales standpoint, we are well-positioned in Mexico. In the Market section, learn more about Latin America's second largest economy and become more familiar with several of our customers there!

With our measurement products, solutions and services, we help our customers improve their processes, and thus their products. The foundation of this approach is our in-depth understanding of the needs of each industry and their process applications. In the Know-how section, we illustrate what this means to our customers' day-to-day business and how we help them to be successful, such as integrating Industrial Internet of Things applications into existing plants or calibrating our flowmeters around the world in accordance with traceable standards using highly precise systems.

Endress+Hauser is celebrating its 65th anniversary this year. Founded as a two-man start-up, the company has grown into an international Group. Although much has changed during this time, the family company's principles and values have remained the same. What will it take to ensure it stays this way in the future? Supervisory Board President Klaus Endress shares his thoughts in the Insights section. You will also learn more about the sustainable development of the Group. We hope you enjoy this year's selection of exciting and diverse articles!

Yours

Mattluas Eterdorf Matthias Altendorf

PS: How did you enjoy the new edition of 'changes'? I look forward to your feedback and suggestions! changes@endress.com





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# World hunger

Without food and water, we could not survive. What will it take to adequately provide a constantly growing and increasingly older global population with good and healthy food?

### Supply and demand

Population growth has led to a significant increase in food production. Much of this increase is tied to modern agriculture methods in industrial countries, with their wide assortment of high-yield crops and the effective use of pesticides, fertilizers and feedstuff.



795 mil. starving people (-216 mil. since 1990)



overweight people (+700 mil. since 1990)

# Abundance and scarcity

Although statistically speaking we produce enough food for everyone on the planet, hunger still exists. Poverty, political crises, climate change and the battle for natural resources are all to blame. At the same time, more and more people in industrial and emerging countries are finding it increasingly difficult to achieve a balanced diet.

#### Expenditure on food





Developing countries 70%

Industrial countries 15%

of personal income

By 2050\*, the earth will have

9.7 billion inhabitants.



Water consumption 15,000 liters 1 kg meat 250 liters

1 kg potatoes



### Changing consumption habits

Increased wealth and prosperity is giving rise to a greater demand for food, and thus for meat, the production of which requires considerable amounts of water and land. Today, livestock breeding and feed cultivation uses up to 80 percent of our agricultural lands.

#### **Global meat production**



## Dwindling soil

Soil is the essential foundation of agriculture, supplying plants with nutrients and water. But this valuable resource is finite and gradually diminishing. Each year, 24 billion tons of fertile soil are squandered through overuse, improper cultivation methods, erosion or the construction of roads and cities.

Available agriculture surface per capita



Fifa soccer field: 7,140 m<sup>2</sup>

If the demand for agricultural products continues unabated, additional land the size of India will need to be opened up.

Food production will increase at an even higher pace.



# Food for a better life

As the world population continues to grow, its nutrition will have to change in the coming decades. Researchers and engineers are already working on the solutions of tomorrow.

Innovations that change the world are often created in inconspicuous places: garages, basements or, like at the end of the 19th century, in a grain mill. It was the age of industrialization in Europe. Workers toiled long and hard in factories for paltry wages. Concerned, Swiss mill operator Julius Maggi sought ways to ease the burden of malnourished working-class families.

In 1884, the first thing he did was produce an inexpensive but filling flour from protein-laced legumes. The breakthrough came two years later when Julius Maggi introduced the first instant soup to the market, made from pea and bean flour. Additionally, he launched a seasoning sauce, followed not long after by a stock cube. With this idea, Julius Maggi became one of the pioneers of a new sector – the food & beverage industry found ways to process agricultural products so that they were well preserved and easy to transport and prepare.

In a century replete with innovations, the young industry was able to develop rapidly. The invention of the railroad prepared the ground for low-cost transportation. In addition, new conservation methods such as sterilization, pasteurization and vacuum technology went hand-in-hand with mechanization to make it possible to process food cheaper than ever before and in large volumes.



A blessing and a curse With the food & beverage industry now in full swing, it achieved something monumental. Together with advances in medicine and hygiene, it made urbanization possible, and in the process helped improve human health and significantly extend life expectancy.

For around 200 years, life expectancy rates rose in parallel with per capita calorie intake. Today it appears that this development has already reached its zenith. The food & beverage industry's former recipe for success has now turned from a blessing to a curse. From its inception, the industry was committed to the paradigm of improving quality of life. And for a long time that meant feeding people more and more calories!

In the 20th century, chemists had identified only proteins, fats and carbohydrates as the main elements of nourishment. This trio supplies the energy for all physiological processes, making it the fuel of life. Loads of calories might be ideal for those who perform tough physical labor, but today most people sit at desks, plagued by diseases of affluence such as high blood pressure, obesity and diabetes. **Demand and reality** Given the enormous choices that are available, and because people have the money to shell out for food, people are thinking a lot more about what they eat. Today, eating is more than just nourishment for the body. Food is to be enjoyed. It's a health elixir, a comforter of the soul, a photo subject, status symbol, an expression of one's personality – and a social bond. Food is a sensitive matter and a projection surface for many things.

In contrast to Julius Maggi's time, today there are a multitude of demands placed on products manufactured by the food & beverage industry. For instance, they should be healthy, safe and of high quality, yet cheap. The ideal products are locally grown – and in the most environmentally friendly fashion possible. It's a formidable demand that even consumers themselves often fail to meet. Just around half of Germany's population cooks on a daily basis. And only one-third use fresh products, not to mention that resource conservation is hardly a priority. In Germany alone, 18 million tons of food landed on the garbage pile in 2017.



Apart from the growing demands of individual consumers, the food & beverage industry is facing new global challenges. The world population is rapidly growing. According to most prognoses, by 2050 there will be 9.7 billion people on our planet – 2 billion more than today. Once again, the industry is tasked with ensuring that the world has enough to eat. In more concrete terms, by 2050 it will have to produce an incredible 70 percent more food than it does today.

**Changing agricultural landscape** The conditions have unfortunately become less favorable. Farmlands are shrinking and climate change is threatening the harvests. Moreover, evolving eating habits that reflect a growing demand for protein-rich meat and dairy products are leading to diminishing natural resources. Addressing these issues requires drastically changing the way food is produced and changing the way we eat.

The solutions, now more than ever, call for innovative technologies and ideas. Initial visions can already be seen in fields and in cities. Using precision farming, for instance, sensors can examine plots of ground and detect soil properties, nutrient content and harvest yields as the tractor drives over the field. By combining this information with GPS navigation technology and connected machines, the farmer can precisely determine the amount of seed and fertilizer to spread over every square meter of his farmland in order to grow more crops over the same area.

So-called vertical farming could also be part of the future agricultural landscape. With this approach, crops are planted in high-rise buildings using frames stacked one on top of another in closed systems, and under stable environmental conditions. The roots of the plants are sprayed with water and nutrients, while LEDs provide light in the correct wavelength. Increasing numbers of such high-rise farms are being created around the world.

**The future of eating** If today's researchers have their way, people will one day eat more insects and microalgae, both of which are considered an environmentally friendly alternative to meat. Insects and microalgae, while low in fat and calories, have the potential to supply large populations with the protein they need. In parallel, the industry is tinkering with a new convenience product – namely food from a 3D printer. With the help of a cartridge filled with a food paste, the idea is that every consumer can prepare whatever tastes good to them, customized to their personal nutrient requirements, bodyweight and intolerances.

The question is, where does the data come from? The answer is, from sensors worn on the body – and from a physician. This still young field of research, referred to as nutrigenetics, is confident that in 10 years, a blood test will make it possible to create meals tailored precisely to our individual needs and disposition. Here's to happy and healthy eating!

Text: Christine Böhringer, Alexander Marzahn Illustration: Ralf Marczinczik

# "We understand our customers"

The food & beverage industry faces growing demands on safety, quality and efficiency. Ola Wesstrom explains how Endress+Hauser supports customers around the globe in their efforts.

# Mr Wesstrom, what are the most pressing issues in the food & beverage industry?

There are a couple of challenges. Food safety is definitely the highest priority. This drives the need for education, process improvements and reporting in our industry. Additionally, in most parts of the world food is very inexpensive. This underlines the need for highly efficient operations. Balancing operational expenses while meeting the ever-changing consumer demand for new products is another issue. Above all, we must recognize the challenges that population growth will bring.

# What does the food & beverage industry expect from measurement engineering?

Reliability of instrumentation and trust in measurements is of utmost importance. With fewer operators in plants, the measurement and control must work. Most plants run a very lean operation with minimal maintenance staff. This means repairs, replacements and calibrations need to be fast and easy.

# What are the current industry trends with regards to process instrumentation and automation?

Most plants still rely on 4 to 20 milliampere signals. But forward-thinking market leaders utilize digital protocols such as Ethernet IP, Profinet or IO-Link to take advantage of state-of-the-art process and instrument diagnostics and multivariable capabilities. Instrumentation and systems designed to the highest hygienic standards allow for more efficient cleaning which saves water, chemicals, time and energy, all important for efficient operations. We also see a growing interest for in-line or at-line quality-related measurements as a supplement to lab measurements. This approach helps to speed up production and reduce off-spec products.

# In what areas has process engineering chalked up the most progress in recent years?

Water conservation is a top initiative for many processors and a lot of progress has been made by measuring and controlling water usage. Measurement improvements for change-over and clean-in-place procedures are often the main contributors to successfully conserving water and reducing product loss while balancing food safety. Membrane filtration has also been one of the largest differentiators in the past decade. This technology is used for separating a variety of products into new value-driven ingredients. Both areas still have a lot of untapped potential. I also see continued growth in shelf-stable products.

# How is Endress+Hauser positioned in the food & beverage industry?

We are definitely the global market leader! No other single company offers the width and depth of products and services used in processes and utilities. With a tiered approach in most categories, we allow our customers to balance budget with application needs. We are a close partner for a large number of market-leading plant builders, OEMs and food processors who help us to continually improve and align toward current and future needs.

#### What makes Endress+Hauser a reliable partner?

At the core of our culture is a deep commitment to understanding our customers' requirements and to applying what we learn in product development and customer engagement. With regional production facilities all over the world, we can quickly adapt and respond to local regulatory requirements and delivery needs.

> Questions: Martin Raab Photo: Dalonte Keemer

#### Committed to the industry

Ola Wesstrom (49) has led Endress+ Hauser's US activities in the food & beverage industry since 2001. He aims to develop innovative ways to improve quality, food safety and resource use through best-practice application of instrumentation and control. The Swedish native joined the Group in 1992. Ola Wesstrom's educational background is in instrumentation and automation. In his free time, he and his wife enjoy flying powered paraoliders.



# "Great brands support change"

How does changing consumer behavior impact the world's largest food company? Magdi Batato, Nestlé's Head of Operations, explains in discussion with Matthias Altendorf why the whole value chain has to be looked at.



How to succeed in an evolving environment? Nestlé's Head of Operations Magdi Batato (left) in conversation with Endress+Hauser's CEO Matthias Altendorf.



#### Mr Batato, you have spent most of your career with Nestlé. What makes the company unique to you?

**Batato:** In my eyes, the most amazing thing about Nestlé is our capability to embrace change. We have been around for 150 years, and of course we have the ambition to stay another 150 years at least. But that's easier said than done; it requires a lot of adaptability. And I think that's the strong point of Nestlé: we have been able over many, many years to adapt to changes in the outside world.

#### This must be an ability much in demand, as Nestlé is challenged in various fields...

**Batato:** We are seeing changes in consumer behavior in particular. Millennials are looking for more variety and innovation, for healthy and natural products that are tasty and made with fresh ingredients. This younger generation of consumers is also very digital savvy. That means ecommerce is gaining importance for us, and we will have to make good use of the fourth industrial revolution in manufacturing to be able to provide the right products in the right quality at the right time on the right channels. It's an exciting journey we have started, but I'm very confident that the way we have adapted over the last 150 years will stand us in good stead in an evolving business environment. We are a company of great brands. And great brands support change, because you can let them evolve!

#### "You cannot achieve results alone. You have to work together. We succeed on the marketplace with our suppliers!"

Magdi Batato, Executive Vice President and Head of Operations of Nestlé

#### Mr Altendorf, you started more than 30 years ago as an apprentice. How did your business change during this time?

Altendorf: A decisive event was the fall of the iron curtain. In combination with China's economic opening this changed our world dramatically, from both a political and a business point of view. It opened giant new markets, accelerated growth and led to a shift in the global balance of powers... processes that still have an effect. From a technical point of view, computers and microprocessors have been the other important drivers of change during this time. With all the computing power and intelligence in our products, we generate an immense wealth of information, making everything much more transparent. Digital transformation is still in full swing and has just entered our industry and our customers' plants.

#### What's the biggest challenge for Nestlé today?

**Batato:** When you are in the midst of a change, you always think this is the biggest challenge ever. But when you talk to retirees, they just smile – because 30 years ago, they had to cope with things that also presented an important challenge for the company at that time. We always had and still have to adapt to the environment. One of today's challenges is certainly to safeguard future growth. We want to be the leader in nutrition, health and wellness and therefore focus on investments in these fields. Another aspect is responding to consumers who are increasingly asking: What does the product contain? Where do the ingredients come from? How has it been produced?

# Sometimes it looks as if everything is down to marketing... How important is production expertise for Nestlé?

**Batato:** Marketing plays an important role, but there is much more to a successful brand. If you look at a product like Nespresso, the coffee maybe comes from Ethiopia or Colombia. The entire sustainable value chain from bean to cup is a long process that involves our operations expertise and knowledge while integrating the environmental dimension.

Altendorf: And all along this value chain, Endress+Hauser supports Nestlé. In the laboratory we help to measure the moisture of the beans, analyze their ingredients or detect the ripeness. In manufacturing, our process instrumentation helps to monitor and control each step from processing the beans to the packing of the ground coffee. It takes a lot of things before marketing can do a good job!

