Between dreams and reality

Where artificial intelligence is breaking new ground

changes

What's driving the process industry

#1/24

Endress+Hauser

To the next level

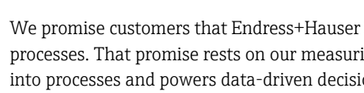
We promise customers that Endress+Hauser is the right partner to improve their processes. That promise rests on our measuring technology, which provides insight into processes and powers data-driven decision-making. Our instruments deliver alongside their measurement data a wealth of signals and information that shed light on the status of sensors and processes – all thanks to digitalization.

And yet, we still aren't making enough use of this information. Boiling down raw data to information that can be mined for knowledge has a long way to go. In order to realize its full potential, huge amounts of data from all kinds of sources must be transmitted, processed and interpreted in the context of the application. Human brainpower is not up to such a complex task – but artificial intelligence is.

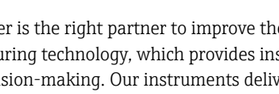
AI is capable of automatically analyzing vast amounts of data, identifying patterns, trends and correlations. It constantly learns and is able to deal with uncertainty. In a nutshell, AI enables better decision-making. So there is potential for it to become a key pillar in a data-centric future and take the process industry to new levels of efficiency and sustainability.

We have only just begun. Yet it is a topic galvanizing the industry. Many customers and partners, just like ourselves, are sounding out what the new technology might be capable of. Examples of what might be just around the corner are aplenty in this issue of *changes*. They show once again that the best way to tackle major challenges is to work together in a spirit of trust, pooling knowledge and skills. Collaboration is crucial to take us to the next level.

An enjoyable read awaits!



Matthias Altendorf
President of the Supervisory Board



Dr Peter Selders
CEO of the Endress+Hauser Group

PS: Changes at the helm of the company (see joint interview starting on page 44) also leave their mark on this magazine, as after 10 years Matthias Altendorf gives way to Peter Selders as the publisher.

Artificial intelligence enables better decision-making.

One short prompt* is all it takes. Seconds later, a futuristically envisioned industrial landscape appears. That's the power of AI. The following pages demonstrate from various perspectives that the technology can change industry in the real world, too. Spoiler alert: As the front cover illustration attests, human skills will continue playing a crucial role.

* Original AI-based image software Midjourney prompt without any further refinement: {pipeline landscape and gas pipelines in the look of alice in wonderland}

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

An acquired taste

What AI can – and can't – do. **Page 8**

We need knowledge and enthusiasm

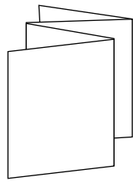
How SAP helps collaboration.
Page 14

A helping hand

Encountering artificial intelligence in our daily lives.
Page 4

Practice makes perfect

Endress+Hauser explores the possibilities of AI with customers.
Page 26

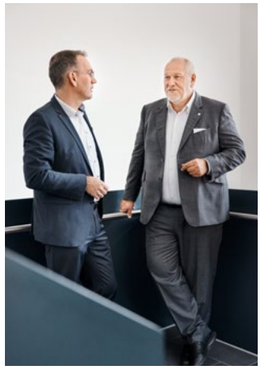


A pioneer in many fields
The event-filled life of Georg H Endress.

Smart water

How Maynilad uses data and algorithms to supply a metropolitan city with water.
Page 18

Step-by-step progress



Supervisory Board president Matthias Altendorf and CEO Peter Selders look ahead.
Page 44

Contents

4 **A helping hand** What is artificial intelligence – and where do we encounter it in our daily lives?

8 **An acquired taste** It can do a lot, but not everything: where artificial intelligence runs up against its limits in the process industry.

14 **We need knowledge and enthusiasm** SAP CEO Christian Klein and Matthias Altendorf talk about data, collaboration and time.

18 **Smart water** Digitalization is coming to the water supply system in Manila – with help from Endress+Hauser.

26 **AI is not a quick fix** Marco Colucci explains where the potential of the new technology lies.

28 **Faster off the mark** Endress+Hauser is opening up to the outside world as part of its innovation process.

30 **Crystal clear** Netilion Liquiline Assist bundles experienced-based knowledge.

31 **Beer in focus** Microbrewer Armin Pillmeier uses real-time analysis of fermentation data to automate the brewing process.

32 **The bridge-builder** AI research scientist Jawad Tayyub explains why AI has nothing to do with voodoo.

33 **Service in the spotlight** Endress+Hauser's Lens product monitors instrumentation quality in the field.

34 **Getting more out of AI – together** Endress+Hauser is co-developing AI solutions with customers in a transparent process.

36 **Self-reliant** How algorithms work.

38 **Foundation for the future** How Endress+Hauser continually invests in its employees, its internal network and sustainability measures.

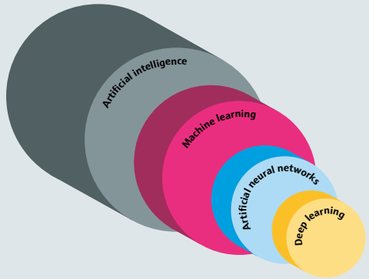
42 **The financial year at a glance** Key facts and figures for 2023.

44 **Step-by-step progress** Matthias Altendorf and Peter Selders discuss continuity and change at Endress+Hauser.

A helping hand

There is more than one kind of artificial intelligence – and it's nothing new. Artificial intelligence stands to improve our everyday existence like few technologies have done before. Yet we are seldom aware that it is already shaping our lives.

Text: Robert Habi, Roman Scherer
Photography and graphics: 3st kommunikation, 3st kommunikation using midjourney, Joseph Racknitz – Humboldt University Library, Shutterstock



Just what are we talking about?

Artificial intelligence is a branch of computer science. The term was coined at a 1956 conference in the US by John McCarthy, a programmer, to describe the simulation of human learning capabilities. These days a machine is considered intelligent if it can perceive information or patterns, process them according to a specification and then make a decision. AI is an umbrella term that encompasses fields such as machine learning, neural networks and deep learning.

Machine learning

Anyone who has shopped online will know about personalized product recommendations. That shopping experience is based on machine learning, which underpins artificial intelligence in all of its myriad forms. AI technology is the enabler for algorithms that learn from large volumes of data and detect patterns – although for this to happen the data has to be presented in a structured form.

Artificial neural networks

Neural networks interconnect multiple data nodes in a similar way to neurons in the brain, hence the term. Machine learning processes run in parallel on many different levels. What makes neural networks special is their ability to correlate huge amounts of data representing images, text, sounds and more. The downsides are that they require enormous processing power and potentially months of training.

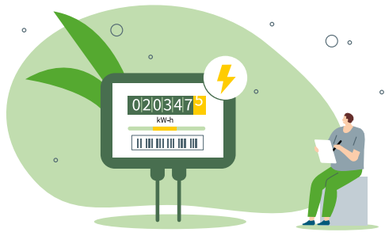
Deep learning

Build onto neural networks with additional algorithms and data nodes, and you have deep learning. This machine learning method recognizes patterns and autonomously links them with new context. It can make its own decisions and question them too. Deep learning can thus resolve otherwise unsolvable problems such as diagnosing illnesses through image recognition.

"Success in creating effective AI could be the biggest event in the history of our civilization, or the worst. We just don't know. So we cannot know if we will be infinitely helped by AI, or ignored by it and sidelined, or conceivably destroyed by it."

Stephen Hawking, physicist, at the 2017 Web Summit in Lisbon

This is an increasingly difficult question to answer – and the issue that drove British computer science pioneer Alan Turing to develop his Imitation Game in 1950. This tests whether a person chatting with two participants via computer can tell which one is human and which is a machine. Should they be indistinguishable, the machine is deemed intelligent. Although the test is controversial, Turing is considered an influential figure to this day. He gets a small homage in CAPTCHA, a spam protection measure that challenges millions of internet users daily to match a variety of images or copy characters in hard-to-recognize writing. CAPTCHA stands for 'completely automated public Turing test to tell computers and humans apart'.



How green is AI?

1 percent of global electricity consumption is attributable to data center operations (according to the International Energy Agency).

0.5 percent of global electricity consumption could additionally be used for AI computing centers by 2027.

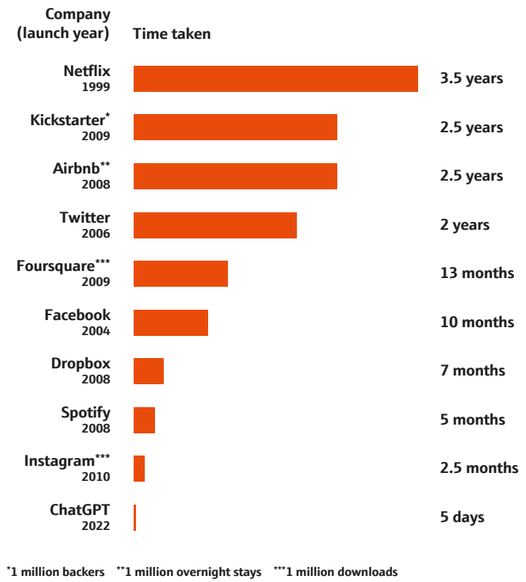
20,000 graphic cards were deployed just to process ChatGPT's training data.

1,287 megawatt hours of electricity went into training the GPT-3 model.

10 percent of an AI model's overall electricity usage goes into training; actual operation of the model accounts for 90 percent.

Hitting the million mark

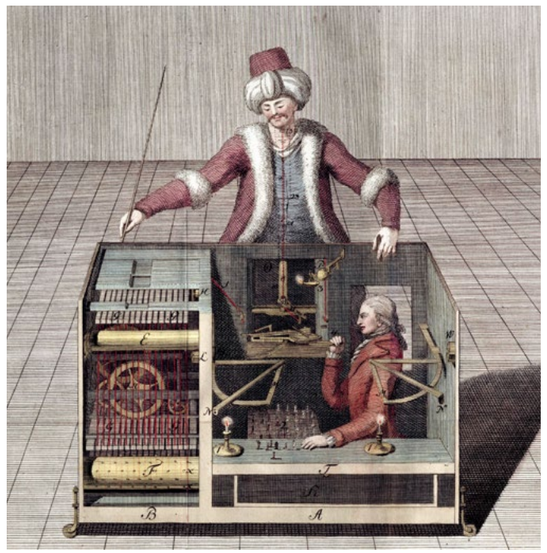
How long it took various internet-based services to acquire a million users:



*1 million backers **1 million overnight stays ***1 million downloads

Human input remains essential

The Mechanical Turk, also known as the Automaton Chess Player, was a fraudulent game-playing machine constructed in the 18th century. The device took the form of a man in traditional Turkish costume, who rarely lost a match. But there was nothing automatic about the machine's inner workings: in fact it was a human pulling various ropes and levers. Although the secret finally came out in 1835, the identity of the person inside the contraption remains a mystery. Fast-forward 200 years and this legend embodies the people behind today's smart machines, albeit with a twist: many of the most successful AI models are developed using labor from hundreds of thousands of generally low-paid contract workers who search for jobs on large crowdsourcing platforms. One of the best known is tellingly called MTurk, a contraction of Mechanical Turk.



Almost routine

AI is more everyday than many might think.

7:00 am: Time to get up! As soon as you're awake, unlock your smartphone using **facial recognition.** Any notifications?

7:30 am: Check AI-generated **weather and stock market reports** during breakfast.

8:00 am: A question for the **smartphone AI-assistant:** what appointments do I have today?

9:00 am: Quickly **translate a customer email.** AI does that better than me.

1:00 pm: Arrive for the customer meeting on time thanks to **GPS** and real-time traffic data.

5:00 pm: Radiology appointment: smart **pattern recognition** helps diagnose the image.

7:00 pm: Another unwanted email. Good thing we have **spam filters.**

8:00 pm: Time for a little **online shopping** while lounging on the sofa. It's uncanny how the retailer's suggestions always seem to match your tastes …

An acquired taste

ChatGPT opened the floodgates: artificial intelligence has gone mainstream. AI holds huge potential, not least for the process industry. Yet how much of this is hype, and how much could become a reality?

Text: Armin Scheuermann
Illustration: Timo Meyer

Artificial intelligence tastes fruity, with notes of toffee, vanilla, pear and apple, and a slight hint of toasted oak casks. Such are the flavorsome hallmarks of ‘AI:01 Intelligens’, the first whisky to have AI supplement the master blender’s expertise. In 2019 Swedish distillery Mackmyra pioneered the use of AI to blend whisky from different casks so that the bottled product would appeal to the broadest possible customer tastes. AI:01 may be seen as a harbinger of what AI can accomplish for the future process industry: shorter product development times, greater production efficiency and lowered costs.

The whisky may have been somewhat of a marketing gimmick, yet it serves to highlight the possibilities of AI: rapidly evaluating myriad courses of action and process routes is essential to the fastest possible sustainability transformation of process industries like petrochemicals, life sciences and food & beverage. AI’s rising importance also ties in to the general transformation of the economy: in a future circular economy, products at the end of their life cycle will revert to being raw materials. The result will be complex systems and dependencies that classic automation approaches cannot handle. The energy transition taking place in parallel will require energy providers, industry, transportation and building management to be interconnected in order for them all to optimize harmoniously.

So do we need a completely new approach to controlling business and production processes? Is the process industry facing major AI disruption? And besides, what is artificial intelligence anyway – and how does it differ from machine learning or deep learning?

FROM FEARED ADVERSARY TO HELPFUL TOOL

There are likely as many ideas about what is meant by artificial intelligence as there are experts in the field. But there is broad consensus on the following definition: AI aims to simulate human intelligence using machines. Its effectiveness at things like data aggregation, reasoning, self-correction and creativity comes down in part to machine learning – algorithms that use historical data to predict future data. While machine learning is frequently based on human-selected parameters, deep learning models are able to automatically extract relevant parameters from the data. This makes deep learning particularly applicable to image and speech recognition, as well as natural speech processing.

Artificial intelligence has been on everyone's lips since the public release of AI chatbot ChatGPT in November 2022. That sent a fear of missing the AI boat coursing through C-suites and boardrooms. On the political side there is the fear of artificial intelligence without checks and balances. "I believe there will be nothing more transformative to the futures of our children and grandchildren than technological advances like AI," British prime minister Rishi Sunak said ahead of his appearance at the first international AI Safety Summit. But does that also apply to the conservative process industry, which prioritizes process reliability over innovation?

Suppliers of process automation technology are seeing mounting digitalization fatigue. That mostly comes from a lack of clearly formulated goals, unfulfilled value propositions and underestimation of the time and effort it takes to establish digital infrastructure in plants. A force for change here is NAMUR, the user association of automation technology in process industries. Its mission is to promote the benefits of digitalization, including AI. "We can't just talk about technology and individual use cases; we must position those use cases within an overall picture," said NAMUR vice president Michael Pelz at the annual general meeting in Neuss, Germany.

WHAT CAN ARTIFICIAL INTELLIGENCE DO?

Artificial intelligence is the simulation of human intelligence processes by computer systems. Specific applications for AI include expert systems, natural speech processing, speech recognition and machine vision. AI's cognitive abilities include:

- Learning: recording data and generating rules on how to convert that data into usable information. The rules, otherwise known as algorithms, give computers step-by-step instructions on how to complete a given task.
- Reasoning: selecting the correct algorithm to achieve a desired result.
- Self-correction: continuous fine-tuning of the algorithms to keep them delivering the most accurate results possible.
- Creativity: generating new images, texts, music and ideas using neural networks, rule-based systems, statistical methods and other AI techniques.

"Present-day AI is unable to control plants, and future AI probably won't be able to either."

Kai Dadhe,
vice president of digital process technologies at Evonik

76%

of management executives are convinced that generative AI can optimize production schedules and detect inefficiencies in production processes, according to a survey conducted by management consultancy KPMG.

What role might artificial intelligence play here? Not a disruptive one, that much is clear. "Present-day AI is unable to control plants, and future AI probably won't be able to either," says Dr Kai Dadhe, vice president of digital process technologies at Evonik. This is his summary of insights from KEEN, a three-year research project where German industrial companies and scientific institutions investigated the technical and economic potential of AI in the process industry across entire product life cycles. However, the project also showed that AI methods definitely offer added value: they are particularly effective as decision-making support for plant operators and in boosting the efficiency of engineering tasks.

"The two worlds of information technology and operations technology are merging. The vision is data-centered and software-based automation, which is where artificial intelligence can supply important information by generating new insights from an otherwise unmanageable volume of data," says Dirk Neirinck, corporate director for business development at Endress+Hauser. Yet he thinks it unlikely that the AI revolution will come from above. That's a view that Hans-Jürgen Huber, managing director of Endress+Hauser Digital Solutions Germany, also shares: "Much more likely

“The revolution will not come from above. AI will make its way into the process industry gradually, through individual applications.”

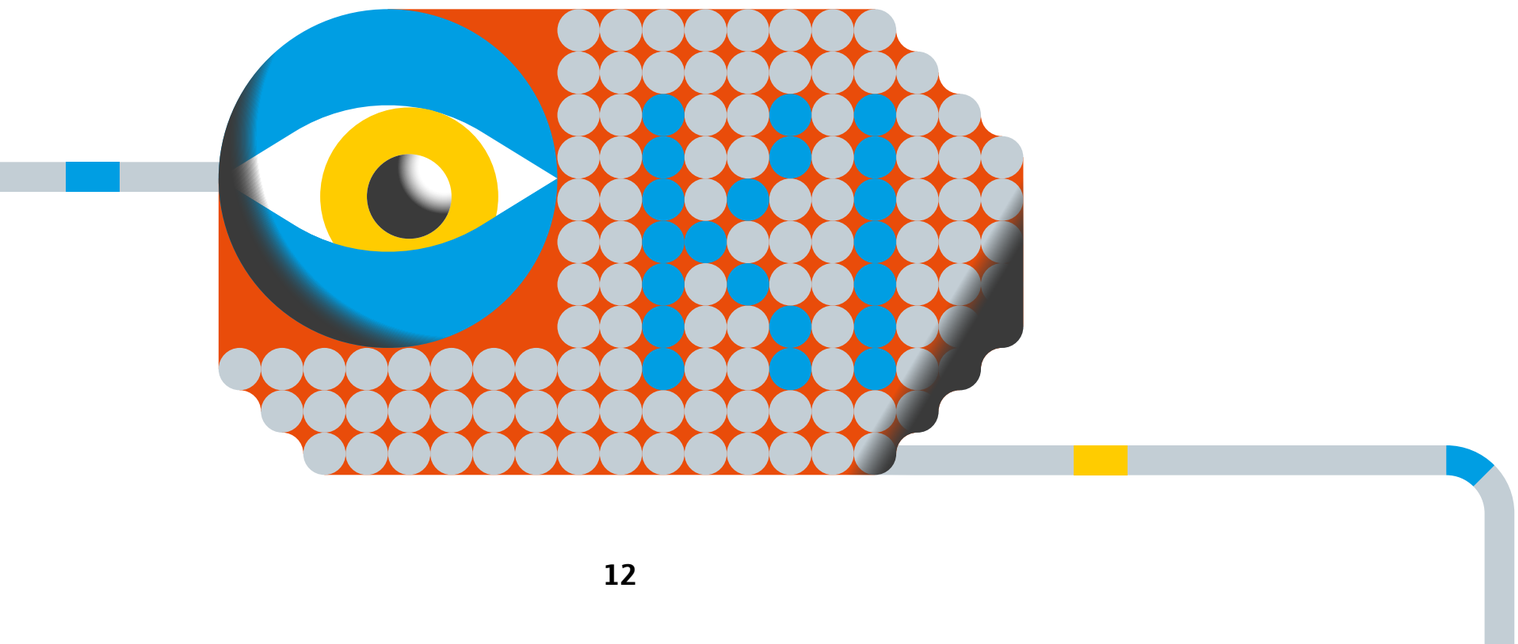
Hans-Jürgen Huber,
managing director of Endress+Hauser Digital Solutions Germany

is that AI will make its way into the process industry gradually, through individual applications, over time becoming another tool in the digitalization and process automation toolbox.”

Take a practical example from plant engineering: document analysis as a stage in preparing machine-readable plant topologies and smart pipeline and instrumentation plans – the basis of a real plant’s digital twin. AI can also assist in the creation of process models that in turn make process simulations more efficient. AI deployed in actual plant operations can optimize production planning, identify anomalies in production processes and derive quality parameters from sensor data. These enable further insights and findings from the process and can be used for novel approaches in process control.

SUPPORT FOR DECISION MAKERS

By evaluating historical and current operating data, AI could also help consolidate and preserve knowledge about causal relationships in plant operations that was hitherto kept in the heads of production planners and plant operators. More broadly, decision-making support in complex systems could develop into a key discipline within artificial intelligence – not only in plant operations, but in other areas of corporate activity too. Documents such as standards, contracts and tender documents are highly amenable to analysis by language models like GPT, meaning that those models could also be put to work in sales or in engineering to home in on answers to specific questions. Consultancy firm McKinsey estimates that engineers who delegate information research to AI could increase their productivity by 10 to 20 percent.