# How can Endress+Hauser create value for a customer like Nestlé?

Altendorf: When I met Mr Batato for the first time, he said: "We have to become faster, better and more cost-effective." Endress+Hauser is able to accelerate Nestlé's development in all these dimensions. First, we support with our people. Wherever Nestlé runs a plant, we are not far away, because we are a globally active company. Second, we provide state-of-the-art measurement technology. We have a full product basket of instrumentation for the food & beverage industry, segmented to the various application needs. And third, we are familiar with the industry and aware of its specific requirements. We can help Nestlé to ensure that their products meet quality standards, customer expectations and food safety regulations. Batato: We tend to forget that food safety is crucial. Measurement and automation engineering of course make our food safer!



#### What significance do suppliers like Endress+ Hauser have to you?

**Batato:** Our customers want our deliveries to be on time, complete, cost-effective and to meet the specifications. And that means that all our suppliers need to meet these requirements too! For us, the collaboration with Endress+Hauser is like a partnership. You cannot achieve results alone. You have to work together, understand what is needed and find solutions. We succeed on the marketplace with our suppliers!

# What benefits can Endress+Hauser offer through close cooperation?

Altendorf: It's quite important to go beyond a simple buyer-supplier relationship, because it's partnership that creates innovation and thus generates value for our customers. When we collaborate closely we observe our customers' needs and recognize possible improvements. In this regard, our relationship with Nestlé is very strong, marked by reliability and stability. We share common objectives and have created mutual understanding over time. Time and again we work together on specific issues and developments. As our company founder said, we serve our customers and learn from them – and by serving and learning from them, we become better in what we do. We wouldn't have this position in the food & beverage industry without this approach!

# How important is innovation in Nestlé's operations?

**Batato:** Although we are a company of great brands, we are also a manufacturing company with a lot of science and many core competencies. We innovate in some product categories by developing our own technology because we believe it gives us a competitive advantage. We also innovate in our processes to improve our adaptability and thus our flexibility – for smaller batches or faster change-overs, for example. Efficiency is another consideration. We want to benefit as much as possible from the fourth industrial revolution, for example through predictive maintenance.

Nestlé was founded here in Vevey. How important is this heritage to your company? Batato: Everything started here. The company is very much linked to this place, but that doesn't mean it's a Swiss company. Nestlé is a multinational company. If you walk through the head office, you will hear a lot of languages. We have dozens of nationalities working here. Diversity is one of our strengths that make us successful, as well as openness of culture. Altendorf: Diversity is a strong protector, because it makes a company less prone to external effects. It creates more complexity, but leads to better productivity, more innovation, higher employee satisfaction and even stronger customer retention.

# What could Endress+Hauser learn from a company like Nestlé?

Altendorf: First of all, it's our goal to one day celebrate Endress+Hauser's 150th birthday as Nestlé did two years ago, even if I will unfortunately be unable to attend... (*Laughs*) But this anniversary shows that the company culture is based on strong values that allow survival even in highly dynamic environments. I think in this respect we can learn a lot from Nestlé how to develop a company continuously over time but preserve the core of it. Nestlé always adapted in a very sustainable way to customer needs. This is a great achievement and something we aim for, too!

> Questions: Martin Raab Photos: Christoph Fein

Top executive Dr Magdi Batato has been a member of Nestle's executive board since 2015. As Head of Operations he is responsible for procurement, manufacturing, supply chain, engineering, quality management, agriculture, water resources, safety and health, environmental sustainability and operations strategies. The Swiss national was born in 1959 in Egypt. He holds a Bachelor's Degree in mechanical engineering and a PhD in thermodynamics from Ecole Polytechnique Fédérale de Lausanne and completed executive programs at IMD, Switzerland and INSEAD, France. He joined the world's largest food company in 1991. Founded in 1866, Nestlé is one of the industry's iconic companies. With more than 2,000 brands from food and beverages to healthcare nutrition, skin health and petcare, the group generated a turnover of approximately 90 billion Swiss francs in 2017 and employs over 300,000 people worldwide.

# A reliable partner for every step

Safety, quality and efficiency play essential roles in the food & beverage industry. Endress+Hauser helps this industry meet constantly growing requirements across the entire value chain. Milk production illustrates one example of this.



• For cows to produce enough milk, they need the right type of nourishment. Good soil and the optimal application of fertilizer ensure the animals are fed high-quality, contamination-free feed crops.

Soil analyses are the foundation of farmers' activities. They show if the soil is healthy and what type of minerals and trace elements the crops need. This is where Analytik Jena's instruments for **elemental analysis** come into play. Inductively coupled plasma mass spectrometry (ICP-MS) for example can measure a wide range of elements in a short period of time, detecting even minuscule traces of metal. 2 After milking, the raw milk is filtered and kept in chilled storage tanks. The dairy will test the milk received. Once it's released, the milk is processed in a completely hygienic environment.

Food & beverage manufacturers are obliged to eliminate any health risks to consumers. This is why the design, materials, surfaces and welding seams of measurement devices are subject to stringent hygienic requirements. No other manufacturer offers such a wide selection of instrumentation with **hygienic design** as Endress+Hauser. As many as 37 EHEDG-certified flow, pressure, level, temperature and liquid analysis devices are currently available.



**3** The raw milk is transported from the dairy's storage tanks to various systems and either turned into powder, skimmed to separate the cream (both products are used separately) or processed directly into drinking milk. The typical pasteurization process – heat-treating the milk – destroys any microorganisms and extends the shelf life of the end product.

Temperature, level, pressure and flow must be monitored, regardless of how the milk is processed. Endress+Hauser boasts a wide range of **level** measurement devices that allow users to select the measuring principle that best suits the specific process conditions and requirements. For **pressure** measurement, Endress+Hauser developed the Contite cell, a hermetically sealed measuring cell that prevents condensed humidity – which frequently occurs in food & beverage industry processes – from penetrating the instrument. **Temperature** is a critical measurement during pasteurization. Endress+Hauser's iTherm QuickSens supplies the correct value three times faster than comparable sensors to ensure energy efficiency and to keep the milk from unnecessary thermal impact. The **flow** measurement helps to control flow velocity and heat holding times during the pasteurization process. Apart from flow, electromagnetic devices from Endress+Hauser also monitor the temperature and conductivity parameters. On top of that, the instruments can carry out permanent self-monitoring thanks to Heartbeat Technology.



4 The milk is fermented in large tanks and processed into cheese using lactic acid bacteria or rennet.

Through **pH measurements** in the cultivation and fermentation tanks, dairy producers acquire information about the quality of the product and how the process is running. Non-glass pH sensors and digital Memosens technology from Endress+Hauser make it possible to carry out inline measurements. Memosens sensors can be precalibrated in the laboratory and exchanged while the process is running.

5 Filling and bottling systems are at the heart of dairy production, where bottles, cups or bags are rapidly filled with milk or dairy beverages.

As a complete offering in instrumentation and in-depth industry expertise, Endress+Hauser not only provides direct support to dairy producers, but also serves as a strong partner for **plant builders**, **OEMs and engineering companies**. Endress+Hauser flowmeters also form the basis for automation solutions: preconfigured systems for filling applications. 6 Milk powder – a common base ingredient for baby formula – is produced by extracting the water from the milk through an evaporation process.

Determining milk powder quality, plus the mineral and nutrient content, can be accomplished with the high-resolution continuum source **atomic absorption spectrometers** from Analytik Jena. These instruments use a single light source with a continuous spectrum and high-resolution optics to quickly analyze all elements within a sample and detect even the tiniest traces.



If the label says "milk from cows," that's what the product must contain. To meet mandatory declaration and health guidelines, food & beverage processors examine the origins of animal-based ingredients.

Genetic information carried by DNA can be used to determine the types of animals used in the manufacture of food and beverages. Analytik Jena offers a complete range of **DNA analyses** with special instruments and extraction kits for simple, reliable and automatic DNA isolation. The analysis is carried out in real-time using molecular test systems and polymerase chain reactions. 8 A lot of effort goes into producing a glass of milk, while at the same time making it available to consumers at low prices in the stores. Like all food & beverage companies, dairy producers have the same goals: consistent quality, fewer resources and lower production costs.

Endress+Hauser supports the industry with products, solutions and services. The on-site **calibration** of flowmeters, without removing the devices, saves manufacturers time and money. This service is globally unique and now also available for density measurement instruments, regardless of the manufacturer. Additionally, Endress+ Hauser can help optimize calibration processes to extended calibration cycles and minimize calibration effort. The foundation of energy efficiency is energy monitoring. Apart from the instrumentation used to measure energy volumes and flows, Endress+ Hauser also supplies from a single source all components required for the transmission, visualization and analysis of the data. Finally, Endress+ Hauser offers measurement technology not only for food and beverage processing, but also for all associated applications. This reduces the variety of instrumentation, which results in less effort for training, maintenance, calibration and spare parts handling.

> Text: Christine Böhringer Illustration: Ralf Marczinczik

# Sustainable success

The Berchtesgadener Land dairy sits at the crossroads of conventional farming and modern process technology. Although the mountain farmers, who are organized around a dairy cooperative, still rely on a traditional and extensive approach, earnings are nevertheless higher than average thanks to IIoT technology.

Frische fettarme

Alpenmilch

ltbar 1,5% länger haltbar 1,5%

Berchtesgadener Land

Frische fettarme

Alpenmilch





Under control: Thousands of instruments help Florian Lexhaller (right) optimize the plant technology at Berchtesgadener Land dairy.

The setting is right out of an advertising brochure. The Berchtesgadener Land region is marked by gentle valleys, rocky peaks and alluring villages. Even the cows that graze in small herds on the verdant meadows appear remarkably satisfied. Visitors easily gain the impression that if there is one place where the world is in order, it's here in the southeastern most part of Germany.

To some extent, it's an illusion. "We've been dealing with global environmental problems such as climate change and dying insect populations for some time already," says Bernhard Pointner. The managing director of the Berchtesgadener Land dairy in Piding is deeply involved in these issues. After all, the natural environment visible through his office windows is the foundation of the dairy's products. One thing Bernhard Pointner is sure of: "Mankind is living on borrowed time and at the expense of future generations."

**Sustainable, through and through** The Berchtesgadener Land dairy doesn't just pay lip service to sustainability. The entire operation is designed completely with the environment and efficiency in mind. "Our members decided to actively position the cooperative against the destruction of planet," says Bernhard Pointer. For that reason, protection of the environment, fair treatment of people and animals and conservation of our natural resources have been top of the agenda for many years.

In a unanimous vote, Berchtesgadener Land's management and supervisory boards recently prohibited the use of broad-spectrum herbicides like glyphosate on pastures and farmlands owned by the cooperative's members with immediate effect. While this approach creates extra effort, it pays off economically, as well as socially. "Fortunately, more and more people are willing to pay for high-quality products produced under fair conditions," emphasizes Bernhard Pointner.

**Ubiquitous digitalization** To lay claim to its position as an environmental trailblazer, the dairy relies on state-of-theart technology. More than 100 million euros have been invested in production and logistics systems since 1986. The dairy maintains its own fleet of tank trucks to collect the raw milk daily. The cruise control systems in the trucks, which are coupled to the navigation systems, take into account the conditions of the mountainous terrain during



Sustainable success: Organic farmer Johann Angerer benefits as a member of the cooperative from the dairy's smart strategy.

acceleration and braking. The result is that each journey is optimized from an energy standpoint.

The dairy is continuously expanded and updated to improve and enhance the operational flows and processes. The recently completed power house as well as the milk receiving station and the CIP (cleaning in place) system that are under construction are all testament to this strategy. "Digitalization of the systems is our biggest challenge," adds Bernhard Pointner. Today, nearly all the measurement values related to the processes, utilities and energy consumption are fed into a computer system.

The data is used for monitoring purposes, as well as to control the various systems. A dense network of measurement points runs across the entire operation. Even Andreas Holleis, Manager of Process Automation, doesn't know the exact number of instruments. "All told it's certainly in the several thousands and growing," he adds. And nearly all of them are adorned with the blue Endress+Hauser logo.

**Trustworthy and reliable** The Berchtesgadener Land dairy relies almost exclusively on Endress+Hauser for its process measurement technology. And that has a lot to do with people. From the Endress+Hauser sales office in Munich,

Friedhelm Möginger has managed and supported the customer for a good 25 years. "One focus of my activities is coordinating third parties, such as plant builders and service providers, in the dairy's many projects."

Whenever measurement technology is being specified for a new project, Friedhelm Möginger provides advice and consultation during the selection of instruments, components and systems. "On the one hand, one of the challenges is identifying the right measurement principle and right instrument model for each task," explains the sales engineer. "On the other hand, we want to keep the variety of instruments to a minimum in order to keep the spare parts inventory lean." The hygiene areas require completely different models than those applied in utilities, for instance. The cleaning and disinfection solutions used in the CIP process also have special requirements.

The engineers at the dairy are completely satisfied with the quality and reliability of the Endress+Hauser instruments. "The bottom line is, everything works. We have little to do with the instruments," says Technical Director Florian Lexhaller. He admits that problems have cropped up here and there over the years. "It's when things get tough and you have to find a solution that you can recognize a good partner."



# "Digitalization of the systems is our greatest challenge."

Bernhard Pointner, Managing Director of Berchtesgadener Land dairy

**High degree of efficiency** Berchtesgadener Land recently commissioned a new power house, "a genuine showcase project when it comes to sustainability," says Managing Director Bernhard Pointner with pride. A gas turbine generates electricity from natural gas. An ample 1.6 to 2.0 megawatts of electricity flows directly into the milk production process. The new power house boasts total energy efficiency of more than 90 percent. "The turbine pays off economically, as well as environmentally."

The thermal energy from the gas turbine is used to create steam. "Steam is one of the most costly forms of energy in a process plant," explains Florian Lexhaller. "We need steam at many different points." As if that were not enough, the residual heat from the steam plant is then used to produce warm water for the process and heat the office building. The company uses measurement engineering from Endress+ Hauser to control the system, track the energy flows and monitor the energy cycles.

**Steep hillsides, hard work** Organic farmer Johann Angerer runs his farm virtually devoid of technology. The family-owned operation, with just 10 milking cows, is one of the smallest members of the cooperative. He manages his pastures without machines. "The hillsides are too steep to use tractors. We still rely on pure muscle power!"

Like the other members of the cooperative, Johann Angerer benefits from the relatively high prices that the dairy is able to pay for the raw milk that is delivered. Angerer is thus fully behind the dairy's sustainable strategy. "What they are doing is just great," says the farmer. "And over the long term, it's the right way to go." While he talks, his cows crane their necks time and again, as if endorsing his comments. That the world is a little more in order in the Berchtesgadener Land region than other places is perhaps not far from the truth.