“It is not enough to talk about technology and individual use cases; we must position those use cases within an overall picture.”

Michael Pelz,
vice president of users’ association NAMUR

However, the development of AI applications for process automation is still in its infancy and faces many hurdles. That is because AI requires data – and in the process industry especially, this data is often unavailable, or not in the requisite quality, or is plain inaccessible. Chemical companies, for example, are already generating more data than ever before and yet that data is frequently inconsistent and lacks context – for instance about relationships within material cycles. That was another finding of the KEEN project when it considered AI’s capability to control plants: only in process states with massive data underpinning them did AI deliver reasonably useful results. Should exceptional process conditions arise, it lacks understanding of process engineering interrelationships. Hence another reason why AI applications in the process industry today are usually one-offs that neither scale readily, nor transfer from one use case to the next.

DATA CONSISTENCY IS KEY

In this context, the role of process automation is changing too: its future core task will be creating conditions that produce steady and consistent data streams. Then again, there is no clarity yet about the architecture of a data-centered approach for new AI-based applications: will it be implemented in the cloud, locally in edge devices, or even embedded in the sensor electronics? Whichever scenario prevails, one thing is clear: companies seeking to tap the potential of artificial intelligence will need more than just a handful of AI specialists. As many employees as possible should be getting to grips with the basic principles, benefits and limitations of artificial intelligence. High-profile examples like ChatGPT or AI:01 could whet appetites for new possibilities in process automation.

Armin Scheuermann is a chemical engineer and trade journalist

“We need knowledge and enthusiasm”

Artificial intelligence will fundamentally change how people work and how companies do business – in a good way. Christian Klein, CEO of SAP, is convinced of that. In a joint interview with Endress+Hauser Supervisory Board president Matthias Altendorf, he talks about the transformation required to exploit its potential.

Questions: André Boße
Photography: Matthias Schmiedel

Mr Klein, when did you last use artificial intelligence in your everyday life?

Klein: Yesterday, actually. My son came home from school and showed me a new drawing app. Kids draw something with the app and the AI technology is supposed to guess what it is.

And in your business activities?

Klein: I regularly use our own AI applications for things like travel invoice compliance checks and vendor selection. Our AI hub has various large language models like GPT4 embedded, so when preparing a speech I will check in there to see whether it can provide a boost or two.

How will AI systems change the way your customers work with SAP products?

Klein: The changes will take hold everywhere. One example is how users communicate with SAP systems. Here there are millions of transactions occurring every second, which still tend to be entered manually. That will change. Communication will shift to natural language, accompanied by a much higher degree of automation.

Mr Altendorf, what do AI applications mean for the process industry?

Altendorf: The process industry is in the midst of a digital transformation. By now, everyone knows the huge potential in data. The problem is the huge volume. In a large chemical plant with thousands of actuators and sensors supplying vast quantities of data every second, no human can keep track of it all. This is where AI technology helps by categorizing, prioritizing and then processing the data so that companies can make better-informed decisions. The point here is that a data-driven industry would not be possible without AI technology.

Where does AI technology offer further potential?

Klein: The many CEOs and CFOs I talk with all tell me that they have a balancing act to perform. Customers want to see businesses becoming more sustainable. On the other hand, those businesses are expected to grow and increase their bottom lines. The question is how sustainability and growth fit together. Take supply chains. These generate a lot of data as well. Manually analyzing all the options is an impossible task. Here we use AI technology to help us make smart decisions, for example by intelligently linking logistics chains. Or consider business planning. There is now AI technology that can optimize warehousing based on all kinds of weather, business, consumer and economic data. In short, AI technology is a driver of growth for businesses. It all rests on data. Our corporate customers have already agreed to the use of data for over 20,000 SAP systems. We are jointly developing a data model that continues to grow.

Altendorf: Our production involves a lot of welding. Until recently, we had people visually inspecting components to ensure they are in the correct position for laser welding.

“AI technology is really strong when networked beyond enterprise boundaries.”

Christian Klein, CEO SAP

This is an important step because incorrect alignment could ultimately cause harm to people and the environment. Now there is AI technology performing the task. It works faster and more reliably than humans. We save time in production, use less energy and increase quality, which in turn improves efficiency and sustainability.

When it comes to using AI technology, how do collaboration and connectivity fit in?

Klein: It’s really simple: without those, nothing works. All collaborative effort is cloud based these days. That is where data is shared, and where companies can operate as part of a network. Ten years ago, businesses were still purchasing SAP software in order to digitalize. Today, the second step is about opening up the business and collaborating with others. Staying with the subject of supply chains, AI technology can make full use of its strengths when networked beyond enterprise boundaries.

Is the industry ready to think beyond individual company boundaries?

Altendorf: From my perspective, this is crucial to moving a company forward. In tomorrow’s world, no business will be able to survive on its own. The successful ones will be those that collaborate and through doing so join a technological ecosystem. A good example here is the Open Industry 4.0 alliance launched by SAP, which Endress+Hauser joined as a founding member. This same mindset also needs establishing inside businesses. There used to be veritable silos. But internally too, collaborative styles of working are the only way to go. What the development of the steam engine once meant for muscle power, generative AI now means for brain power. We will see huge boosts in productivity and interconnectedness.

ACHIEVING GROWTH THROUGH AI AND THE CLOUD

Christian Klein (1980) is CEO and member of the board at SAP. As a young man he dreamed of a career as a professional soccer player. Things turned out differently. He began his career with SAP as a student in 1999 and was active in various positions. In October 2019 he took over as co-CEO along with Jennifer Morgan and was then named sole CEO in April 2020. Christian Klein lives with his family in his hometown of Mühlhausen, Germany, 10 minutes from SAP headquarters in Walldorf. **SAP** was co-founded in 1972 by Hasso Plattner and Dietmar Hopp along with three other former IBM employees. The company is the longstanding world leader in enterprise software. More than 106,000 employees in nearly 160 countries help business customers grow sustainably and profitably. A key aspect of this is the integration of AI systems into the SAP cloud with more than 280 million users worldwide.

Some developers are warning that AI technology could be too much for humans to handle. So do we need regulation before it’s too late?

Klein: I was in the US several weeks ago and had precisely this debate with representatives of the US government. I realized that the general mindset is different over there. When a new technology is developed, you first look for use cases, then you monitor them, with issues of ethics and regulation raised afterward. In Germany, and likewise at EU level, regulation tends to be considered before there is even a use case for the technology. I believe the American approach is better.

Altendorf: Of course, there must be laws and ethical standards applying to the use of AI. But a core problem in Europe is indeed a lack of entrepreneurial mindset, attempting to control through prohibition rather than incentives, such that enthusiasm gets driven into the ground. But this enthusiasm is exactly what we need. We should be viewing technical developments like AI as an opportunity, not as a risk. What develops otherwise is a widespread fear of the unknown.

Let’s glance into the crystal ball. How will AI technology have changed the business models of Endress+Hauser and SAP in a decade’s time?

Altendorf: Our offerings will expand. For our customers to really utilize the data we generate, they will need additional context – in other words, a deep understanding of this data. Here is the business model of the future: data plus context. Of course, we will continue to produce measurement technology, although it may be that a customer no longer owns the actual product and only wants the data from it.

Klein: In 10 years software developers will need to write much less code than today; that task will be shifted onto generative AI technology. The time gained can be used to think about the application or the quality of the algorithm. AI will also help us make better budget decisions. Today, if we asked 100 CFOs how the business will develop, we would receive 100 forecasts. A decade from now, AI will do a better job of this because it can factor in and join together much more data.

If your children ask whether there will still be jobs for them in the age of AI, what do you say?

Altendorf: I was born in 1967 and still remember the time when the first office computers arrived. It was claimed that hundreds of thousands of jobs would disappear. But what happened? More jobs were created and productivity increased many times over. This is how it will be again in the AI era. One thing is clear: work will change. People will be able to utilize their potential for more intelligent, creative and communicative activities.

Klein: I have no concerns about the jobs of the future either. Growth occurs wherever new business models develop – and the employees benefit. Of course, jobs will be more data-intensive. Schools and universities will need to consider this. It comes down to teaching a networking mindset and bringing IT and business together. As you pointed out so succinctly, Mr Altendorf, what we need is not only knowledge, but enthusiasm. Having both will put us on the threshold of an era where we can use our creativity to manage generative AI in our favor.

“A data-driven industry would not be possible without AI technology.”

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

Smart water

1

Supplying water is a mammoth task in the Philippine mega-metropolis of Manila. Maynilad tackles this challenge with intelligent data models and steady digitalization of its infrastructure.

Text: Alan Robles, Robert Habi
Photography: Joseph Lynch

2

3

1
Clean water for Manila: The Parañaque water treatment plant is Maynilad's largest water reclamation facility.

2
Maynilad's area of responsibility is growing just like the megacity of Manila.

3
Ivan Louie Villar (left) is the first point of contact for Maynilad at Endress+Hauser.

Dr Francisco Castillo looks at his laptop, skimming over a couple of figures on the dashboard. "It will be drizzling in Quezon City around noon tomorrow." At first glance it might be surprising to discover that the senior vice president and chief information officer of the largest water provider in the Philippines is occupied with weather forecasts. But data like this is in fact part of the business model at Maynilad Water Services Inc. (Maynilad). "We began to pay more attention to the weather two years ago. Now we can precisely predict the water levels in our reservoirs or determine if we can draw water from them," explains Dr Castillo. The company draws its raw water primarily from Angat Dam and the country's largest lake located in southeast Manila.

Francisco Castillo and his team even installed their own weather stations to create more precise forecasts. Each station features a solar panel, wind vane, rain gauge, temperature sensor and an anemometer, which transmit their information via a satellite link. The reason is simple, as Francisco Castillo explains: "No one collects weather data at our water sources in the mountains." Finding its own solutions, even far removed from the company's own plants, is just part of the Maynilad way of doing things. The company has consistently pursued a strategy for 10 years that involves digitalizing the operational technology (OT) at all plants and connecting it with the information technology (IT). Maynilad thus wants to fulfill its mission even more efficiently: managing the water and wastewater for 10.3 million residents in the cities and communities of the western Manila metropolitan area.

EVERYTHING UNDER CONTROL

A visit to the Maynilad control center in Quezon City, which belongs to the Manila Metropolitan Region, reveals just how valuable this work is. The room is filled with silent concentration. With ergonomic chairs in front of large monitors displaying a wealth of information, it feels like a command bridge. Small red warning lights blink occasionally on digital maps. From this room employees monitor the entire Maynilad network around the clock. The system encompasses five water treatment plants, dozens of pumping stations,

“If we can solve a problem faster with AI and remain within the cost framework, we will use it.”

Francisco Castillo,
senior vice president and chief information officer at Maynilad

186 million

liters of water are treated every day in the Maynilad plants

wastewater plants, reservoirs and over 7,500 kilometers of pipes. The entire operation is highly automated. The employees intervene only if there’s a malfunction or if action is required, such as when an area experiences a loss of pressure and water has to be diverted from another area.

Pointing to a monitor, Francisco Castillo says: “We must be able to analyze where we are losing water because of leaks or illegal water connections. The data collection is an enormous help.” The impact of the continuously advancing digitalization is even greater, however. “We’re in a position to view the status of all assets in our plants, nearly all of which are online in real time: pumps, drives, valves and of course the measurement devices that include sensors for flow, level, pressure, temperature and liquid analysis. They generate a lot of data, often every second or millisecond. We can access this information from any smartphone as needed.”

PANDEMIC AS A CATALYST

The reason the company chose this path early on has a lot to do with Francisco Castillo and also with the measurement technology from Endress+Hauser. The catalyst for change can be traced back to 2011. “The term Industrial Internet of Things was barely established at that time. There was no integration of the IT and OT platforms. That made it difficult to obtain information from the operating systems in the plants,” recalls Dr Castillo. In those days Maynilad engineers drove from plant to plant, collecting data with USB sticks. That caused delays in detecting problems.

After Maynilad took over a plant from a contract partner with incomplete documentation, Castillo’s team made a decision to manually digitalize all of the important technical information and create a central storage location in the process. “Our thinking was, why not collect all of the technical data in one place? We developed our own IIoT platform from this idea.” In terms of implementation this meant equipping each plant step by step with edge devices, which forward data that is as clean as possible. All told, it adds up to more

1

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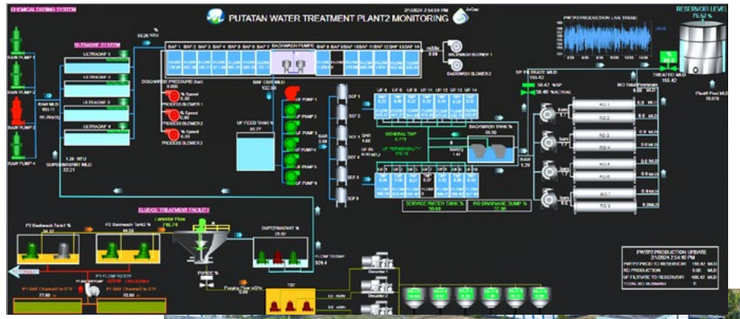
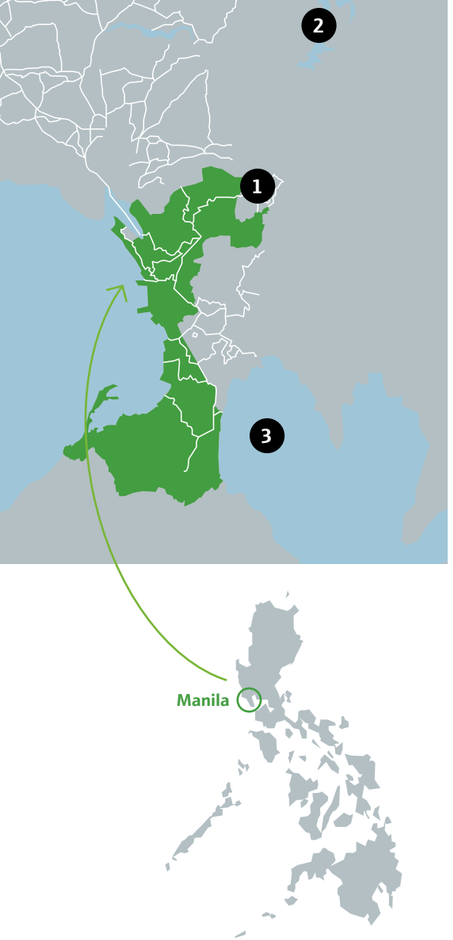


3

1
Via an IIoT platform, Maynilad presents plant and process data on dashboards. Here in the central control room, a team monitors all plants around the clock.

2
Users receive relevant information on their dashboard, e.g. water quantities or status data of individual instruments.

3
Many Maynilad systems run completely automatically and send data to the system in real time.



Green = Maynilad area of responsibility
1 Ipo Dam
2 Angat Dam
3 Laguna Lake (largest water resource)

WATER MANAGEMENT FOR MILLIONS

Maynilad Water Services Inc. is the largest water service provider in the Philippines in terms of customer base, serving 17 cities and municipalities in the western half of the Greater Manila Area. And the number of people in its area of responsibility is growing rapidly: The population of 8 million in 2011 has since increased to 10.3 million. The company has cultivated a partnership with Endress+Hauser for many years. Today nearly the entire Endress+Hauser product portfolio is utilized at Maynilad.

than 300,000 individual data points that provide measurement values, status notifications and much more. According to Castillo, the majority of the platform users are engineers. “We make the technical platform available, including the data. Users then create their own dashboards because they know best what they need.” The platform supplies data that is used in the control center and facilitates operations.

Maynilad’s digitalization efforts received a decisive boost during the Covid pandemic. In 2020 the Philippine government imposed one of the world’s strictest lockdowns. That meant the maintenance teams could travel to the plants only on rare occasions. “The IIoT platform saved us a lot of time because our technicians only had to be on site for urgent maintenance activities,” says Dr Castillo. “The majority of the analysis could be carried out remotely.”

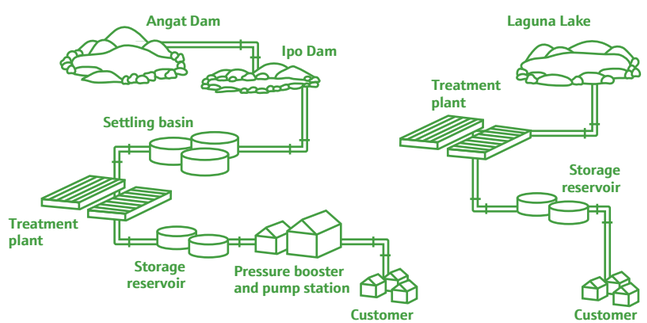
MEASUREMENT TECHNOLOGY CREATES SOLID DATA BASIS

Reliable, high-quality data serves as an indispensable source of information for the analysis, which in turn calls for reliable measurement technology. Kim Rean Estrada, head of facilities maintenance for wastewater at Maynilad, explains: “Our plan consists of automating and digitalizing all plants, from north to south, and connecting them with our control center.” Endress+Hauser plays an important role here because the company’s devices are reliable, consistently supply precise measurement values and thus create no data leaks, an enormously important foundation for the water supply system.

Malfunctions have to be resolved quickly. “Electrical and measurement equipment that lack local support are currently the cause of the biggest issues. But in the case of Endress+Hauser, support and spare components are always available,” explains Estrada. This is why Maynilad has already installed around 1,000 Endress+Hauser devices across the entire product portfolio: flow, pressure, level, temperature and liquid analysis technology.

This also applies to the Parañaque water reclamation facility, Maynilad’s largest sewage treatment plant. It bundles several wastewater streams, which undergo a series of purification processes before being discharged into the environment.

HOW MAYNILAD DELIVERS POTABLE WATER



“In the case of Endress+Hauser, support and spare components are always available.”

Kim Rean Estrada,
head of facilities maintenance for wastewater at Maynilad

The measuring devices from Endress+Hauser run reliably, generate an abundance of data and can communicate digitally

Jerahmeel Andrew Layco, head of automation and instrumentation design, stands on a metal bridge above one of the treatment tanks in the midday sun and talks about how much he values Endress+Hauser’s innovative strength. “Most of our measurement parameters are covered, plus Endress+Hauser is constantly working on new developments.” He cites the ‘0 x DN full bore’ technology as one example. This innovation enables the installation of electromagnetic flowmeters in extremely tight spaces where the instruments do not require the usual distance to the next pipe bend. “It’s the perfect solution for our tightly spaced plants,” says Jerahmeel Andrew Layco. Since all of the instruments feature digital communications, Endress+Hauser is the partner of choice, especially for all new Maynilad plants.

If Jerahmeel Andrew Layco wants to discuss new developments or services, he gets in touch with Ivan Louie Villar, the first point of contact for Maynilad at Endress+Hauser in Manila. The business development manager believes Endress+Hauser’s intelligent field devices with Heartbeat Technology can lead to further opportunities for increasing efficiency at Maynilad, a company that is open-minded about new technologies. “Heartbeat Technology performs self-checks in the background and reports the status of the instrument. The functionality of the device can also be verified at the touch of a button at anytime. No one has to be on site and downtime is prevented.”

> 1,000

Endress+Hauser instruments are in use in Maynilad plants

Thanks to data analyses, the water company can identify whether and where water is being lost in the metropolis, e.g. through leaks or illegal connections.

10.3 million

people in the Manila metropolitan area receive their water through Maynilad

TRANSPARENCY AND EFFICIENCY GAINS

Automation and connectivity via the IIoT platform furthermore bring benefits in terms of sustainable water management. “We utilize Endress+Hauser instruments for optimizing the chemical treatment of wastewater or for adding oxygen, which is energy-intensive. This helps us conserve resources. And remote control of the pumps can only be carried out with the help of connected pressure sensors. Thus, via the IIoT platform, the pumps can be controlled as needed,” says Dr Castillo.

This prompts the question: could the use of AI lead to even more efficiency? After all, Maynilad has been collecting technical data for 10 years, an ideal prerequisite for employing AI models. Francisco Castillo, who wrote his dissertation on the subject of AI around 30 years ago, adds: “You should always think about things from the perspective of the problem. AI can be the solution, but in our case our initial focus is the IIoT platform.” Nonetheless, the company is already relying on machine learning for predictive maintenance as an example. The CIO emphasizes that even more data and processing power are required to train a large-scale generative AI model. “If we can solve a problem faster with AI and remain within the cost framework, we will do that.”

AI is already more firmly established in the area of customer service. Chatbots that operate on the basis of large language models should relieve the workload of call center agents in the near future. According to the CIO, cybersecurity is another interesting area where AI is employed to recognize hacking patterns and protect the system as a result. Francisco Castillo closes his laptop. “It’s a good thing that we began to collect and process data at an early stage,” says the CIO in summary. “And it’s important to have partners like Endress+Hauser at our side who supply the right hardware and understand the IT aspect at the same time.”