> Text: Florian Kraftschik Photos: Christoph Fein

# Sustainable, through and through

Munich

Milchwerke Berchtesgadener Land Chiemgau eG, headquartered in Piding in Bavaria, was founded in 1927. The dairy is organized around a farmers' cooperative, and is thus owned by its members. The company has deliberately followed the guiding principle of sustainability since its inception. Organic milk has been collected separately since 1973. Among the 1,733 members of the cooperative, 491 are currently certified organic farming operations. Roughly 30 percent of the milk delivered to the dairy originates from organic farms.

Berlin

Piding

Vienna

Salzburg



# 200

million euros in revenues are generated by Berchtesgadener Land dairy.



#### 415 people

300

people are employed by the cooperative.





### 27

is the average number of milking cows in the stalls of the cooperative members.

million kilograms of raw milk are

processed each year by the dairy.

### 2



colonies of bees live on the grounds of the dairy, symbolizing its concern about dying bee populations.



Quality and efficiency: Berchtesgadener Land dairy constantly updates and expands its modern operation.



A WORD WITH... FRIEDHELM MÖGINGER

# "Open communication is the key to everything"

Mr Möginger, what is so special about the working relationship with Berchtesgadener Land dairy?

Quality is ingrained in the way the company thinks. If management is convinced that a service, solution or instrument from Endress+Hauser benefits product quality or increases efficiency, money will be set aside for it. And of course, I'm pleased that we've been able to develop such a trustworthy relationship with Berchtesgadener Land dairy over the course of so many years!

#### A large part of the business is handled through third-party partners, such as plant and machinery manufacturers. What special requirements do these suppliers have?

What's important for us is that the customer's standards are clearly communicated and applied by all parties involved to avoid using different instruments for the same task. As a sales engineer, I also have to make sure that I introduce new services, solutions and instruments from Endress+Hauser in a timely manner to not only the dairy, but the plant and machinery manufacturers.

# What is the key to success for Endress+Hauser when working with the various partners?

The key is open communication with all of the project participants. We try to make life simpler for our customers and improve project coordination with the equipment and plant manufacturers, thus giving them an incentive to work with us as a partner!

**Friedhelm Möginger** (53) is a sales engineer for Endress+ Hauser Germany. He supports customers in the food & beverage, water & wastewater and life sciences industries from the sales center's offices in Munich.

# The full menu

The food & beverage industry focuses on safety, quality and efficiency. Endress+ Hauser helps customers with these goals with a complete offering tailored precisely to their needs.



Safety first: Food manufacturer Colona relies on Endress+Hauser's non-glass pH sensors.

# Consistent quality

What does it take to safeguard product quality and strengthen customers' trust? This question was on the mind of Colona, Belgium's largest independent manufacturer of emulsified sauces. The family-owned company must meet growing certification requirements in the retail trade. For Colona, the pH value is at the heart of the quality assurance process. It shows whether the vinegar content is sufficient to ensure the sauces have a long shelf life. In the past, samples were taken from the sauces and then analyzed in the lab. The company now performs continuous in-line monitoring of this key parameter during production with the Ceramax pH sensor from Endress+Hauser. Colona was persuaded by the non-glass, break-resistant sensor, its hygienic design and high precision. Memosens technology allows the sensor to be calibrated in the lab. "Optimization of the pH measurement with the Ceramax is the next step in our quality-oriented approach. It provides us and our customers with a high level of assurance and reliability and is an invaluable aspect of the traceability of our products," says CEO Philippe Colon.



Groundbreaking technology: TrustSens temperature sensors perform self-calibrations during operation.

# The heat is on

Temperature control is important in many processes in the food & beverage industry - not least for the German manufacturer Walter Rau Neusser Öl und Fett AG. The company produces vegetable-based fats and oils that are used to manufacture food products such as ice cream and baked goods. One of the many state-of-the-art processes involves heating freshly pressed cooking oils under vacuum in order to remove volatile components and dissolved gases from the oil. If the process temperature is too high, it can impair the product. Temperatures that are too low keep the product from being properly purified. To date, the sensors had to be calibrated after each product and batch changeover. This enormously timeconsuming step now belongs to the past thanks to the iTHERM TrustSens thermometer from Endress+Hauser. It's the world's first temperature sensor capable of selfcalibration while the process is running. By deploying the iTHERM TrustSens, Walter Rau Neusser Öl und Fett AG eliminated roughly 3,000 process interruptions per vear. in addition to the same number of technician service calls.



Global partnership

Heineken is enjoyed by beer lovers around the world. The premium beers brewed by the Dutch group are sold in 192 countries. The company's success lies not only in the high-quality ingredients, including a unique type of yeast, but also in the fact that Heineken focuses on its core expertise and works together with strong partners in other areas of the business. For more than 10 years, Heineken has been relying on knowledge from Endress+Hauser to manage its measurement devices across the entire life cycle at multiple locations around the world. The wellthought-out instrument management and maintenance model was first established in the Netherlands. Persuaded by the benefits, the company introduced it at other locations, such as Heineken's first operation in South Africa, the Sedibeng brewery, which opened in 2010. "Thanks to the existing relationship between Endress+Hauser and Heineken in Europe, in the early planning stages we were able to develop a successful partnership that continued to grow with the roll-out of the brewery," says Field Service Manager of Endress+Hauser South Africa Glenn Smith. Endress+Hauser is meanwhile responsible for managing the maintenance and calibration of 20.000 instruments from more than 50 manufacturers at eight of the company's locations.

Core competency: Beer brewers Heineken assigned the complete maintenance and calibration of process instrumentation at many locations to Endress+Hauser.

# Full speed ahead

Mexico catapulted itself from developing to emerging country. Now that it's eager to join the ranks of the industrial nations, the country is facing new challenges.

### On the fast track

After 1940, fueled by the unlocking of the domestic market and the oil rally, Mexico experienced an unprecedented, four-decade long economic upswing. An influx of millions of rural inhabitants transformed Mexico City into a megacity. The metropolitan region accounts for half of the country's industrial production. After Brazil, Mexico is Latin America's second largest economic power.



GDP per capita

(adjusted for purchasing power, in international dollars)

### Key drivers

Mexico's economy continues to grow, albeit more slowly. The main driver is the automobile industry. After the collapse of the oil & gas markets, the food & beverage industry has taken on more importance. One cornerstone of the economy is tourism. Mexico is Latin America's top tourist destination.

Tourism

**35 mil.** foreign visitors annually



#### Foreign exchange income

20 bil. US\$ from tourism **27 bil. US\$** in wire transfers from non-resident Mexicans

### Powerful neighbor

The NAFTA free trade agreement transformed Mexico into an export nation. To reduce dependence on its northern neighbor, Mexico is developing trade relationships with other countries.



World leader Mexico is the world's largest beer exporter



27.5 mil. hl beer

63.5% 32.7% Services Industry

#### The shadow economy

60% of Mexico's workers are in the informal sector

3.8% Agriculture

### **Extreme differences**

While Mexico is an important regional and global player, the country is confronted by social issues. Nearly half of the population live in poverty, a situation that is particularly volatile in the south.



55 mil. Mexicans live in poverty

11 mil. live in extreme poverty

### Charting new paths

Mexico's fast pace of industrialization has placed a heavy toll on the country's environment and natural resources. Efforts are underway to improve the water, wastewater and waste systems. Mexico has furthermore set ambitious sustainability goals for itself.



96% with access to clean water



85% with access to sanitary systems

Infographics: Pia Bublies · Research: Christine Böhringer



# Always on hand

Mexico is repositioning its economy in response to slumping oil prices. As the opening of state-controlled sectors fosters investments, the focus is on efficiency and system reliability, two areas in which Endress+Hauser expertly supports its customer base in Mexico.

The clownfish in the foyer of the Endress+Hauser Sales Center Mexico has it pretty good. Despite living in a relatively small aquarium, it enjoys excellent water quality. pH, oxygen content and temperature are all permanently monitored from an adjacent office via a wireless connection. 25 degrees Celsius and water as clear as the Caribbean: it's no wonder the tiny Nemo appears so relaxed.

Endress+Hauser customers in Mexico should have the same feeling. Whether they are global players or small operations, their demands and needs are met by Endress+Hauser employees. The sales center is located on the edge of Mexico City in Tlalnepantla, a community that was swallowed up by the hungry metropolis years ago. One of the world's most populated cities, Mexico City is the economic heart of the country.

**Fast response** Oil is the country's most important source of income, even topping tourism and money transfers from Mexicans working in the US. Black gold harbors risks, however. "In 2015, we lost roughly 20 percent of the business due to falling oil prices," says Managing Director Eduardo Rodriguez. "Luckily, we were able to react immediately. Meanwhile, we have more than offset the loss of oil & gas business through growth in non-cyclical industries."

Mexico grew from a developing country to an emerging market in only four decades. The country is rich in resources, boasts a large domestic market and excellent highways, and has close trade ties. The NAFTA agreement has guaranteed free trade between Mexico, the United States and Canada since 1994. Like the sword of Damocles, however, major manufacturing facilities that developed in the northern part of the country are now operating under the US government's threat to cancel the agreement, a decision that would have devastating consequences for Mexico's economy. A strong black economy is furthermore acting as an impediment to growth.

# *"Expertise and reliability are our greatest strengths."*

Eduardo Rodriguez, Managing Director of Endress+Hauser Mexico

Significant potential Industry generates one-third of Mexico's gross domestic product. Although export-focused manufacturers often meet US standards, the degree of automation is generally low: a situation that offers great potential for Endress+Hauser. "There is a growing awareness that low wages alone will not lead to long-term success," says Eduardo Rodriguez. Investments in measurement engineering and automation technology are occurring particularly as a result of acquisitions. "A change in ownership frequently means modernizing plants."

Business is picking up even in the public sector, where there is an evident lack of progress in carrying out reforms. The signs are pointing to privatization, whether in the water sector, energy generation or the oil industry. To increase national oil reserves, new storage and distribution facilities are currently being planned. "With our tank and terminal management solutions, plus our liquids management systems, we're well positioned," says Marketing Manager Miguel Revilla.

**High degree of precision** The solutions and services businesses are growing in importance. "Customers see us as an expert partner, not an instrument seller," says Eduardo Rodriguez with confidence. The calibration lab also testifies to this view. With highly precise reference instruments for flow, pressure, temperature and liquid analysis, it's one of the top calibration labs in the country. "Of course, we can

calibrate the instruments directly in the system as well," explains Lab Manager Sergio Montes, pointing to the calibration vehicle. "No one holds a candle to us in this area in Mexico."

Eduardo Rodriguez views expertise and reliability as his team's greatest strengths. "Our message is, we bring everything needed to improve the efficiency of our customers' plants and drive down costs." Training plays an increasingly important role. Employees and customers can become familiar with the latest technologies in the sales center's own showroom, or at one of the European centers of competence. "People are always impressed by Endress+ Hauser's high standards, but also by how we embody our values," says the managing director.

**Next dimension** Given that skilled workers are rare in Mexico, the development of the sale center's own personnel takes on more importance. Human Resources Manager Cesar Esqueda is pleased with the low turnover despite a young average age of under 30. He is convinced that "recognition and a career perspective are just as important as salary." A team made up of dedicated employees from different departments searches for solutions to various problems. "We've been able to improve a lot of processes already."

The willingness to continuously change is one of the key foundations of success for the sales center. Business is good in Mexico. Eduardo Rodriguez is currently looking for property to build a separate sales office to create an even better environment for employees and customers. "We've yet to make a decision," says the managing director, "but who knows, perhaps we can celebrate our 20-year anniversary in our own building!"

> Text: Alexander Marzahn Photos: Edgar Aguirre, Karla Ayala



Superior water quality: The aquarium in the foyer.



Recognition and perspective: The sales center employees enjoy ample opportunity for personal and professional growth.

#### Team player

Eduardo Rodriguez took over as managing director of Endress+ Hauser Mexico in October 2015. The 50-year-old industrial engineer, who completed part of his education and training in Toulouse, France, joined Endress+Hauser Mexico as marketing manager seven years before that. With the goal of providing excellent customer service, most of all he values quality management and employee development. Eduardo Rodriguez is married with two step-children and is a passionate Harley rider.



Market: Mexico 33



A gathering of expertise: At Endress+Hauser Mexico, teamwork is of high importance.



Among friends: Stimulating discussions during the coffee break.



Digital integration: Various applications and protocols can be tested in the showroom.



Lean processes: The employees are constantly looking for ways to improve their work.



Taken care of: Whether it involves repairs or calibration, service technicians are quickly on hand.



A warm welcome: Visitors are greeted with a smile.



Absolute trust: Customer intimacy pays off.





## 1999

Endress+Hauser Mexico S.A. is founded, headquartered in Tlalnepantla since 2007.



125

employees work for the Mexican sales center.

10



large customer accounts with strategic significance are serviced by the sales center.



#### 25%

of Endress+Hauser Mexico's business is in automation solutions and services.



#### 1/4

of the sales are generated within the Mexico City metropolitan area.

## Strong presence in a growth market

Endress+Hauser Mexico grew into a leading provider of products, solutions and services for process applications within just a few years. The sales center now competes head-to-head with the market leader. The key industries are food & beverage and oil & gas. As part of an alliance partnership with Rockwell Automation, an expert in automation solutions for industrial production, the companies are focusing on the end customer business. The sales center is supported through two sales rep companies. ECN's 200 staff take care of customers in all industries in the northwest with a focus on mining; Mytec, a smaller partner, serves customers in the northern part of central Mexico.

# The scent of fresh laundry

La Corona and Endress+Hauser have been on a joint mission for 40 years: to reliably and efficiently manufacture Mexico's most popular laundry soap with consistent quality.




Modern plant: The La Corona factory produces 400,000 bars of soap day by day.



Quality first: Endress+Hauser has been preferred partner for instrumentation for many years.