As global industry manager, **Emily Hoon** coordinates the worldwide network of water and wastewater experts at Endress+Hauser. The business economist has been working for the Group since 2009. In her private life, climate protection and sustainability are her special concern: among other things, she supports the We Are Water Foundation, a non-profit organization that gives people in disadvantaged regions access to clean water and is committed to the sustainable management of this valuable resource.

“If you want to optimize processes, you first need to have a complete overview of all the instruments in your plant.”

Emily Hoon,
global industry manager for water & wastewater at Endress+Hauser

Technology for enhanced sustainability

Technology, especially digitalization, can help conserve resources in the water industry, thus promoting the UN’s global goals for sustainable development. Emily Hoon, global industry manager for water & wastewater, explains how Endress+Hauser supports its customers in this area.

How can a valuable resource like water be used even more efficiently?

Digitalization plays a crucial role in improving efficiency. Many opportunities are already present: monitoring the water quality in real time, smart metering for detecting leaks, creating digital twins, automation and process optimization, to name a few. All of them have been proven to conserve water and energy, and reduce operating expenses. The more companies succeed in connecting their OT and IT platforms, the greater the effect will be, as Maynilad shows.

Which Endress+Hauser digital solutions can help?

Customers who want to optimize their treatment processes must first have a complete overview of all the instruments in their plant. Our Netilion Analytics application helps document the installed base and the data can be used to make recommendations for device standardization, which in turn reduces complexity, streamlines maintenance and minimizes spare parts inventory.

Documentation is also a real operational challenge in the water and wastewater industry. The Netilion Library application enables our customers to quickly find the right information whenever they need it, for example for environmental audits. If information like calibration and verification reports can be stored safely and kept up to date – in a completely automated way that reduces operating expenses – this represents true added value.

To what extent is sustainability a driver for the industry?

Endress+Hauser’s water and wastewater strategy and industry value proposition are oriented toward the United Nations Sustainable Development Goal 6. We and our water and wastewater customers ultimately want the same thing: to protect and conserve our water resources, as well as optimize treatment processes to increase efficiency. By combining an innovative portfolio of measuring instruments, expert services and industry expertise, we are confident in helping our customers meet their operating targets throughout the water cycle. This creates a mutually beneficial scenario for achieving success in the future!

Practice makes perfect

AI could be the key to really exploiting the potential of digitalization. Endress+Hauser is working together with customers and partners in a step-by-step exploration of these new technologies – and in doing so is underlining their true added value.

“AI is not a quick fix”

Artificial intelligence has been in commercial use for years. Now it’s set to boost efficiency in industrial plants. Digital strategist Marco Colucci explains where the potential of the new technology lies and how Endress+Hauser is helping customers prepare.

Questions: Christine Böhringer
Photography: Andreas Mader

INNOVATION

There is considerable hype surrounding artificial intelligence these days. Some even tout it as a universal solution for all process-related problems. What is your take on the technology from the Endress+Hauser perspective?

For me, artificial intelligence is first and foremost a new driver of insights. In the digitalization context, AI combined with data acquired from our intelligent sensors installed in industrial plants should allow users to make better decisions based on the insights gained and thus unlock new opportunities for plant optimization. Chemical, food & beverage and life sciences count among industries that are highly automated already. Our customers there believe that intelligent solutions have the potential to improve efficiency by an average five percent, albeit only in certain areas. While there is a lot that AI can do, it’s in no way a panacea.

In what applications might AI deliver the greatest added value?

From developing numerous applications for customers over the years, I believe the greatest benefit lies in areas where AI can transcend the limits of physical measurement technology; here we’re talking predictive quality, predictive reliability and digital twins. The latter could use AI for autonomously adapting to changed system conditions. Predictive reliability is about reliability statements on the measurement performance of our instruments, as well as optimizing their calibration intervals. Statistical models are the present-day tool for analyzing historical calibration data; in future an algorithm could additionally incorporate monitoring data from our instruments equipped with Heartbeat Technology.

Predictive quality is frequently based on soft sensors able to determine parameters that today’s physical sensors are unable to monitor, or only in the lab or using the human senses. To accomplish that, we combine hardware sensors with an AI model and provide the new parameters inline. Soft sensors close what have until now been process information gaps. That’s why I view them as a highly important field for the future!

What about predictive maintenance? Many consider it a prime example of AI applications…

Predictive maintenance with AI is of course an important thing for the process industry. The idea is to improve plant availability through timely detection of impending component failures and scheduling specific maintenance activities accordingly. That being said, plant operators are not necessarily focused on our instruments so much as on wear-intensive mechanical and rotating components such as pumps and valves. Our sensor data could conceivably support predictive maintenance of these assets. Moreover, we are currently working on an AI solution for our instruments deployed in highly demanding applications where deposit formation, abrasion and corrosion are issues.

At Endress+Hauser and in the process industry in general, the use of AI has barely progressed beyond pilot projects. What makes transitioning to broad-based deployment difficult?

There are several reasons. For one thing, industry and manufacturers are still in an exploratory phase. Many attempts failed to yield hoped-for efficiency gains – or the solution is not scalable. Secondly, use cases cannot be developed overnight. Co-innovation stands front and center here; we must delve deep into the customer’s application know-how, get hold of the right data, then put it into the cloud, from where we can do the interpreting jointly with the customer. Aspects such as data access, interoperability, cybersecurity, the right mindset in the company and a whole lot more also have parts to play. AI is not a quick fix. And it’s not an issue that individual companies can drive forward all on their own.

So there is still work to be done before AI can become a success?

When planning new systems in particular, it is essential to think about digitalization and AI at the same time. We are currently involved in many water and wastewater projects where the measurement technology is selected with this in mind, and the plant design already contains provision for the requisite IT and OT infrastructure. Error-free, structured data is the first step, its management and visualization the second step, and the two together a prerequisite for the third step of algorithmic analysis.

FUTURE THINKER

Marco Colucci (53) has worked at Endress+Hauser for 30 years and is responsible for digital strategy and portfolio management at the product center for flow measurement technology. He holds a degree in electronics and information technology and is currently working on his doctorate, which focuses on how companies can adopt a dual innovation approach to transform and drive forward their established core business.

Faster off the mark

In an increasingly complex world, Endress+Hauser is taking steps to open up to people and organizations outside the company in a collaborative search for innovations. The approach has already made it possible to quickly gain ground in the field of AI.

Text: Christine Böhringer
Photography: Christoph Fein

1

2

1
A new wireless sensor was the inspiration behind the development of the flood warning system.

2
Endress+Hauser strategy expert Dr Simon Zühlke and market manager Florian Falger are the minds behind the partnership with Okeanos.

PARTNERSHIP

When a river unexpectedly overflows its banks somewhere in central Europe, Florian Falger often receives a phone call the very next day. The market manager helped develop Endress+Hauser's Netilion flood monitoring early-warning system. With input from sensors and artificial intelligence, it is capable of predicting if, when and where a flood might happen. "That way, the responsible authorities can make the right decisions at the right time and take protective measures, for example to prevent damage," says Falger, an industrial engineer by training. The system is unique for its type – and that is not the only thing setting it apart: there was just a year between the start of the project and market rollout.

By any measure, 12 months is not much time to develop a finished product. For a solution that combines sensors with AI-based software, though, such pace is comparable to the speed of light. "That it went so fast is thanks to a new, agile department and our open innovation approach," says Dr Simon Zühlke, a strategy expert at the Endress+Hauser product center for level and pressure measurement. Open innovation means the company is purposefully opening up to outside partners in the active search for innovation alliances. "We now live in a dynamic world where no one can do it all on their own," says Zühlke, a process engineer. "Pooling skills and knowledge makes it faster to tap into new fields."

Four years ago, Zühlke attended a start-up convention at Ruhr University in Bochum, Germany. There he encountered Okeanos, a start-up founded by two hydrologists who were looking to digitalize the world of water management using data-driven approaches, including AI. "Even after just a few minutes, it was clearly a perfect match," Zühlke says. At the time, Endress+Hauser had just launched the world's first wireless 80 gigahertz radar sensor for monitoring levels in plastic tanks. The sensor uses its wireless technology to transmit data to the cloud. "On the one hand, we were seeking new applications for the battery-operated sensor, such as surface water monitoring in remote locations," Zühlke explains. "On the other hand, we wanted to get more out of the sensor data." Okeanos for its part was also immediately attracted to the measurement technology specialists. "Endress+Hauser is very good at recording data – and we're very good at analyzing it," says Okeanos co-founder Dr Benjamin Mewes.

PREDICTION, NOT JUST MEASUREMENT

The partners initially experimented with digitalizing storm water overflow basins using measurements and an algorithm. But then, in 2021, catastrophic flooding hit Germany. "Suddenly, there was a major societal need," Falger says. "We asked ourselves: 'Could we use the radar sensor and AI to leverage water level measurement and turn it into a flood warning system for small bodies of water?'" A newly set up internal innovation lab got to work on the idea. "There we operate outside of the standard processes, using agile methods, to work on new products and solutions. We cooperate closely with customers – and we enjoy a lot of freedom," Falger explains.

The result is an optimal blend of an idea, a business start-up and knowledge. Endress+Hauser provided level measuring devices, soil moisture sensors from its IMKO subsidiary and precipitation gauges to supply the required measurements and a cloud platform. Okeanos brought in hydrological knowledge (the founders had written their dissertations on flood forecasting) along with the AI algorithm. This merges measurements with other data in the cloud and delivers a clear forecast, saving users the task of interpreting the numbers. AI training was in cooperation with pilot customers. The system is already in widespread use. "That gives local communities up to 45 minutes of advance warning in the event of a potential flood," Falger says. "And we want to make that window bigger still."

Hydrologists Dr Benjamin Mewes and Dr Henning Oppel founded Okeanos in 2019. The start-up, based in Bochum, Germany, is working on projects including AI-based solutions for flood protection, storm monitoring and optimizing water treatment plant management.

3 questions for Benjamin Mewes

Your goal with Okeanos is to modernize water and wastewater management. What role do data and AI play in this?

A crucial one, considering that we have more environmental information and measurements today than ever before. Our purpose is to analyze them and from there find answers to the industry's questions on future topics such as sustainability, the shortage of skilled labor and the impact of climate change. AI is just one item in our toolbox to do that. It lets us link data together much faster to gain an overview of the situation and create hydrological models. Our overall mission is to combine water resources engineering with modern IT strategies.

You develop your solutions in partnership. Why do you focus so strongly on collaboration?