#### Tradition and innovation

Fábrica de Jabón La Corona with around 4,600 employees was founded in 1920. The family-owned company boasts a strong values orientation with a focus on product quality, respect toward its employees and independence. La Corona brands, such as Zote laundry soap, Foca or Roma laundry detergents and 1-2-3 cooking oil, are deeply rooted in the Mexican market. The modern 400,000-square-meter plant in Xalostoc in Mexico City, which produces soap, toothpaste, cleaning and laundry detergents and cooking oils, is considered one of the largest of its kind in the world. Although exports are growing, most of La Corona's turnover comes from the national market.

**F** very Mexican knows Zote, the pinkish laundry soap with the fresh scent of citronella. With quality and a reasonable price, the soap has secured a place in the homes of Mexican families for generations and has now expanded to the US and South America as well. The original formulation has been preserved since its launch. But today Zote is sold in eye-catching packaging and manufactured with state-of-the-art equipment in La Corona's factory.

The plant north of Mexico City produces 400,000 bars of soap – daily. The enormous campus sits on 40 hectares, as big as 50 soccer fields, with production and storage facilities, silos and raw material tanks, administrative buildings and loading terminals, maintenance workshops and training rooms as well as a restaurant, medical facilities, a car park and even a sports unit for the staff. Apart from soap, La Corona also manufactures cleaning and laundry detergents, fabric softeners, toothpaste and cooking oils.

Safety, quality and efficiency "Production runs day and night and we cannot afford downtime," emphasizes Mateo Salguero, Chief Engineer of the automation department. Reliable measurement and automation technology is consequently important. The close working relationship with Endress+Hauser goes back to 1977. Several measurement instruments from this period are still in operation.

La Corona continuously optimizes and modernizes its systems. Today for instance, Ethernet/IP communication permits fast access to process and device data, guaranteeing traceable custody transfer operations. "Over time, the close relationship with Endress+Hauser has allowed us to enhance our production in many respects," says Mateo Salguero.

The soap is manufactured by cooking fats together with lye and adding salts. The emulsion is extracted through a separation process, then dried, enhanced with perfumes and pigments and pressed into form. The complex, multistage process places a correspondingly wide range of demands on the measurement technology. The huge campus contains several thousand integrated measurement points, many of which are subjected to adverse conditions.

Reliable measurement technology Traversing a labyrinth of silos, cooling and absorption towers, reactors and pipes, the production system leads to a series of winding halls virtually devoid of human activity. Visible on nearly every corner, however, are instruments replete with Endress+ Hauser's blue logo that measure temperature, pressure, level, flow or pH values.

"We originally wanted to calibrate the measurement instruments once a year," explains Jorge Maza, one of the plant engineers. "But even after years, the accuracy level remains unchanged. That allowed us to extend calibration intervals and significantly reduce costs." Jorge Maza's department has its own metrology shop. He acquired the necessary knowledge in part through Endress+Hauser customer seminars in Switzerland.

Why Endress+Hauser? "Regardless of the need, Endress+ Hauser always has a solution that fits," says Maintenance Engineer Sergio Vargas. "Configuration is also simple, and

### "We couldn't dream of a better partner than Endress+Hauser."

Mateo Salguero, Chief Engineer of Fábrica de Jabón La Corona

the interface is intuitive." If external support is needed, an Endress+Hauser service technician is not far away. In addition, specific instruments can be quickly delivered any time of the day. "In Mexico, that's certainly not a given!"

Valuable partnership Endress+Hauser technology has often played a role in improving processes at La Corona. For instance, when splitting fatty acids with temperatures of 300 degrees and pressures of nearly 30 bar, level measurement was often done manually, until capacitive level transmitters from Endress+Hauser were installed. "Today the process runs so smoothly that we sometimes forget that measurement points were installed there," reports Sergio Vargas.

During truck loading, the weight is no longer determined with a weight bridge, but by measuring the mass flow with Coriolis technology. The data flows directly into the IT system, so that customers no longer have reason to complain about false readings. And in the aggressive alkaline world of laundry detergent manufacturing, today Memosens sensors ensure that pH values are accurately met. "That eliminates fluctuations during the process, reduces the consumption of raw material and ensures the quality of the product," explains Mateo Salguero.

Mateo Salguero values the direct contact with the sales center in Mexico City. "We couldn't dream of a better partner," emphasizes the Chief Engineer. "With the knowledge of the People for Process Automation, we can continuously improve our processes and increase efficiency." And with that, the characteristic scent of Zote laundry soap will remain with the people of Mexico for a long time.

> Text: Alexander Marzahn Photos: Karla Ayala, iStock



# Clean water for corn and tomatoes

One of the world's largest water treatment plants is up and running in central Mexico. Apart from treating water for 10 million people, it also produces power and fertilizer.

From soccer stadiums and city plazas (so-called Zócalos) to sombreros, a lot of things are one size bigger in Mexico. And that includes a new water treatment plant in Atotonilco, north of Mexico City, which is setting new benchmarks. The plant will treat the wastewater of 10 million people, water 80,000 hectares of farmland and in one fell swoop boost the country's water treatment capacity from 42 to 62 percent.

The plant was built through an agreement with Conagua, the national water commission, at a cost of around one billion US dollars. "The project brought a new dimension to all of the participants," says Roberto Villanueva, Technical Director at Atotonilco. "To ensure efficient, safe and economical operation, we need reliable instrumentation." Hundreds of measurement points with dozens of different devices for level, flow, pressure, temperature and liquid analysis were integrated in the plant.

3 mil

cubic meters of wastewater is treated each day at the Atotonilco plant **Reliable partner** The region's farming operations have long used wastewater from the megacity to water and fertilize the fields. The water was supplied for free, but was untreated. "For environmental and health reasons, we wanted to improve the quality of the water, eliminate pollutants and preserve the nutrients," explains José Flores, Managing Director of plant operator ATVM. How much the government reimburses the operating company for the service depends on verifying the amount and quality of the treated water. "I have to place blind trust in the process technology. In a large plant like this one, a small error can immediately turn into a big one."

Water has been bubbling through the clarifiers since December 2017. The focus is now on fine-tuning the process parameters. "Endress+Hauser helped us continually optimize the processes, even after commissioning," says Roberto Villanueva. One unique challenge is related to the seasonal fluctuations of the water amounts. In order to manage peaks during the rainy season, in addition to the biological systems – which encompass 18 lamella separators, 42 aeration tanks, 24 secondary clarifiers and disinfection

> **/00** measurement points help control the systems





A scrutinizing look: Endress+Hauser specialist Miguel Revilla (left) checks on a device.

Huge dimensions: The Atotonilco plant treats the wastewater of 10 million people.

chlorinators – the plant has five additional chemical treatment lines available. Although more expensive to operate, they can be started and stopped at any time.

The consortium operating the plant includes Atlatec, Ideal and Acciona. "We've already demonstrated our expertise at numerous systems across the country. Now we can show that we're also in a position to successfully manage large-scale projects across all phases," says Miguel Revilla, Director of Marketing at Endress+Hauser Mexico. "We're proud to be the main instrumentation vendor for one of the world's largest water treatment plants." A maintenance and calibration services contract is currently under negotiation.

**Recycling waste** The measurement engineering also provides a level of safety, for example by ensuring that chlorine is dosed in precise amounts for eliminating bacteria,

or in the digesters, where methane gas is harvested from the sludge. An integrated cogeneration power plant supplies 70 percent of the energy needed to run the huge wastewater treatment facility. Explosion-proof measurement instruments monitor the sludge feed, the pressure in the reactors and the methane gas feed line into the power plant.

An incredible 100,000 tons of sludge accumulates each full year of operation, of which only a small portion is deposited. The material, rich in nitrate, phosphate and other mineral nutrients, is treated and processed into non-toxic organic fertilizer. "Today the farmers can cultivate feed crops or corn," explains Miguel Revilla. "But with clean water and good fertilizer, they will be able to grow high-quality vegetables without harmful substances making their way into the food chain."

> Text: Alexander Marzahn Photos: Karla Ayala



# Every drop counts

Water supply has been in private hands for four years now in Puebla, a city with 1.5 million inhabitants. Thanks to technology from Endress+Hauser, Agua de Puebla is setting a new standard in Mexico.

The view from the 27th floor of the business tower is breathtaking. Far below, a sea of houses spreads out across the city of Heroica Puebla de Zaragoza. On the horizon sits Popocatépetl, a 5,462-meter-high active volcano that looks out over the broad plateau around 100 kilometers south of Mexico City. Agua de Puebla has a first-class headquarters location that sends a clear message: the company has its sights set very high.

Agua de Puebla was awarded a license in 2014 to operate the water system in Puebla. With 1,200 employees, it's the first company in Mexico to be responsible for the entire water cycle, from collection, distribution, drainage and sewage, to wastewater treatment. It even handles invoicing and maintenance, a genuine challenge in light of the 3,300-kilometer-long distribution network.

**Focus on quality** In Mexico, 95 percent of the water supply is in government hands. And the system is in deplorable condition in many parts of the country. "We're 25 years behind western countries," says Héctor Durán Díaz, General Director of Agua de Puebla. In Puebla, with its 1.5 million inhabitants, he wants to prove that water is a viable business model and that customers can receive what they want.

When Agua de Puebla took over the water supply in Puebla, there were only two measurement points for the city's nearly 200 sources. "No one really knew how much water was being collected or consumed," says the general director. "It was clear to me that the first order of business was to measure, control and automate things." Today, more than 200 Endress+Hauser instruments reliably supply the measurement values needed to operate the system safely and efficiently. "Because we wanted the best results, we chose the best technology," says Héctor Durán Díaz.

Measurements are taken nearly everywhere: at the sources, the treatment plants and also at the six filling locations in the city, from which water is distributed by truck. Héctor Durán Díaz travelled to Europe, Israel and the United States where he learned how the local systems work. He then chose the best model for Mexico. He also went to Greenwood, Indiana, where Endress+Hauser produces measurement instruments. "Endress+Hauser has an excellent reputation, but I was still deeply impressed by what I saw." A close eye on all values Flow, pressure and level are normally registered at the 200 sources. The measurement values are transmitted directly to the Agua de Puebla control center and displayed on a huge wall monitor. "We were able to convince the customer with an overall solution," says Miguel Revilla, Director of Marketing at Endress+Hauser Mexico. The modbus signals from the sources are transmitted over the mobile phone network. "Our partnership with ICH, a local company that supplies technically sophisticated data transmission systems, paid off in this situation."

The new system has been up and running for a year. Thanks to Heartbeat technology, the measurement instruments are self-monitoring, making the system low-maintenance. Today, technicians are called in only when needed. "Thanks to state-of-the-art process control technology, the city enjoys a reliable water system," says Héctor Durán Díaz. "The focus now is on using the measurement values to improve efficiency, monitor consumption and minimize waste."

Energy costs account for 45 percent of expenditure. The pumps in particular draw significant amounts of energy. Engineer Marin Escobar estimates the company has already saved 8 to 12 percent through modern measurement technology. "During the night, or when it rains, we can reduce pump capacity from the control center with the click of a mouse." Because unusual drops in pressure are immediately registered, leaks are also quickly detected.

**Model approach** "We have established the Puebla water system on a completely new basis," says Héctor Durán Díaz. It will serve as a model for other cities such as Morelia and Durango. "We will triple our investments in 2018," says the general director in announcing the company's intentions. One thing he is convinced of: "Water can be a profitable business if you invest in service, people and the right technology."

> Text: Alexander Marzahn Photos: Karla Ayala, Shutterstock



Impressive setting: the PopocatépetI (Smoking Mountain) is an active volcano situated on the edge of Puebla, a city of 1.5 million inhabitants.



"Change takes time," says Héctor Durán Díaz, General Director of water supplier Agua de Puebla.

![](_page_42_Picture_5.jpeg)

Transmission via mobile network: the data is sent directly to the control center.

![](_page_42_Picture_7.jpeg)

200 water sources are distributed across the city, where flow, pressure and level are measured.

# In good hands

Mexico's producers are aligning their operations with global guidelines and industry standards. Thanks to customized complete solutions from Endress+ Hauser, they can keep entirely focused on their core business.

![](_page_43_Picture_3.jpeg)

10 square meters of the latest technology: Metering unit for loading liquefied petroleum gas.

### Precision at the terminal

The shortest way to reach the ocean from Mexico City is to head east. The Port of Tuxpan on the Gulf Coast thus plays a key role in the transportation of goods. The terminal handles large volumes of soy, corn and automobile exports. But with major oil fields located off the coast, and with industrial areas surrounding the capital that rely on liquefied petroleum gas (LPG) imported from Russia, Malaysia and the United States, crude oil and gas are an increasingly important aspect of the port's business.

A new plant for storage and distribution of LPG was put into operation in 2014. As an experienced supplier of complete automation solutions for terminal management and flow measurement, Endress+Hauser Mexico provided the customer with comprehensive support compliant with international guidelines.

For custody transfer measurements, system manufacturer Marsori Group chose the Coriolis technology from Endress+Hauser. "This technology ensures a maximum deviation of 0.05 percent from the measurement value and exhibits hardly any pressure loss with large nominal diameters," says Hugo Fonseca, instrumentation specialist at the Marsori Group. "The instrument's compact design permits optimal construction of the loading unit. Endress+Hauser entirely met our expectations."

To increase capacity, the terminal was recently expanded with the addition of four LPG loading stations. This time Endress+Hauser worked directly with the end customer, Ductos y Terminales, and acted as project

![](_page_44_Picture_1.jpeg)

manager to install four identically constructed units together with two plant engineering partners. The order encompassed engineering, component selection and procurement, design, commissioning, on-site acceptance testing and training programs.

![](_page_44_Picture_3.jpeg)

Popular thirst-quencher: the beer produced in Mexico is not just for export.

#### Efficiency for the brewery

One of the biggest cost factors for breweries is energy consumption. Efficient plant and equipment technology thus ensures a competitive advantage. With this in mind, a major international brewery, which is required to adhere to the highest quality standards, ordered an energy monitoring system from Endress+Hauser Mexico. The system is used to monitor utilities like drinking water, carbon dioxide, compressed air and steam at the company's plant on the Yucatán Peninsula.

The brewery was looking for a complete solution to cover around three dozen flow measurement points and expected installation within only two months. Given the enormous size of the plant, the device communication occurs across a wireless network. With a range of 250 meters, the WirelessHART network from Endress+Hauser can transmit signals from even the most remote corners of the production system. "Because the time-consuming cable installation was omitted, we had no trouble meeting the tight deadline. We saved time and money even in this phase of the project," explains Miguel Revilla, Director of Marketing at Endress+Hauser Mexico.