We can't do everything on our own. Digitalization and modernization only work if you collaborate. That's why we're on the lookout for partners with whom we can develop a shared vision and generate synergies. Endress+Hauser is such a partner. Our areas of expertise complement each other perfectly. That's also reflected in the speed with which we developed the flood warning system. Both sides brought the right basics to the table. All we had to do was refine from there. The result is a standout product, the likes of which we could only have created in this partnership.

Endress+Hauser is a large company with a long history. You're a small and recently founded one. Do you feel that difference?

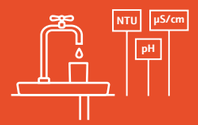
No, we have a partnership of equals. That's exactly what co-innovation needs, along with the trust that comes from openness and communication. Plus, we only collaborate on ideas that both sides truly believe in.

Crystal clear

Rapid assessment of measurements at water treatment plants is possible thanks to the experience of the operators. In the future, machine learning could help spot the need for action. Endress+Hauser is working on this kind of assistance system for liquid analysis.

Text: Christine Böhringer
Illustration: Teresa Wagner

A GLIMPSE AT THE FUTURE: HOW NETILION LIQUILINE ASSIST COULD WORK



1

Analysis panels monitor the quality of drinking water during pumping and distribution. Sensors also record critical parameters such as turbidity (NTU), pH and conductivity (µS/cm).

2

A Liquiline transmitter aggregates the data and sends it via an edge device to the Endress+Hauser Netilion cloud.

3

In the cloud, machine-learning algorithms analyze the plausibility of each measurement – factoring in the experience assimilated from operations staff.

4

The dashboard features a map showing whether everything is okay at the plants. If not, one click is all it takes to find the measuring point that signaled an anomaly.

PLAUSIBILITY CHECK Can I trust the measurement? That's a question that operating personnel at water treatment plants constantly ask themselves. "The people in the control room must keep a constant eye on all the graphs tracking things like turbidity, pH and conductivity," says Lars Bondzio, business development manager at the Endress+Hauser product center for liquid analysis. "From experience they can decide whether measurements for a given application are within the usual range." Outliers or other anomalies could point to problems with the process – or to deposit formation, sensor drift or aging.

"The sheer number of measurements they have to assess can be overwhelming," says Julia Mildner, head of the service innovation group. Then there is the shortage of skilled and experienced workers, which means that shifts are often understaffed. This is where Endress+Hauser aims to help out with an intelligent assistance system. It uses machine learning algorithms to model the plant operators' knowledge and automatically check the plausibility of each measurement. To do this, the AI also pulls in historical measurements, diagnostic and verification information from the sensors, and environmental data. "For example, the algorithms can ascertain whether high turbidity levels are the result of heavy rain, meaning everything's okay, or whether action is required," Mildner explains.

The new plausibility checks proved a trailblazer in projects undertaken with water suppliers, and are now being developed into a market-ready product called Netilion Liquiline Assist. "Users see tremendous added value in the solution," says André Lemke, digital portfolio product manager. Netilion Liquiline Assist converts measurement data into easily understood information from which workers can decide on the appropriate response. Inclusion of sensor data could also help to keep measuring points up and running even more reliably: their diagnostic data is noted and trends become apparent. In addition, the plausibility index holds potential as a quality parameter, meaning that comparison measurements in the field are not always necessary.

"The example also illustrates the long innovation timescale for technical changes in the water treatment industry," says Dr Achim Gahr. As business development manager at Endress+Hauser, he laid the groundwork for automated checking of measurements over 10 years ago. "Now, thanks to digitalization and machine learning, we can finally make such assistance systems a reality."

Beer in focus

AI doesn't always have to be the answer. A multi-sensor system such as the QWX43 fermentation monitor supplies data to conventional, cloud-based algorithms – another way for users to benefit from digitalization. Microbrewer Armin Pillmeier uses real-time analysis for precise control of fermentation processes.

Questions: Marlene Etschmann
Photography: Christoph Fein

DIGITALIZATION **Mr Pillmeier, the microbrewery that you run uses the kind of technology normally seen in larger breweries.**

Precisely because my company is so small, it's important to automate as many processes as possible. It's just me and one part-time employee, so this is the only way we can brew 1,000 hectoliters of beer a year. The fermentation monitor gives me the peace of mind I need to take care of other things, such as sales.

What exactly does the system do to keep your mind at ease?

Without the monitor, I would have to take daily samples from the fermentation tank. This takes a quarter of an hour, and an open tank is always an infection risk, no matter how cleanly you work. Then I would have to measure the sample densities in a hydrometer and enter the measurements into a spreadsheet. The next step is sending off the samples for the alcohol content to be measured and then waiting two days for the results. The fermentation monitor displays all of this information in real time.

Do you use the measurements for anything else beyond analytics?

The values are fed directly into the process control system using Netilion – the Endress+Hauser IIoT ecosystem – and I use them to actively control the fermentation. The valves can be controlled digitally, so the fermentation process is fully automatic. This is particularly important on weekends when we organize events, as it allows me to take care of our guests in peace and quiet while brewing quality beer at the same time.

You have been working with the QWX43 fermentation monitor for a year now. What are your experiences with it so far?

Positive, every step of the way. Installation was simple and the system has been running smoothly ever since. Before I became a full-time brewer, I spent 10 years planning and optimizing brewing systems as a project engineer. From my experience, I can safely say that there is no comparable device on the market that generates such benefits from data and algorithms. Above all, its measurement accuracy is unparalleled.

Are there any types of beer for which the monitor is particularly useful?

Yes, it's particularly important to have fermentation under control when I brew my non-alcoholic beer. Extracting the alcohol from a conventional beer after fermentation is a very complex, technical process. Instead, I use a special variety of yeast that produces only trace amounts of alcohol and I optimize the taste by dry-hopping – that means adding hops to the fully fermented beer, which restarts the fermentation process. This is where the fermentation monitor helps me to stay below 0.5 percent alcohol by volume.

With Bock-style beer, it's the reverse. This variety has a high alcohol content of over six percent, which stresses the yeast toward the end of the brewing process. Fermentation takes longer than with other varieties of beer, but thanks to this measuring instrument I always know what stage it is at.

AS EASY AS QWX43

The QWX43 fermentation monitor measures density, viscosity, temperature and acoustic velocity in beer. Its measurements go to Endress+Hauser's Netilion cloud, where a static algorithm calculates the sugar and alcohol content and monitors the fermentation process in real time. The data is accessible from anywhere – and with additional software it can even be used to actively control the brewing process.

The bridge-builder

Jawad Tayyub and his team are developing AI solutions for next-generation measuring devices and advanced production technology. He is championing the opportunities offered by the new technology and is calling for a dialogue between researchers and practitioners.

As told to Jannik Jürgens
Photography: Andreas Mader

Dr Jawad Tayyub (34) works as an AI research scientist at the Endress+Hauser competence center for level and pressure measurement technology. The computer scientist and expert in artificial intelligence previously conducted research at the University of Leeds in the UK.

KNOWLEDGE TRANSFER

"Many people see artificial intelligence as something creepy or even threatening. They fear it could take their jobs away one day, but I don't see that happening any time soon. AI can help humans immensely. For example, it has the potential to handle some of our tasks – especially the unpleasant and monotonous ones. What it can't do, though, is replace our creative thinking and complex decision-making.

As an AI research scientist at the competence center for level and pressure measurement technology, I develop AI algorithms for our production and next-generation measuring technology. As part of the Group-wide AI knowledge community, I also want to raise awareness throughout Endress+Hauser of the opportunities that the technology offers us.

There's one thing I would like people to know: AI isn't voodoo, it's elevated statistics. AI-based large language models such as ChatGPT can provide precise responses to questions because we humans have provided them with answers to similar questions. We have written down tons of information online, and a generative model simply utilizes it to learn the statistical patterns on which language is based. When we ask the model questions, it uses the patterns it has learned to generate responses by stringing one word after another. However, it often lacks an understanding of the meaning and the underlying rules that govern the content it produces.

One example of this is multiplication. Simple calculations like six times six are no problem for the models. But if you ask them to multiply two five-digit numbers, they get it wrong. Why? Because they haven't been exposed to enough examples of such problems to learn how to produce the right answers.

That said, AI is capable of helping us in all areas of the company, taking over laborious tasks such as checking products for visual defects and analyzing large volumes of texts. To make that possible, though, we need sufficient quantities of the right data to train AI on. This is particularly true in the development domain, where everything is based on standards – some of which span hundreds of pages. By adapting a large language model, we can enable colleagues to quickly extract the desired information from said documents.

No matter what the challenge is, my team and I find the optimal algorithm for the corresponding use case. Complex production activities, in particular, require very sophisticated and highly bespoke solutions. For example, we recently developed a new neural network architecture for our colleagues in that sector. This model, inspired by neural networks used in the medical domain, detects the edge of a weld seam between two metals automatically and precisely.

AI is a new, up-and-coming technology. Every week brings new algorithms and models with it. We now have more than 200 of them. I collaborate regularly with professors from Germany and the UK, attend conferences and supervise students' theses. It's important that we expand this transfer of knowledge in order to be at the cutting edge and find better and better solutions."

Service in the spotlight

From purchasing to logistics, Endress+Hauser already utilizes AI in many areas to create transparency and optimize processes. One application specifically helps to monitor product quality in the field.

Text: Kirsten Wörnle
Graphics: Teresa Wagner

QUALITY ASSURANCE

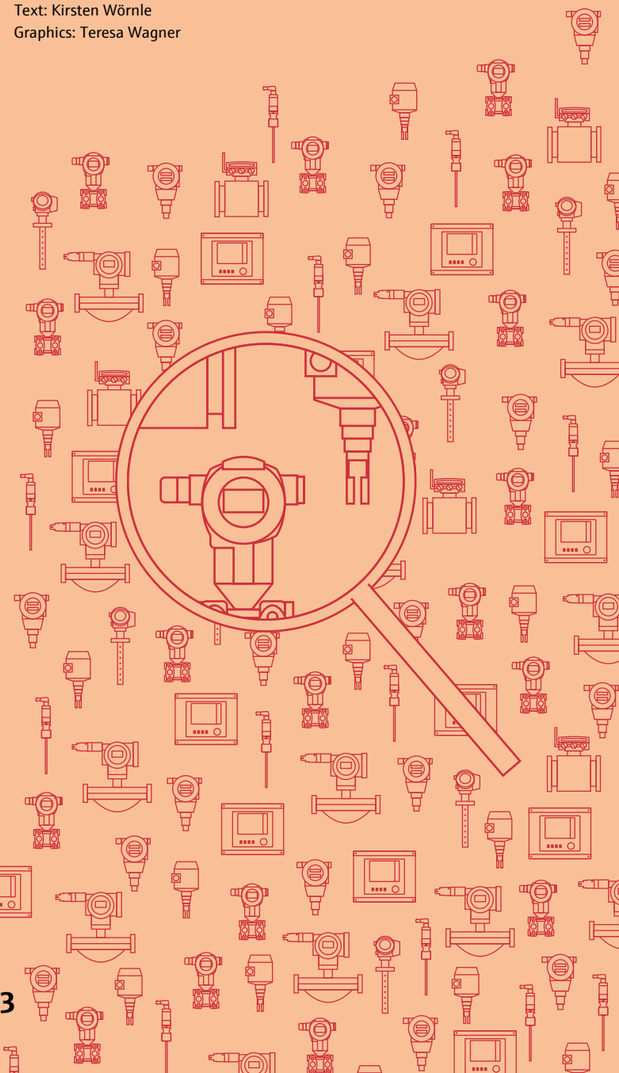
Artificial intelligence can analyze enormous volumes of data, recognize patterns, draw conclusions, and even learn while it is doing so. It's no wonder the technology is attracting such huge interest from businesses. Endress+Hauser uses the technology to analyze, improve and automate processes. Examples of its use include altering device specifications, checking weld seams or selecting the best shipping routes. With three million units coming off the production line every year, the efficiency gains are huge; AI saves time and prevents mistakes.