It also took little effort for the specialists to integrate the devices, a step that is often a hard nut to crack when large existing plants are involved. "Our solution integrates seamlessly into the installed base, even though the plant features components from various suppliers," explains Miguel Revilla. The customer now has an overview of the energy consumption at all times and can run the utilities in an optimized fashion. The reporting software provides the necessary proof consistent with international industry guidelines.

# At your service

Endress+Hauser has developed an extensive portfolio of services around the core of process instrumentation that help improve efficiency, safeguard quality and reduce risks.

### **Global support**

The People for Process Automation have comprehensive expertise in the field of measurement technology, in addition to an in-depth understanding of the special requirements of various industries and processes. This knowledge is available to customers at every stage of their plant's life cycle.

![](_page_45_Picture_5.jpeg)

### Assistance and advice

Endress+Hauser supports customers with professional diagnostic and repair services. The People for Process Automation also provide a complete range of tailored solutions, from engineering to commissioning, maintenance and calibration to training. Endress+Hauser furthermore helps customers optimize their processes and plants, consults in the areas of maintenance and metrology or assumes complete responsibility for maintenance and calibration.

![](_page_45_Picture_8.jpeg)

**up to 30%** less engineering effort

![](_page_45_Picture_10.jpeg)

>1,000 Endress+Hauser service engineers worldwide

![](_page_45_Picture_12.jpeg)

up to 50% reduction in commissioning time

![](_page_45_Picture_14.jpeg)

**2,500** users trained annually

![](_page_45_Picture_16.jpeg)

![](_page_46_Picture_1.jpeg)

![](_page_46_Picture_2.jpeg)

![](_page_46_Picture_3.jpeg)

World's first

![](_page_46_Picture_4.jpeg)

#### **Highest accuracy**

Quality-relevant measurement points must be tested and calibrated on a regular basis. Endress+Hauser offers calibration services consistent with global standards for nearly all physical, analytical and mechanical parameters, regardless if performed in a production center, in a service center or on-site at the customer.

> >1 mil. instruments calibrated each year

### **Big data services**

When it comes to services, the future is digital. Analyzing enormous volumes of sensor and process data by means of smart algorithms creates new service opportunities, such as predictive maintenance. This helps minimize system downtime and permits scheduled service calls.

![](_page_46_Picture_10.jpeg)

## 19 mil.

instruments registered in the Endress+Hauser CER device database

![](_page_46_Picture_13.jpeg)

![](_page_46_Picture_14.jpeg)

#### **Digital services**

The Endress+Hauser Analytics app provides an overview of the installed base

![](_page_46_Picture_17.jpeg)

**IIoT ecosystem** Analysis of sensor data and device information in the Endress+Hauser hub

# Step by step into the digital age

Digitalization is stirring up the industry, and some users are bewildered by the topic. With new digital services, Endress+Hauser is demonstrating how the potential of the Industrial Internet of Things can be easily used without converting existing plants.

Is everything all right at home? How are my shares doing? And how many fitness points have I collected today? One look at a smartphone is enough to bring you up to date on many everyday issues. While digital interconnection in their private lives has long since become self-evident for millions of people, it is still pie in the sky to large parts of the process industry. Those who want to know more about a certain field device in their plant often have to go and check for themselves on location.

As far as Steffen Ochsenreither is concerned, digital convenience will also enter the process industry. Endress+ Hauser's Business Development Manager is working on the Industrial Internet of Things (IIoT). His aim is to make the data from all the sensors of an industrial plant easily accessible from anywhere. Many users are therefore also calling it the fourth industrial revolution: after mechanization, electrification and automation, (digital) interconnection is now on its way.

Keeping an eye on all field devices Steffen Ochsenreither doesn't have a revolutionary coup d'état in mind, however, but rather an evolutionary step-by-step approach. "As part of our IIoT strategy, we are developing very specific applications that integrate seamlessly into the existing plant technology and immediately provide the user with added value." The first application to be realized is called Endress+Hauser Analytics, which enables the digital inventory of the installed base. Following a first successful field test with a steel manufacturer, it is now available to Endress+Hauser customers from every field of application.

With Endress+Hauser Analytics, all field devices in a plant can be easily categorized and analyzed, even those from third-party manufacturers. An interface module installed in the network (in this case, an Edge Device) independently recognizes the various device types and creates a digital twin in a cloud-based hub. Alternatively, the devices' nameplates can be read by the Endress+Hauser Scanner app and the information can be automatically uploaded to the hub, where they are compared and added to the Endress+Hauser device database.

Endress+Hauser Analytics reduces the length of time needed for taking inventory down to a fraction of the time required for manual recording. Through the app's clear interface, which can be accessed by mobile devices as well as the office PC, customers can view device data and documents **Convenient access** The Endress+Hauser Hub provides access to all relevant data on the installed measurement devices, directly from the office desk. The Endress+Hauser Asset Health application also enables monitoring of the devices' statuses; in future, it will even be possible to carry out predictive maintenance.

**Digital inventory** The Endress+Hauser Scanner app recognizes the nameplate, from which it generates device data directly in the hub. It's even simpler with the Edge Device, an interface module that is directly integrated into the process network and reads the information fully automatically.

**Flexible reaction** Users can access and take action with the data in the hub at any point and from anywhere using mobile devices. The Endress+Hauser Analytics app identifies critical measuring points, reports outdated devices and provides recommendations for measurement technology optimizations.

**Certified security** In order to guarantee a secure and trustworthy framework, the Endress+Hauser IIoT platform was certified by the independent EuroCloud organization, with four stars for data that is particularly worth protecting. This data is located in European research centers.

**Quick overview** A clear dashboard represents the virtual gateway to the Endress+Hauser Hub, where all data and documents relevant to the devices is securely stored. It has been designed as an open platform, so that data from third-party devices can also be incorporated and processed.

such as calibration certificates or repair reports. Furthermore, they also receive information on the criticality of measuring points, on standardization opportunities and successor products, should a device require replacing. As is common with private sector apps, the basic package is free, while usage fees only apply to anything beyond that.

An ecosystem for the digital world The key elements of Endress+Hauser's IIoT ecosystem have therefore already been named: the cloud-based hub, interface modules for connectivity and the Endress+Hauser device database. These elements help realize the full potential of the intelligent measurement devices and create the foundation for algorithms that connect the existing device and process data, therefore generating added value for the user in the shape of digital applications.

The measurement technology itself does not require any adjustments. The existing device communication via HART, WirelessHART, Profibus and GSM is used; further interfaces will be added in future. The cloud data is encrypted and securely stored in certified research centers.

Further applications based on the Endress+Hauser IIoT ecosystem are also set to be ready for the market soon. An application for asset health monitoring will monitor the status of the installed base, and is set to eventually enable predictive maintenance. Endress+Hauser Smart Metrology is going in the same direction: This application, which is still in its conceptual phase, will enable the optimization of the calibration intervals of pH sensors. Another application for water quality will allow for the simple and cost-effective remote monitoring of water levels.

"We will offer the water quality application as a complete system with a GSM gateway and a smartphone app in our web shop, with the option for a Memosens sensor and a Liquiline transmitter," Steffen Ochsenreither announces. This will not only test the acceptance of digital services, but also of online sales, which are still less common in the process industry: "The IIoT ecosystem provides us with the opportunity to enter into a new relationship with our customers that goes beyond the sale of products. We want to accompany them through their activities and demonstrate new ways with which to configure their processes more efficiently."

> Text: Reinhard Huschke Illustration: Ulrich Birtel Photo: Ahrens+Steinbach

![](_page_49_Picture_7.jpeg)

![](_page_50_Picture_1.jpeg)

#### A WORD WITH ... KÉVIN RUEFF

# "We aren't just talking about IIoT, we're leading the way"

# Mr Rueff, how can Endress+Hauser's IIoT strategy be summarized in just a few words?

Our aim is to create true added value for the users. We want to achieve this using knowledge, simplicity and community: we support the users with our device expertise and enable them to easily apply this knowledge, while providing a community platform for exchange with us and other users.

#### Which products are set to emerge from this strategy?

When it comes to our IIoT solutions, they are not products in the usual sense. With these solutions based on our knowledge, we are providing our customers with easy-to-use possibilities for optimizing their processes. Current internet technologies and the elements of the IIoT ecosystem are just a means to an end.

# In the process industry, the digital revolution is still in its infancy. What developments do you envisage for the IIoT in the medium term?

It's the same in the process industry as anywhere else: more and more young people are moving up who use digital services intensively in their private lives, and who appreciate the possibilities and convenience this provides. For this reason, we've decided that we will no longer just talk about the Industrial Internet of Things, but will lead the way with specific steps – and do so across all our fields of activity.

> Questions: Reinhard Huschke Photo: Christine Schmalz

Digital native Kévin Rueff (32) is Product Manager Internet of Things for Endress+Hauser Process Solutions, and as such was heavily involved with the development of the IIoT ecosystem. His aim is to directly incorporate market and customer requirements into the conception of new applications.

![](_page_50_Picture_12.jpeg)

![](_page_51_Picture_1.jpeg)

# Revealing the full picture

Problem solver, cost cutter and process optimizer: The products, solutions and services from Endress+Hauser make the difference in many places – in oil storage tanks as well as in production systems in the life sciences industry.

![](_page_53_Picture_1.jpeg)

Examination from head to toe: Boehringer Ingelheim thoroughly analyzed and optimized the complete calibration process across its German sites.

# Calibration processes under the microscope

Boehringer Ingelheim improves people's health across the globe every day. Germany's largest research-based pharmaceutical company also continuously advances innovations in its internal pharmaceutical production in order to achieve the highest levels of quality required in the industry.

Measurement technology plays a large part in this: 91,400 measuring points for 20 physical parameters are installed at the headquarters in Ingelheim alone; 8,200 of which directly influence the process and production output. The company therefore vetted the entire calibration process across all four German sites together with Endress+Hauser some time ago, before subsequently optimizing it.

"We were looking for a partner who possesses established technical know-how, and particularly a profound calibration expertise, across all measured values," says Klaus Fickinger, Head of Automation Pharma. "The knowledge of regulatory proceedings is just as important: what do authorities require in terms of calibration, and what must be observed in order to conform?" Approximately 120 standard operating procedures (SOPs) were examined, harmonized and established across all departments in cooperation with those responsible for calibration. An Endress+Hauser calibration expert brought in an outside perspective and was always on-site as a contact person.

This standardization has created true added value for Boehringer Ingelheim: complexity was reduced, and all departments involved have grown closer together. Systematically questioning the processes also demonstrates further potential for optimization in the calibration department. Today, calibration is placed on an even stronger footing. Klaus Fickinger emphasizes: "Even the auditors were thrilled by our procedures!"

![](_page_54_Picture_1.jpeg)

Trailblazer: An automation solution from Endress+Hauser keeps the tanks from overfilling.

### Safety at the push of a button

In the heart of the Emirate of Fujairah on the Gulf of Oman, the IL&FS Group operates the state-of-the-art independent oil storage terminal IPTF. With 14 product tanks with a combined capacity of more than 330,000 cubic meters, the terminal is equipped to handle various grades of refined petroleum products, both black and white oils. Because of their focus on safety, IL&FS relies on the independent, automatic and fail-safe Overfill Prevention System from Endress+Hauser to avert hazardous situations arising from tank overspills. The system has thirdparty certification in accordance with the current standards for these types of facilities (API 2350 and IEC 61511 SIL). It performs prescribed function proof tests in specific intervals on all instruments in the system chain, from the sensors to the alarm devices. Before the solution was installed, employees had to climb onto the tanks and dip a sensor into the oil to simulate an alarm. Now, the 14 tanks are tested in less than five minutes at the push of a button. Industry experts are impressed by the system as well. The facility recently received the 'Safe and Secure Port - Terminal of the Year 2017' certificate issued by the Global Ports Forum.

![](_page_54_Picture_5.jpeg)

Pioneering service: Analysis technology from Endress+Hauser helps remove micropollutants from the effluent.

# Technology for the fourth treatment stage

The water treatment plant in Laichingen, Germany, which is designed for a population of 35,000, is one of the country's pioneers in the treatment of wastewater. It recently became one of the first plants to institute the fourth treatment stage, a process that removes micropollutants, such as medication residues, hormones or residues from personal hygiene products, from the water. To date these trace materials, which pose a danger to aquatic organisms, have made their way unchecked into the ecological system. As a final step that follows the mechanical, biological and chemical treatment processes, the fourth stage eliminates these contaminants by means of, for example, an active charcoal filter. Serving as partner for the entire measurement technology was Endress+ Hauser. The operator of the plant was persuaded by the complete offering for all standard liquid analysis parameters, as well as the Liquiline transmitter platform and Memosens sensor technology. This allows the plant to continuously monitor and optimize the processes that remove the trace materials. Because the Memosens sensors significantly reduce the maintenance effort, cost efficiency is improved at the same time.

![](_page_55_Picture_1.jpeg)

Processes under control: Foam build-up can be reliably detected with Heartbeat Technology.

### The right dose every time

Achieve process reliability, reduce costs and protect the environment: those were the goals of Infrapark Baselland AG, a large 32-hectare chemical park located near Basel, Switzerland that is home to various chemical and pharmaceutical companies. At Infrapark, the accumulated wastewater that cannot be broken down in a biological sewage system must be pretreated. Because there was no way to detect foam build-up in the oxidation reactor, a defoaming agent had to be added as a precautionary measure. This was the only way to ensure that the reactor was being fully used and that the ventilation system was not being blocked. With the Micropilot radar-based level instrument and the integrated Heartbeat Technology, Endress+Hauser supplied a more efficient solution to address the issue of foam build-up. The system not only diagnoses and verifies the instrument, it also detects surface foam. "This solution allows us to reliably detect foam build-up during the oxidation process and apply the defoaming agent in a targeted fashion," says Stefan Graser, who oversees the wastewater pretreatment process at Infrapark. Conserving resources pays off. The park significantly reduced the amount of defoaming agent it uses each year.