AI can also help out when those instruments are operating in the field. Endress+Hauser uses a cloud-based application called Product Lens to monitor in real time how the company's measuring devices are performing worldwide. The insights are used to learn and anticipate potential problems. There is an in-house instrument database containing 60 million entries that Product Lens checks every night, identifying new service cases and cross-checking them with historical data. If there are a lot of service callouts concerning a particular type of instrument, Product Lens will analyze technician service reports and spot which cases might hint at a broader issue.

Identification is by no means straightforward because service is usually a routine part of commissioning, calibration and maintenance. So reports containing words such as 'repair', 'problem' or 'replacement' may indicate manufacturing-related issues – or maybe not. "In cultures like Japan's that emphasize politeness, maintenance is sometimes documented as repair," says Enrico De Stasio, head of corporate quality, lean and IT. "Other cultures say maintenance when they actually mean repair." Product Lens has already learned all of these subtleties. "Context is key," says Thomas Fricke, head of the marketing services division. "We trained our AI on 15,000 cases, and now it identifies relevant ones with a 95 percent success rate. Our in-house experts review those in greater detail and narrow them down. The tool learns more with every case it finds."

VALUABLE INFORMATION

There haven't been any product recalls as yet. But the application brings many extra benefits. "We can track in the field whether tiny changes to the manufacturing process bring any undesirable side effects," De Stasio adds. All Endress+Hauser employees have access to Product Lens: its findings are just as relevant to manufacturing as they are to development and technical support. When there is a new service case, technicians can get on the right track more quickly. "If one measuring instrument is flagging up a problem at just one customer, while thousands and thousands of the same model are working fine, we're probably looking at a faulty connection or operator error," Fricke explains.



COLLABORATION

Getting more out of AI – together

Optimizing processes with AI requires users and providers to embark on a shared journey. Endress+Hauser follows a standardized procedure, ensuring transparency at every step and fostering trust.

Text: Christine Böhringer
Graphics: 3st kommunikation

1 JOINING FORCES
Endress+Hauser believes in joint innovation with customers to develop AI solutions. The initiative for this may come from either side. “Sometimes it is our users who ask us things like whether we can get more out of an instrument by leveraging additional data and information,” says Dr Rebecca Page, a data scientist working in R&D at the flow measurement technology product center. With an end-to-end application involving all manner of measurement variables and instruments, Endress+Hauser will often be the one to approach the customer. “Our industry managers with their expertise and global network know exactly where their customers’ pain points are. In many cases, people have been thinking for quite some time about measurement-based solutions. But only now, with the digital transformation and AI, has it become possible to put this approach into action,” Page says.

2 STARTING WITH A CLEAR GOAL
If everyone is keen to work together, Endress+Hauser and the customer will go through a standardized model for data mining projects (CRISP-DM). It all starts with understanding the business. For an end-to-end application this means asking various questions: What exactly does the process look like? What is the challenge? What improvements are users hoping to see? What does Endress+Hauser want to achieve with the project – and what resources and contributions does Endress+Hauser need for it to be a success? What do both partners bring to the table – and where do their skills and expertise lie? “Transparency is crucial here, along with clearly defining a common goal and the exact path for getting there,” Page notes. “Both sides have to trust each other, communicate well and want to learn – and users must be open to the idea of digitalization.”

3 UNDERSTANDING THE PROCESS AND DATA
In the next phase, data scientists at Endress+Hauser receive measurement datasets to determine things such as the critical parameters and the control options that offer starting points to solve the problem. “Right now, we’re working on a predevelopment project with a customer in the mining industry to optimize a thickener,” Page explains. The process for separating solids from liquids is to be optimized with the help of AI. In addition, the layer of solid matter that settles on the bottom of the tank should have a certain density. “Another part of this is a deep dive on site with the process engineers,” Page says. “We need to gain profound insight into the process and then compare it against what we see in the data. The crucial point is to use the data to discern patterns that have an impact on the process.”

4 BRIDGING GAPS
If there are gaps in the data, for example because an interval between measurements is too long or key parameters are missing, Endress+Hauser steps in to bridge them. “Such gaps are often the consequence of manual steps such as sampling,” Page explains. In the case of the thickener, the solid content of the overflow was going for lab analysis just once a day. “We’ve added various new measurements to record the dynamics of the process in between times when the samples go to the lab. That’s an immediate gain in transparency for users,” she says.

5 FINDING THE RIGHT MODEL
Data for the predevelopment project then flows via edge devices into the cloud. The result is even larger datasets for ongoing analysis and interpretation with help from the customer – looking for trends, variability and outliers. A final dataset forms the basis for developing a suitable AI model. “In applications where the many measuring devices in use make relationships more complex, machine learning can provide support,” Page explains. The model is tested extensively, first with simulated measurements and then real ones. “This is where we work with the customer to see whether the model fits, reflects reality and offers the added value they are seeking, or whether we need to change something.” After that, the model is configured, implemented in the customer’s environment – with or without a cloud connection, as the customer prefers – and monitored further.

6 READY FOR THE MARKET
“In the thickener case, our AI solution is tasked with ensuring optimum automatic dosing of the flocculent,” Page says. If the solution proves successful, other customers also stand to benefit in that the algorithm will be offered as a complete package with all the necessary components, such as measuring instruments and edge computers. “At that point, the only thing left to do is adapt the solution to the parameters on the ground. Often, thickening processes may run with different raw materials such as coal, gold or copper, at different temperatures, and with different flocculants,” Page says. “But that’s no longer such a big deal when you’re working closely with the customer concerned.”

Self-reliant

Algorithms control simple machines as well as complex AI systems – and are as diverse as the tasks they solve. To understand how they work, it helps to look at measurement instruments from Endress+Hauser.

Text: Robert Habi
Graphics: Teresa Wagner

Algorithms are not a modern invention. The dictionary defines an algorithm as a step-by-step sequence of instructions specifying how to solve a particular task or problem. These clear-cut procedures essentially work like a recipe or game rules. In the field of information technology, however, they take the form of programs and electronic circuits that perform complex tasks. Their control over computers, machines and plants makes processes reliable, efficient and automated. Algorithms are used to light up traffic signals in the proper sequence, to calculate the shortest route in navigation systems, or to determine how search engines like Google rank their results. AI algorithms can do even more. Fed with huge volumes of data, they can learn on their own and thus handle tasks without a human having to program every step in advance.

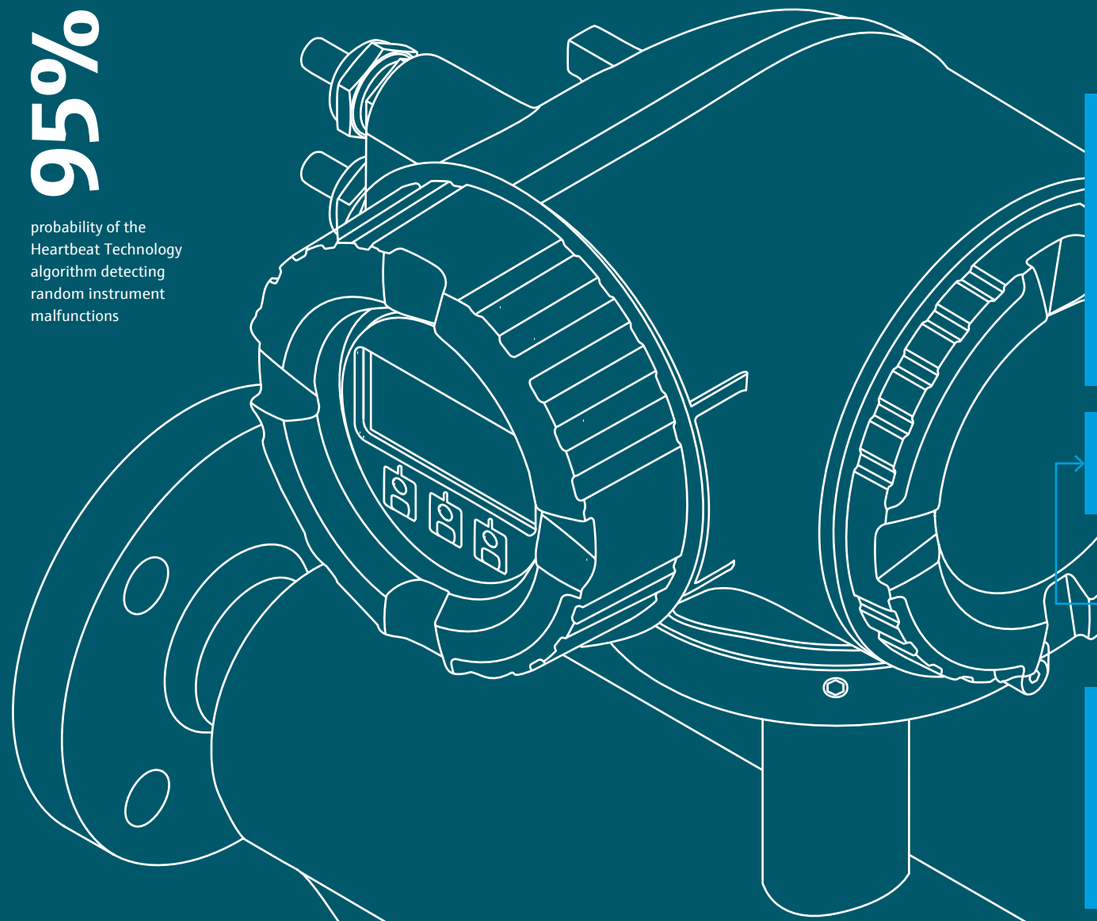
TRANSFORMING REALITY INTO CODE

"Because algorithms can be a solution for any technical task, new ones are created all the time," says Christian Scherer, senior software engineer in the IIoT development area at Endress+Hauser Digital Solutions. Among other things, Scherer and his colleagues are tasked with improving the diagnostic, test and monitoring functions built into many instruments that carry the Heartbeat Technology label. Among the various algorithms at work here is one that solves multiple customer issues at once. The Heartbeat Verification algorithm used in flowmeters and other instruments checks their functionality in under a minute, at the press of a button. It automatically tests whether internal components still have their original reference values or whether there is a system fault. It removes the need for an on-site engineer, and whatever process is being monitored can continue undisturbed. All of this eliminates the errors associated with manual verification.