![](_page_55_Picture_5.jpeg)

Reuse: This wastewater treatment plant in Nagpur provides a new power station with cooling water.

#### Wastewater as a resource

Nagpur, an industrial city of 2.4 million in the eastern part of the Indian state of Maharashtra, lacks water, despite being located on the Nag river. The river is polluted, and even the monsoons do little to secure supplies. Together with Mahagenco, a governmentowned energy company, the city is now developing new ways to provide sufficient water for a new thermal power plant. For the first time in India, a new fivehectare sewage plant will draw 130 million liters of contaminated water from the Nag each day and treat it exclusively for use in the power plant as cooling and service water. Endress+Hauser supplied the entire measurement technology, nearly 100 instruments for level, flow, pressure and temperature measurement as well as liquid analysis. "We are the only provider in the country that offers a complete instrumentation portfolio in combination with extensive expertise in the area of water and wastewater," says Sunil Bhor, Head of Industry Water & Wastewater from Endress+ Hauser India. The treated water will cool three, 660megawatt thermal power plant units, thus saving 47 million cubic meters of fresh water per year.

![](_page_56_Picture_1.jpeg)

An expert for tough situations: The Micropilot FMR67 with 80 gigahertz technology.

# 80 gigahertz reliability

As one of Europe's leading steel producers, voestalpine Stahl GmbH manufactures, refines and develops highly innovative steel products for challenging applications in the automotive, electronics, building construction and technology, household appliances and processing industries. To avoid interruptions or downtime at the plants, reliable level measurements are imperative. For years, the company relied on rope probes to monitor the levels for the 45 different materials and granules stored at many of the 160 bunkers located at the headquarters in Linz, Austria. If the bunkers were filled too fast however, the ropes rubbed against the top edge of the bunker, influencing the signal. For this reason, managers at the company were enthusiastic about Endress+Hauser's latest radar instruments: the Micropilot FMR67 with 80 gigahertz technology. The device features a drip-off antenna and small beam angle that provides superior accuracy in even the harshest conditions. This claim was verified during testing, when voestalpine Stahl GmbH used a conveyor to spread carbon dust equally across three bulk containers. Even at high filling speeds, the signal indicated the correct level.

Texts: Kristina Rehl, Christine Böhringer Photos: Christoph Fein, IPTF, Christoph Wolter, Infrapark Baselland AG, Manuel Wittek

![](_page_57_Picture_1.jpeg)

New dimension: The calibration facility's measurement section in Suzhou for magmeters with very large nominal diameters up to 3,000 millimeters.

# Large-scale precision

The new calibration facility in Suzhou, China, is setting new standards: It can even calibrate flowmeters with very high nominal widths – fully automated and with the highest precision. The certificates are valid worldwide.

The gray stainless steel pipe is taller than a human and almost spans the entire length of the 76-meter-long hall. One of the pipeline's segments is blue: it's an electromagnetic flowmeter with a large nominal width that is currently undergoing calibration. A steady, gentle whirr can be heard; now and again an employee looks at a display to check that everything is in order.

Suzhou is one of Endress+Hauser's international production sites. Magmeters of the Proline Promag type with large nominal diameters are manufactured to customer specification at the new plant – the third in Suzhou. Afterwards, they are immediately calibrated and adjusted so that they will later provide precise measured values for the customer.

Endress+Hauser guarantees a maximum deviation of 0.2 percent from the measured value. The

calibration facility itself works three times as precisely: "At 0.666 percent, the uncertainty in measurement corresponds to a glass of champagne in a full bathtub," says Project Manager Jürg Gfeller. He managed and accompanied the construction and start-up of the Suzhou calibration facility for Endress+Hauser Flowtec, the Group's competence center for flow measurement technology. The mechanical engineer was present on site for over 200 days.

It's no coincidence that the new facility is in China. The country is rapidly developing its water supply, which creates high demand for flow measurement devices with large nominal diameters. Endress+Hauser has successfully established itself in this growth market over recent years with its high-precision flow measurement technology. **Globally compliant** The new calibration facility has a total of four measurement sections, three of which are designed for fixed nominal widths (DN) of 1,400, 1,600 and 1,800 millimeters. The fourth can be modified to between DN 2,000 and DN 2,400. Even a nominal width of 3,000 is set to be implemented by the end of 2018 – a new record in Endress+Hauser's production network; until now, DN 2,400 in the facility in Cernay, France, was the maximum.

Before its official start-up, the new facility was given JSMI approval by the relevant Chinese authorities; meanwhile an accreditation in accordance with the international standard ISO 17025 has been applied for from the national CNAS accreditation service. Flowmeters that aren't destined for the Chinese market can therefore also be calibrated in Suzhou and employed all over the world. "Our customers can be certain

![](_page_58_Picture_1.jpeg)

![](_page_58_Picture_2.jpeg)

Heavy weight: The test pieces are lifted into place by a crane.

that their measurement devices are globally compliant, no matter where they were produced," emphasizes Jürg Gfeller.

One of the special features of the Suzhou plant is its construction as a closed system. The water is circulated by pumps at a constant pressure, flowing through the test piece and the reference instruments, referred to as masters. "This setup allows us to run measurements for any length of time. We can therefore guarantee stable, reproducible conditions," says Jürg Gfeller, describing the concept's main advantages. Fourteen Coriolis instruments of the Promass X type serve as the calibration standard. These are connected depending on the flow. Due to the high-precision Coriolis principle, its measurement inaccuracy is at least four times lower than that of the electromagnetic test pieces.

**Complete traceability** Metrological traceability (see graphic on the next double-page spread) is an important requirement for the global validity of the calibration results. This principle applies to all Endress+Hauser's flow

calibration plants around the world. It stipulates that every measurement device was calibrated at a precise facility, which was calibrated at an even more precise facility, and so on – up until international standards such as the primary kilogram in Paris as the ultimate reference.

The Coriolis masters in Suzhou are therefore accordingly calibrated individually at regular intervals. This is done by calibrating the measured values with a scale, which is in turn calibrated using calibrated weights which are audited by an accredited laboratory in China every two years. "The calibration of the test pieces as well as the traceability leading up to the standard weights is fully automated," says Jürg Gfeller. "This can be found in no other calibration facility in the world."

Text: Reinhard Huschke

#### Production hub

Endress+Hauser now operates three production sites for measurement technology in Suzhou, China. A new plant which opened in 2018 was particularly designed for the order-specific production of electromagnetic flowmeters with large diameters. The new calibration plant for flow measurement devices up to DN 3,000 takes up a lot of space here. Temperature measurement and liquid analysis devices are also manufactured in the same building. The first plant for flow measurement engineering was opened back in 2003, and a second production plant for level and pressure measurement technology has been operating since 2006. Overall, Endress+ Hauser employs approximately 300 production staff in Suzhou. As well as the Chinese market, the plants also supply other countries in the Asian region.

# Around and around

The new flow calibration facility in Suzhou is designed for electromagnetic flowmeters with very large nominal diameters up to DN 3,000. When it comes to automation, it goes further than any facility in the world.

![](_page_59_Figure_3.jpeg)

#### Five steps to Paris

The calibration of the test piece can be traced back to the primary kilogram in Paris through procedures in the facility, as well as both national and international standards. Traceable check routines not only exist for the determination of mass as depicted here, but also for the master's impulse counters and further physical and technical parameters of the calibration facility.

![](_page_60_Figure_3.jpeg)

#### National standard

Regular auditing of the reference weights by an accredited laboratory which in turn is traceable to national metrology institutes.

#### SI unit

National standards are traceable to the realization of the respective SI unit – such as the primary kilogram in Paris.

#### IN BRIEF

#### Number one on the market

The consulting firm Frost & Sullivan has honored Endress+ Hauser with the Global Market Leadership Award for electromagnetic flowmeters. Frost & Sullivan commended Endress+Hauser for its customer-oriented approach which has led to the development of a comprehensive portfolio, and noted its consistent investment in product innovations. The firm's experts were impressed by the newest generation of the Proline transmitter featuring Heartbeat Technology for device diagnosis and verification, and the virtually unlimited connectivity offered by the integrated web server, WIFI, Ethernet IP and Profinet.

![](_page_60_Picture_12.jpeg)

#### Leading in innovation

Endress+Hauser has won the Swiss Technology Award in the Innovation Leader category with its Promass Q. The Coriolis flowmeter, which was specially developed for applications in the oil & gas and food & beverage industries, provides outstanding measurement accuracy even under difficult process conditions. The innovative multi-frequency technology compensates for measuring errors that can be caused by entrained gas in the medium, for example. The Swiss Technology Award is Switzerland's most important innovation and technology award.

#### Interest in Open Integration

The level of interest for the Endress+Hauser Open Integration Partner Program is increasing among both customers and suppliers. The partners test and document application-specific topologies comparable to a factory acceptance test. This allows potential interactions between various automation components on the same digital network to be identified and corrected in time. The aim is to make commissioning of plants as easy as possible. New program participants include Festo and Turck – alongside AUMA Riester, Flowserve, HIMA Paul Hildebrandt, Honeywell Process Solutions, Mitsubishi Electric, Pepperl+Fuchs, Phoenix Contact, Rockwell Automation, R Stahl and Schneider Electric.

# Healthy balance sheet

Endress+Hauser achieved solid growth in 2017 and improved earnings. The year was marked by significant investments, a growing workforce, scores of new products and major progress in the area of sustainability.

![](_page_61_Figure_3.jpeg)

![](_page_62_Picture_1.jpeg)

#### Diversity as a strategy

A comprehensive offering and presence in various industries, markets and regions make the company less vulnerable to external influences. A diverse workforce increases productivity and encourages innovation, strengthens customer loyalty and helps to compete for talent.

![](_page_62_Figure_4.jpeg)

Percentage of female employees

![](_page_62_Figure_6.jpeg)

#### Success across the board

Endress+Hauser strives for sustainability. An important yardstick is the EcoVadis benchmark, an audit that evaluates companies along ecological, social and ethical lines. In 2017, Endress+Hauser landed in the top two percent of all participating companies to achieve gold status.

![](_page_62_Figure_9.jpeg)

employees worldwide (296 new positions)

Gold status in 2017 EcoVadis benchmark

![](_page_62_Figure_12.jpeg)

apprentices

# "The family provides values and warmth"

How did Endress+Hauser do in its 65th year? And what will it take to ensure that the company remains successful? Supervisory Board President Klaus Endress and Group CEO Matthias Altendorf share their insights.

Tea or coffee? Supervisory Board President Klaus Endress (left) and CEO Matthias Altendorf in relaxed conversation.

110m

![](_page_64_Picture_0.jpeg)

#### Mr Altendorf, you're drinking a cup of coffee at the moment. 2017 was an excellent year for Endress+ Hauser. Does it still need caffeine?

**Altendorf:** Caffeine is always necessary! We have to continue to keep our eyes on the ball and if required, react quickly. But as you mentioned, we had a great year.

#### What changed exactly, compared to 2016?

Altendorf: The upswing that impacted the consumer business in 2016 is now spurring investments in the manufacturing industry. That means our business performed well in practically every industry and region. China is back on the path to growth, the US economy recovered, and Europe is also charting a growth course again.

#### Mr Endress, you're standing here relaxed with a cup of tea. But 'wait and see' was never your tactic... How did you feel about 2017?

**Endress:** The biggest questions were not raised by the markets, but rather politics – the populists. At the beginning, no one imagined the year would end as well as it did. But I believe we did our jobs well. Instead of searching for reasons why the business was not doing well, we looked for opportunities. If there was a fly in the ointment, then perhaps it was that our growth was driven by relatively few important markets.

### What issues are impacting the markets and customers the most at the moment?

**Altendorf:** Digitalization is way at the top of the list. As companies have recognized, it's not about new software. The Industrial Internet of Things – or IIoT for short – is profoundly changing the value chain, and as a result the work environment. A high degree of transparency makes it possible to optimize processes and increase efficiency. The entire range of automation technology, from sensors to data integration, plays a key role.

### And in what areas is Endress+Hauser currently generating the most interest?

Altendorf: Our innovative and high-quality measurement instruments are still attracting a lot of attention. We introduced well over 50 new products to the market in 2017 and will launch a similar number of new products this year. Customers are furthermore noticing that we are very active in the area of IIoT.

## How do you plan on further enhancing the company's network in the coming years?

**Altendorf:** We want to focus more on regionalization and better distribute our existing support units around the world. In Lyon, for example, we're building a European support hub for advanced analytical technologies. Our sales centers have to position themselves more broadly as well, so that we can

![](_page_65_Picture_13.jpeg)

"We don't have to claw our way from one quarterly report to the next. We can sustainably and successfully develop this company over the long term."

Matthias Altendorf, CEO of the Endress+Hauser Group

expertly market these analytical parameters. We will also focus on doing a better job of getting the message out to our customers about the solutions business that we built around our instrumentation.

Endress+Hauser has now been around for 65 years. Where do you see the biggest challenges for the company, Mr Endress? And where are the biggest opportunities? **Endress:** If we look at where we have come from, then you can see that we have experienced a whole lot of change during this period. Endress+Hauser has constantly adapted - and very successfully I might add. At the same time, we managed to avoid becoming complacent. But we have to make sure that will never be the case. In a world that is constantly optimizing itself, and in which things are always improving – and in fact must improve – there will always be a need for measurement technology. Even in a hundred years, we will not run out of work! Physical parameters such as flow or pressure will still be needed. What will become more and more in demand though are quality-relevant parameters.

#### Analytik Jena has been part of the Group since 2013. Has the entry into the laboratory analysis business met your expectations?

**Endress:** This type of acquisition requires strength and patience. Getting involved in the lab area and covering the entire value chain with our measurement technology was certainly a good step. Overall, it represents a new and additional dimension for Endress+Hauser.

#### Various acquisitions have strengthened the process analysis business since then. Where is Endress+Hauser with its analytics strategy?

**Altendorf:** This strategy has three pillars. The first is liquid analysis, Endress+Hauser Conducta's traditional field of activity. This area is currently one of our growth engines. The second involves gas analysis, which is the direction we are heading in through the acquisition of SpectraSensors, as well as Kaiser Optical Systems. This field is also growing. Finally, we want to do more than just be active in the lab. We want to bring lab measurement technologies to the field.

#### What does that mean in concrete terms?

Altendorf: Apart from physical parameters, we'd like to offer more in the way of qualitative and analytical parameters, inline or online. This data puts our customers in a position to monitor their processes more closely, and produce higher quality with less waste. This area has seen the most activity recently. The technology from Blue Ocean Nova allows us to integrate spectroscopic methods into process plants. SensAction expands our portfolio with systems that measure concentrations in liquids. And the sensors from IMKO Micromodultechnik can detect moisture in solids.

### What are the next steps? Can we expect further acquisitions?

Altendorf: We've brought a lot of great people on board. We have to do a good job of integrating them into the Group. And of course we want to round out our portfolio with innovative technologies from these new companies. All of this demands attention and time. If we discover along the way that other technologies or parameters are necessary, we would either develop them in-house or pursue further acquisitions.

#### What role will the new Sensor Automation Lab play?

Altendorf: It strengthens our innovation strategy. On the one hand we have our own development departments. On top of that we purchase new technologies from time to time. We're now going down a third path and creating a start-up outside of our corporate structures that will allow more creative freedom and enable new forms of cooperation and collaboration. An interdisciplinary team of scientists will work in the Sensor Automation Lab. Nearby we will also gather expertise from the fields of digitalization and sensor technology. By collaborating with other institutes and our production centers, we want to create a network that will allow us to address and solve the customer issues of the future.

### Did you have to do a lot of convincing to put this strategy into place?

**Altendorf:** No, not at all. We have these opportunities because we are a family company. For me, this is absolutely

the key to Endress+Hauser's success. We don't have to claw our way from one quarterly report to the next. We can sustainably and successfully develop this company over the long term. The family not only provides the capital, but also values and warmth.

**Endress:** We are a family company, even into the next generation!

### If you peer into your coffee, Mr Altendorf, what do you see for 2018?

**Altendorf:** Given that our industry lags behind the economic cycle, the outlook, at least for the first half of 2018, is positive. We expect it will be another good year for Endress+Hauser, provided there are no surprises.

#### And what do the tea leaves tell us, Mr Endress?

**Endress:** There is actually no reason to believe that it won't be a good year. But at the same time, there is no guarantee that it will!

Questions: Martin Raab Photos: Christoph Fein

**Family ties** Klaus Endress, born in 1948, obtained a degree in industrial engineering from the Technical University Berlin. He joined his father's company in 1979, took over Group management in 1995 and moved to the Supervisory Board as president in 2014. He is married and the father of two grown children.

**Company roots** Matthias Altendorf, born in 1967, began his career at Endress+Hauser with vocational training as a technician, followed by studies, stays abroad and further education. He was promoted to the Executive Board in 2009 and became the Group's CEO in 2014. He is married and has one son.

# Investing in the world

Endress+Hauser is continually expanding its international network for sales and production.

![](_page_67_Picture_3.jpeg)

Greenwood, Indiana, USA New production facilities for temperature measurement engineering 8 million US dollars Opened in 2017

Ann Arbor, Michigan, USA
Expansion of production facilities
for analytical engineering
9 million US dollars
Opened in 2017

**3** Santiago, Chile New sales center building 5.2 million euros Opened in 2017

**4** Lyon, France New sales office 4.9 million euros Opened in 2017 **5** Brussels, Belgium New sales center building 6.6 million euros Opened in 2017

6 Weil am Rhein, Germany Expansion of sales center building 6.2 million euros

6.2 million euros Opened in 2017

Reinach, Switzerland Expansion of production facilities for flow measurement engineering; new offices 49.5 million Swiss francs Opened in 2017

3 Maulburg, Germany Expansion of production facilities for level and pressure measurement engineering 40.5 million euros Construction started in 2017 9 Ebnat-Kappel, Switzerland

Expansion of the sensor production facilities 18.9 million euros Construction started in 2017

🕕 Nesselwang, Germany

Expansion of production facilities for temperature measurement engineering 11.2 million euros Opening scheduled for 2018

Stahnsdorf, Germany
Expansion of production
facilities for pressure sensors
12.2 million euros
Construction started in 2017

Al-Jubail, Saudi Arabia
New calibration and
service center
3.3 million euros
Opening scheduled for 2018

Kuala Lumpur, Malaysia
New sales center building
9 million euros
Opened in 2017

🚯 Suzhou, China

Expansion of production facilities for flow, temperature and analytical measurement engineering 30.9 million euros Opened in 2018

![](_page_68_Picture_1.jpeg)

Innovative technology: The acquisition of IMKO Micromodultechnik expands the Endress+Hauser portfolio to include moisture measurement engineering, a key quality parameter in a wide range of production processes.

# In-depth look into the process

Endress+Hauser is expanding its portfolio of products for monitoring qualityrelevant process parameters to include innovative moisture measurement and inline spectrometry technologies.

The Endress+Hauser Group has a new member: IMKO Micromodultechnik, a German manufacturer of moisture measurement technology. The IMKO systems utilize time domain reflectometry, a technology that measures the time of flight of reflected radar waves and provides information regarding the dielectric constant of a material, which in turn ties directly to the moisture content.

This innovative method offers advantages over other technologies, given that conductivity has no bearing on the measurement. The precise, reliable and cost-efficient systems from IMKO are used to measure moisture in buildings and soil, for environmental monitoring and also in process applications for the primaries & metal, food & beverage, chemical and life science industries.

Endress+Hauser has also acquired Blue Ocean Nova, a manufacturer of inline spectrometers for analyzing liquids, gases and solids. Using a new technology, the spectrometers can be directly integrated into the measurement probe. The process sensors from Blue Ocean Nova operate in optical spectroscopy regions of the electromagnetic spectrum such as ultraviolet and visible light, in addition to near- and mid-infrared. Strategic building block The systems from Blue Ocean Nova are used in the food & beverage, oil & gas, chemical and life sciences industries for applications such as concentration and moisture measurements and for monitoring qualityrelevant parameters. The technology enhances the Group's analytical portfolio, which already encompasses Raman spectrometry and absorption spectrometry with tunable diode lasers as well as photometry technologies.

"Apart from monitoring the process conditions, growing numbers of customers want to directly determine product quality during the process, without delay and without impacting production," explains Matthias Altendorf, CEO of the Endress+Hauser Group. "These acquisitions are the building blocks of our strategy that is designed to exploit corresponding technologies for process applications."

> Text: Martin Raab Photo: Christoph Fein

# A sense of responsibility

Steven Endress is the first member of the third generation to assume responsibility in the family company. In 'changes', he reveals the background of his decision and explains why he hopes that more family members will follow his example.

#### BY STEVEN ENDRESS

Every day when I arrive at our offices in Manchester, I'm reminded of the company's family ties. The first thing you see when you enter the building of Sales Center UK is a big portrait of my grandfather on the wall. Next to him is another photograph of my aunts and uncles. Sometimes I stop and wonder what my grandfather would think if he were still around to see how things have developed and what he would think of the way I approach my own role.

Manchester itself is very special to Endress+Hauser. Actually, the company owes a lot to this place. It was here that my grandfather spent time working as a young engineer, developing himself both commercially and technically. Indeed, it was after he returned home he teamed up with Ludwig Hauser and founded a company that distributed UK-manufactured instrumentation. That's how everything began...

It was a time of great uncertainty when I took over as managing director in late 2016, only three months after the Brexit vote. We looked back on two difficult years and I wondered what would happen next. Clearly much of the uncertainty was external, related to the economy and the markets, but there was also uncertainty within our own walls due to the change of leadership. We managed the situation perfectly, however, and I think the dynamic and challenging conditions helped the sales center rally together.

It was a concern for me that I had only five years' experience in process automation when I assumed responsibility for this company with 200 staff. But I tried to consider that a strength, making sure that I came in with fresh eyes and lots of questions. That's why I decided to spend time with every single associate. People needed to know that I was there to listen before anything would be implemented or changed. Along with performing my regular duties, it took nearly half a year to get around the entire workforce.

I have always been about empowerment and leadership. This was the first thing I turned my attention to after starting as managing director. The average Endress+Hauser employee in the UK has spent 11 years with the company; so we know what it takes to be successful. Empowerment and leadership can unlock the potential in a company as rich in knowledge as ours. As everyone in our company can lead, everyone can drive improvement! Communication is another area that we focused on. The entire company has worked hard on this. I myself write a communication every week, sharing discussion points and actions that require collective engagement with all employees.

To me, there was something special about becoming operationally involved, not necessarily about being the first member of the third generation. Why did I take this path? There was certainly a feeling of responsibility for this business, and also great pride in what my grandfather started and my family continued. But probably, if I'm honest, it's as much about curiosity and purpose.

One of my earliest memories of Endress+Hauser is listening to my grandfather and my father talk passionately about the business. Now and then I also joined my dad when he went to the office over a weekend. I always wanted to know what this business was about, how it worked, what made it special.

**Strict requirements** Today the bar is set very high for family members who want to join the business. Our family charter puts high demands on education, experience gathered in another company and the management level you must have reached there. Because it's almost impossible to pursue a career within the industry, you need to look outside process automation. This means, when you then join Endress+ Hauser, you take a leap into the unknown to some extent.

Recently the family has decided to think about options for those members who have no aspiration to be a top-level manager. I think this is good. We also want to develop training programs for members of the young generations and encourage them to take an internship within the company – both to gather tangible experience and to learn about the special business culture.

My hope is that we get more Endress family members joining the company. The history we have in the family and the values we bring into the business are huge strengths our competitors can't copy. At the end of the day, we have many people, partners and businesses that depend on Endress+ Hauser. This responsibility is not taken lightly. I personally think that actively engaged Endresses are about the most powerful sign that we are a true family business and not just family-owned!

#### IN BRIEF

### Double honors for Klaus Endress

Klaus Endress, President of the Supervisory Board at the Endress+ Hauser Group, received the Order of Merit of the Federal Republic of Germany in recognition of his work with family-owned companies and his commitment to democracy and the market economy. "Klaus Endress has demonstrated that economic success and values-based corporate leadership go hand in hand," said Edith Sitzmann, Minister of Finance for the state of Baden-Württemberg. Klaus Endress was also conferred the title of Honorary Senator by the University of Freiburg, Germany. "Klaus Endress has been a dedicated and tireless champion of collaboration between universities and industry for decades," explained Professor Dr Hans-Jochen Schiewer, the university's president.

### Happy birthday, Endress+Hauser!

Employees around the world celebrated the 65th anniversary of the Endress+ Hauser Group. Georg H Endress and Ludwig Hauser officially registered their business on 1 February 1953. The two-man company, which had its first headquarters in a private apartment in Lörrach, Germany, has long since evolved into a network of companies spanning the world. Employees at locations in 50 countries across the globe celebrated with cakes, muffins or in some cases even a barbecue.

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'changes' – the Endress+Hauser magazine

Publisher Matthias Altendorf

#### Editors

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![](_page_70_Picture_23.jpeg)

![](_page_70_Picture_24.jpeg)

![](_page_70_Picture_25.jpeg)

Family ties 39-year-old Steven Endress is a grandson of the company founder. He joined Endress+Hauser in 2011 and became managing director of Sales Center UK in 2016: a position his father, Hans-Peter Endress, held for more than 25 years until the end of 2011. Prior to joining Endress+Hauser, Steven Endress gained 10 years' experience in the software industry. He holds a degree in business and subsequently received an MBA. Steven Endress is married with two children. He enjoys motorsport, reading and spending time with his young family.

# A quantum leap for physicists

The Georg H Endress Foundation supports research in the area of quantum physics through a 10 million Swiss francs grant to the universities of Basel and Freiburg. The innovation potential of this future technology is enormous.

Quantum physics puts the power of our imagination to the test. The theory says, for instance, that particles can be present at multiple locations at the same time, meaning a quantum computer could carry out thousands of operations simultaneously. Although the road to the first super computer is still long, research efforts are at full speed, thanks in part to the Georg H Endress Foundation.

The foundation, which continues the legacy of the company founder, will support research into quantum science and quantum computing at the universities of Basel, Switzerland, and Freiburg, Germany, for the next 10 years with a donation of up to 10 million Swiss francs. "This is basic research in one of the most exciting fields of science," says Karin Endress, president of the foundation board. "It could open the door to a technology with the potential to change our world."

Through its donation, the foundation enables 10 young scientists each year to intensify their research under the framework of a postdoctoral program and in close collaboration between the institutes. "We are in the midst of global academic competition," explains Professor Dr Dominik Zumbühl, head of the Department of Physics at the University of Basel, who is also overseeing the project. The collaboration expands the spectrum of research opportunities, promotes knowledge transfer and brings theorists and practitioners closer together.

A wealth of possible applications "Quantum physics, which was discovered more than 100 years ago, was long viewed as merely a figment of the imagination. Since then, many of the wild claims have been proven in the lab," explains the professor for experimental physics. In a laboratory in the basement of the Basel institute, the often bizarre theories are verified using equipment that is no less bizarre.

One of the most recent results has made experts around the world sit up and take notice. Dominik Zumbühl's team succeeded in cooling a chip to a temperature of only several millikelvin above absolute zero for the first time – a record. "Extremely cold temperatures offer ideal conditions for quantum experiments," says the physicist. By carrying out various experiments at these low temperatures, scientists hope to gain a better understanding of the physics near absolute zero.

The project is under the umbrella of Eucor, a consortium of five universities in Germany, France and Switzerland. Since the members' physics departments are all well established in the field of quantum science, a research cluster emerged from this collaboration with resources and expertise unique in Europe. "Our aim is to keep pace with or even stay one step ahead of the world leaders in this field. To do that we have to attract and train the world's top talents," says Dominik Zumbühl.

There is no lack of possible applications. Apart from supercomputers, the potential exists for developing materials with heretofore unknown properties, pharmaceutical agents or super conductors for transporting power without loss. "Quantum physics is behind technology that could also bring major business benefits," says Dominik Zumbühl with confidence. Initial spin-offs have already evolved from this environment.

The freedom to research Given that quantum effects are extremely sensitive to external influences, applications in the areas of sensor and measurement technology are also conceivable. For these and other reasons, the project is supported by the Georg H Endress Foundation, which operates fully independently of the company. "My father was a visionary," says Karin Endress. "Promoting talent, training and further education, institutes and research on pioneering technologies, networking in general and the development of our economic region were always of great importance to him. The project thus ideally aligns with the purpose of the foundation."

The foundation does not dictate how the researchers should carry out their activities. "We are out of our depth when it comes to the environment in which the physicists operate anyway," says Karin Endress with a chuckle. She nevertheless follows the work with all her heart. "You can sense that there is a lot of passion and curiosity within the institute. You get the feeling that something big is being created here." Karin Endress is convinced that the foundation's money is well invested. After pausing for a moment, she adds: "Our father would have been just as proud of this project as we are."

> Text: Alexander Marzahn Photo: Pino Covino


Journey into the unknown: Dominik Zumbühl, Professor for Experimental Physics at the University of Basel, with Karin Endress, President of the Georg H Endress Foundation.



### Living legacy

Dr Georg H Endress (1924–2008) was a lifelong champion of young talent and the growth of the trinational Upper Rhine region. He initiated the trinational apprenticeship and engineer training and education program and promoted the exchange of ideas between the universities. The founder of Endress+Hauser invested four percent of his company in the creation of the charitable Georg H Endress Foundation, which promotes training and education in schools, technical colleges and universities, and supports academic research. The foundation is engaged in a wide range of activities, from experiment kits for children to endowed professorships and research projects. The foundation operates independently from the company. A member of the family presides over the foundation board that oversees the foundation's resources.



# Building for the future

The new building in Belgium is an eye-catcher, but not just from the outside. Behind the new facade lies a highly modern building concept that gives shape to Endress+Hauser's sustainability mindset.

It's shortly after 3:00 pm on a winter afternoon. Jan Heynen, product manager for pressure and temperature at Endress+ Hauser Belgium, has just returned from a meeting. As he nears his workspace on the second floor, the desk light turns on by itself. In about 30 minutes, the electric blinds will close to prevent the westerly setting sun from blinding him.

Sales Center Belgium, situated five kilometers north of the center of Brussels, moved into a modern new office building in October 2017. The four-story building, with 3,600-square-meters of floor space, provides twice as much



The new Endress+Hauser Belgium office building features attractive architecture and quality materials.

room as the previous location. "More space normally means increased energy consumption," says Managing Director Johan Puimège. "That's why we designed the new building with a cutting-edge energy concept."

**Sustainable concept** The plan was developed with two key objectives in mind: cost-effectiveness over the entire life cycle and an absolute focus on sustainability. The concept includes numerous measures for reducing, efficiently monitoring and reusing energy. Since the 10,000-square-meter plot offers plenty of room for expansion, flexibility was built into the concept to support future growth.

Thanks to a well-thought-out plan and the use of commercially available technology, a building was created that meets the highest demands for energy efficiency. Nearly all work spaces enjoy natural light. Areas that lack natural light are furnished with energy-saving LED or fluorescent lighting, which provides a balanced UV spectrum very similar to sunlight.

The entire lighting system has automatic daylighting control, in addition to motion sensors that turn the lights on and off. The outside building lights also operate with timers and light sensors integrated into the weather station, which helps control the heating, ventilation and cooling systems.

**Efficient building engineering** The new building meets all of the requirements for low-energy operation in accordance with current European guidelines. "To a large extent, our building is even energy self-sufficient," emphasizes Geert Van denberghe. The Service Operations Manager is part of the team responsible for the modern energy concept. "Despite having twice as much square footage as the old building, we will be able to reduce our energy consumption by half." The use of geothermal and solar energy contributes as well.

The building is heated with geothermal probes and two heat pumps. The evaporative cooling system is based on an adiabatic process that requires no additional cooling or heating sources. A flow of air in a ventilation shaft under the building is used to evaporate water and thus cool the airstream. This fresh air is transferred throughout the building using conventional ventilation technology and then mixed with the ambient air to provide pleasant temperatures all year round. "Since no energy is required for this type of



Energy-saving LED and fluorescent lighting automatically kick in whenever there is inadequate daylight.



The facilities management center in the basement guarantees a comfortable climate thanks to thermal heating and evaporative cooling.



The large showroom on the first floor for Endress+Hauser's products and solutions serves as a venue for events and training.

cooling system, no additional operational costs are incurred," explains Geert Van denberghe.

Measurement technology is also deployed throughout the building. "We installed a series of Endress+Hauser instruments in the heating, ventilation and water supply systems. We measure temperature, flow, pressure, pH, conductivity and turbidity, in addition to energy consumption," says Geert Van denberghe. "The goal is to monitor the flow of energy in the building and ensure a high degree of efficiency."

**Inspirational atmosphere** The office and work spaces are also painstakingly designed to support efficient work flows. Intelligent space planning simplifies communications and collaboration across all departments and areas. A spacious and open meeting zone is available for discussions with colleagues and customers. The large showroom, which serves as a venue for events and training, is used to demonstrate and explain products and solutions from Endress+Hauser.

"We want everyone to feel at home here. That's why we placed high value on attractive architecture and quality materials," says Johan Puimège. His goal was to forge a communicative environment that promotes creativity and efficiency, one in which the employees are motivated to perform at a high level. The ultimate objective is to position the sales center to continue to meet the growing business demand and satisfy the customers' changing needs.

Managing Director Johan Puimège is convinced: "The new building offers the room to grow Endress+Hauser Belgium even further. With this facility, we have created an inspirational meeting point for customers, employees and business partners!"

> Text: Kristina Rehl Photos: Christoph Fein

# In the heart of Europe

Endress+Hauser S.A., founded in 1962, was one of the Group's first foreign subsidiaries. The 80 Brusselsbased employees manage customers in Belgium and Luxembourg, the majority of which operate in the chemical, food & beverage, life sciences and water & wastewater industries. Strong growth over the past few years is attributed in particular to the services and automation solutions businesses.



### 6.6 mil. €

was invested in the new building in Brussels.



# 3,600 m<sup>2</sup>

of space is available in the new offices of Sales Center Belgium.



<15 kWh/m<sup>2</sup> is the average energy consumption of the building.



### 175

solar modules mounted on the roof supply 41 kW of peak power.

## 40

geothermal probes supply heating energy from 110 meters below the ground.



Under the microscope EcoVadis operates a global platform to evaluate suppliers in accordance with ecological, social and ethical criteria. Structured reporting methods make it possible to understand how a company performs with respect to the environment, society and ethics. The results also highlight areas where there is room for improvement. More than 20,000 companies use EcoVadis to reduce risks, create transparency and build trust.

Michael Sinz makes sustainability visible for customers.

# "An issue of great importance"

EcoVadis evaluates thousands of companies in the area of sustainability. With 66 out of 100 points, Endress+Hauser was awarded an excellent grade.

### Mr Sinz, Endress+Hauser achieved gold status in the 2017 EcoVadis Report. What exactly was evaluated?

EcoVadis recognizes companies that live up to their social responsibilities. The evaluation is based on 21 criteria that cover environmental, ethical and social aspects, as well as the supply chain. Gold status confirms that Endress+Hauser attaches great importance to this issue and that it pursues a structured and forward-looking approach. This calls not only for solid programs and measures, but also measurable activities and qualified reporting.

# Where did Endress+Hauser do well – and where is there still potential?

We can be very satisfied with the results. With 66 points, we're in the top two percent of all certified companies. The audit cited the areas of business practices and procurement as showing room for improvement. Although we are doing a lot in both areas, we can't provide consistent proof of all our efforts.

### Why does Endress+Hauser allow external auditors to examine the company with respect to sustainability in the first place?

Many of our key customers are required to publish this type of information beyond their pure financial figures. They expect their suppliers to be just as transparent. Sustainability and social responsibility have been ingrained in our corporate culture and brand values for a long time, however. The fact that we systematically track and improve our performance in this area is good news for everyone, for customers, employees and society.

Questions: Alexander Marzahn

### Michael Sinz

(48), Director of Strategic Business, is responsible for developing the Endress+Hauser Group's business with key accounts and coordinates sustainability audits from the sales side



Additional information is available at www.endress.com/ecovadis

# Solid growth

Financial year 2017 was marked by a broadly supported growth in sales, solid profitability and an increase in headcount. Chief Financial Officer Luc Schultheiss explains what's behind the numbers.

#### BY LUC SCHULTHEISS

To be sure, we set ourselves ambitious goals for 2017. For some time, however, we could not foresee Endress+Hauser having such a good year. The main driver of growth was a robust business climate. Our three strongest revenuegenerating markets did especially well, with dynamic growth in the US and China, and sales gains even in Germany.

Process automation always lags somewhat behind the economic cycles. After the economic boom in the consumer sector, the past year saw capital investments rise as well. That translated not only into more money for maintaining plants and equipment, but also for expanding manufacturing capacity. We experienced growth more or less across all industries. Even oil & gas contributed to these gains, although we have yet to fully offset the declines that occurred in this industry over recent years.

Not all countries and regions met our expectations with equal measure, however. One example is Asia, where overall growth was weak. In Europe the picture was inconsistent, but generally positive. While North America shined, some countries in South America failed to reach their targets. The majority of the sales centers in Africa and the Middle East were also behind plan.

Consolidated sales in euros once again suffered under pressure from foreign exchange rates. Despite the business turning in a solid performance, the unexpected strong rise of the euro prevented us from reaching our growth targets. When expressed in local currencies, sales are higher by around 1.5 percentage points.

**Strong cash flow** We nevertheless exceeded our expectations on the earning side considerably. On one side, exchange rate effects led to reduced personnel costs, particularly outside the Eurozone, which in turn boosted operating profit. On the other side, income from the sale of one of our business holdings had a positive effect. Despite a clearly negative financial result, which reflects the high costs of currency hedging, we nevertheless achieved record-high earnings, both before and after taxes.

Even excluding extraordinary effects, 2017 would have been an excellent year for Endress+Hauser. Purchased goods and services as well as personnel expenses are being held in check, and in productivity, as well as return on sales, we are close to our demanding strategic objectives. The equity ratio fell slightly only due to the effects of currency fluctuations and the incorporation of the Swiss pension fund into our balance sheet. The financial strength of the Group is nevertheless reflected in a cash flow position that is sounder than ever, allowing us to bear the cost of all investments on our own again in 2017.

Practically every field of activity participated in our positive development. We regained our former strength in level measurement engineering thanks to new products. Flow measurement technology benefited disproportionately from an upturn in cyclical industries such as chemical and oil & gas. Liquid analysis served as a driver of growth again. Although the laboratory analysis area developed positively, expectations were not fully met.

During 2017, the Group created more new positions than planned. The production centers in particular experienced a notable increase in headcount to meet the higher demand. The workforce also grew through the acquisition of two smaller companies that expand our portfolio with innovative technologies for measuring quality-relevant parameters.

**Positive outlook** We look forward with confidence to 2018. Business picked up once again over the last few months of the previous year, allowing us to begin the new year with a sizeable backlog of orders. When calculated in euros, we expect consolidated sales to grow around five percent this year – in local currencies an additional two to three percentage points. Excluding 2017's extraordinary effects, earnings will likely reach the same level.

Given that large uncertainties persist, however, many questions remain. We believe the greatest risks are tied to the current political environment, in addition to the financial and stock markets. With this in mind, we will continue to manage the business prudently, with sound judgment, and prepare ourselves as best we can to deal with unforeseen changes.

Photo: Christoph Fein

### 2017 HIGHLIGHTS

## Sustainable business processes

Endress+Hauser scored 66 out of 100 points in the 2017 EcoVadis sustainability audit to achieve gold status. The audit examines 21 criteria in the areas of environmental protection, work conditions, business practices and procurement. Endress+Hauser scored aboveaverage in all areas to make it to the top two percent of all companies that were evaluated. EcoVadis operates a global platform for evaluating suppliers in accordance with ecological, social and ethical aspects.



#### A knack for numbers

After graduating in business and subsequently achieving a doctorate, Dr Luc Schultheiss (56) worked as an associate professor and consultant before joining Endress+Hauser in 1999. He was appointed the Group's CFO and member of the Executive Board in 2011. Luc Schultheiss is married and the father of three grown children. He is a passionate sailor and is also active in the Basel carnival.



# Acquisitions bolster strategy

Endress+Hauser acquired three companies in 2017 to strategically strengthen the portfolio of measurements for quality-relevant parameters. SensAction manufactures systems that measure concentrations of liquids with the help of surface acoustic waves. IMKO Micromodultechnik provides instruments that detect moisture in solids using time domain reflectrometry. Finally, Blue Ocean Nova is a developer of innovative spectrometers for the inline analysis of liquids, gases and solids.

## Innovation incubator

Endress+Hauser has established a Sensor Automation Lab within the environs of the University of Freiburg, Germany. An interdisciplinary team of scientists will collaborate with Endress+Hauser developers to create new products for the core sensor business, as well as for digital automation solutions and services. The lab will be set up in the new Albert-Ludwigs University innovation center, purposely independent from the established company structures. The goal is to create a collaborative work environment offering a special degree of creative freedom.



Read the complete 2017 annual report online or download our Kiosk app for Android and iOS via www.endress.com/financial-results

# Fiscal year 2017 at a glance

## Net sales and net sales by regions

(in million euros)





Net income

(in million euros)



Employees of the Endress+Hauser Group



# **Capital expenditures** (in million euros)



Patent applications of the Endress+Hauser Group



# Financial highlights 2017

	(in million euros)					
	2013	2014	2015	2016*	2017	Change
Net sales	1,814	2,013	2,144	2,139	2,241	4.8%
Operating profit (EBIT)	277	268	251	219	252	15.0%
Profit before taxes (EBT)	270	274	234	221	276	24.9%
Net income	187	192	165	156	209	34.2%
Return on sales (ROS)	14.9%	13.6%	10.9%	10.3%	12.3%	
Productivity	1.42	1.37	1.30	1.27	1.31	
Equity	1,310	1,465	1,718	1,779	1,820	2.3%
Equity ratio	67.8%	68.3%	73.0%	70.5%	70.2%	
Total capital employed	1,932	2,146	2,353	2,524	2,593	2.7%
Capital expenditures	130	126	166	149	139	-6.8%
Depreciation and amortization	74	85	99	100	104	3.0%
Cash flow	261	277	264	256	313	22.0%
Number of employees	11,919	12,435	12,952	13,003	13,299	2.3%
* Restated						

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