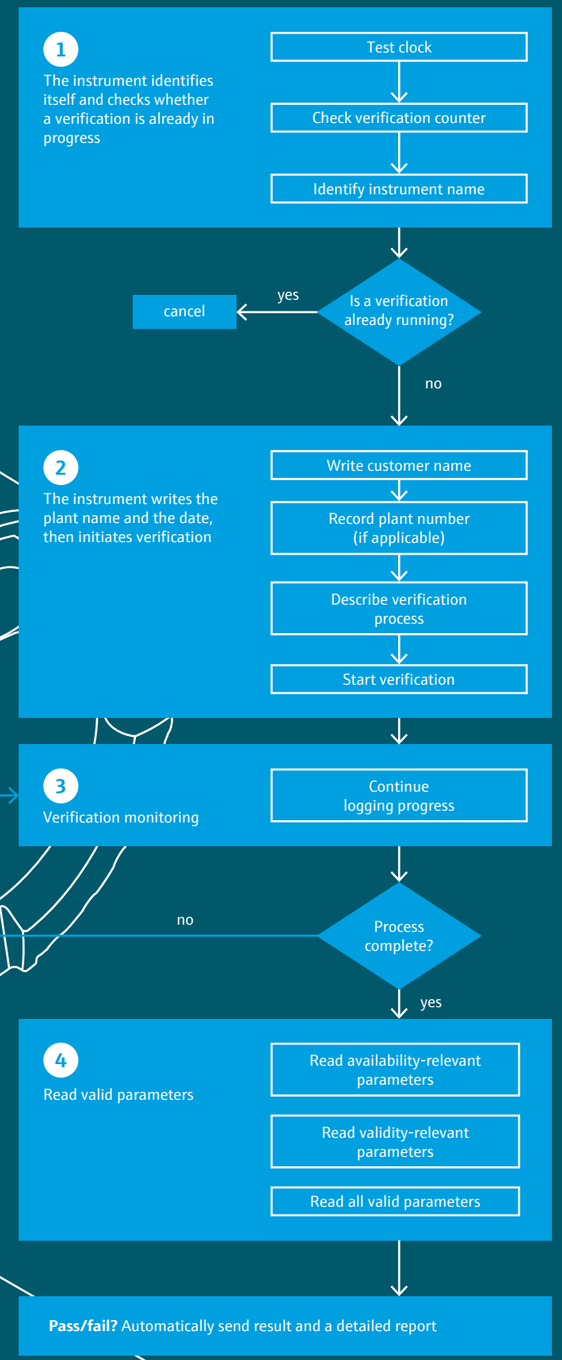
The major benefits of such an algorithm come as the result of intensive development work. "It's all about getting to the heart of a task and breaking it down into steps that a computer can execute. That can be very challenging," says Christian Scherer. Indeed, the step-by-step instructions must be clear, always function identically, lead to a result and have a recognized set of end conditions. Getting it all correct so that the algorithm achieves its purpose quickly and reliably requires many lines of programming code and exhaustive testing.

95%

probability of the Heartbeat Technology algorithm detecting random instrument malfunctions



How the verification works
The algorithm first checks for possible transmitter and sensor component outages and detects system malfunctions such as corrosion of wetted parts, deposits or abrasion. As with any good algorithm, the actual details are confidential, but the flowchart here depicts the steps to verified status.



Foundation for the future

Endress+Hauser thinks in terms of generations, not quarters. That's why the family company continually invests in its employees, its internal network and sustainability measures, thus laying the groundwork for a better tomorrow – today.

Text: Christine Böhringer, Sereina Manetsch, Kirsten Wörnle
Photography and graphics: 3st kommunikation, Endress+Hauser

100 young people began an apprenticeship or dual study program at Endress+Hauser in 2023

364 young people were in vocational training at Endress+Hauser in 2023

18 kinds of apprenticeships are offered across Endress+Hauser's locations

5% percent of all positions at Endress+Hauser will be set aside for interns, apprentices and students by the year 2027

Investment in the next generation

Demographic change in many countries around the world is causing problems for companies seeking young recruits. Among other things, it's increasingly difficult to fill apprenticeships. Despite these challenges, 100 young people began an apprenticeship or dual study program at Endress+Hauser locations in Germany, Switzerland and France in 2023 – the same number as the previous year. There will be even more in future: Endress+Hauser aims to set aside five percent of all positions for apprentices, students and interns by the year 2027.

To attain this ambitious goal, the Group has created a new department focused on global dual education. All these activities are now coordinated centrally with the product and sales center networks. "Our goal is to roll out dual education structures globally across the company and develop them further. We deploy standards, training content and programs to streamline introduction of the models and ensure quality. We also want to intensify collaboration with universities and colleges. It should all help us attract new employees," explains Jens Kröger, head of the department.

EXPORTING A SUCCESSFUL MODEL

Activities concentrate on product and sales centers that to date have been less involved in dual education programs – schemes that combine theoretical instruction at vocational colleges or universities with practical on-the-job stints in the company. Endress+Hauser in collaboration with the German Foreign Chamber of Commerce has offered such a program for up-and-coming mechatronics technicians in Aurangabad, India, since 2018 and in Greenwood, USA, since 2019. In Greenwood, Endress+Hauser is cooperating with Kettering University, a STEM college whose students receive hands-on experience at the company. "We want to launch the dual education program in China as a next step," says Jens Kröger.

"We want to strengthen our dual education program even further and inspire young people around the world to join the company."

Jens Kröger, head of the dual education program department

Never too early

To get more children and teenagers interested in technical professions, Endress+Hauser operates school research centers. The most recent of these labs opened in Maulburg in southern Germany, where it is attached to the product center for level and pressure measurement. Pupils from the surrounding area can have fun developing interests in robotics, 3D printing and electronics technologies. Activities include computer game programming, building a personal weather station or an amplifier. The focus is always on practical applications, with equipment and materials provided to course participants.

Reaching for the stars

Students at technical universities around the world enter their Mars Rover prototypes in one of Europe's biggest competitions in the fields of robotics and aerospace, the annual European Rover Challenge in Poland. The students' remote-controlled vehicles must prove their mettle at navigating a geologically accurate simulation of Martian terrain. The team from the University of Applied Sciences and Arts Northwestern Switzerland finished the 2023 challenge in second place – with help from four Endress+Hauser employees. They shared technical knowledge and led the group of 22 students majoring in varied disciplines, from computer science and mechanical engineering to electronics and information technology.

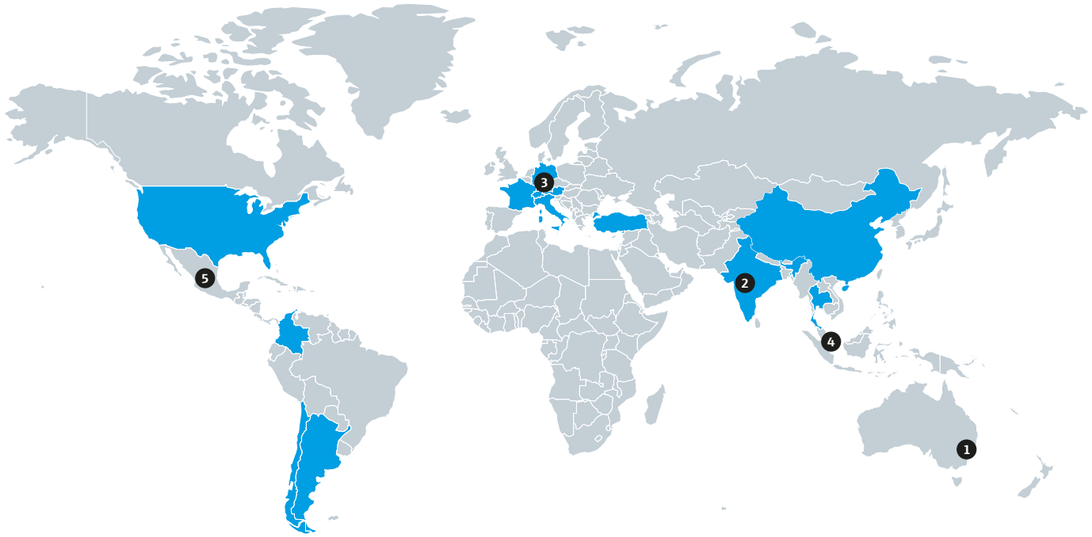
On track for growth

Endress+Hauser continues to grow – and that includes the company's sales and production networks. The Group has invested more than 1.1 billion euros in buildings, plants and IT infrastructure over the past five years. Projects worth over 570 million euros are currently underway in 13 countries around the world. For instance, by the year 2030 there will have been 118 million euros invested in developing the product center for level and pressure in Maulburg, Germany. There is a new sales building under construction in Greenwood, Indiana, at a cost of 37 million euros, as well as development of the headquarters campus at Endress+Hauser subsidiary Analytik Jena to the tune of 50 million euros.

2023 developments

1 **Sydney (AU)** – New location for the Australian sales and service business
2 **Aurangabad (IN)** – New production facility for temperature measurement and liquid analysis
3 **Gerlingen (DE)** – New office building
4 **Singapore (SG)** – Renovation of the sales and service center offices
5 **Mexico City (MX)** – New sales and service center

Current construction projects



Excellence in innovation

Endress+Hauser is among the most innovative companies in Switzerland. In a recent survey conducted by two Swiss business magazines in collaboration with market research and data analysis specialist Statista, Endress+Hauser placed fifth in the overall rankings and second in the category for electronics and industrial technology. The survey analyzed a total of 185 companies in terms of their general innovativeness, innovative products and innovation culture. 8,900 employees and experts in the field were questioned.

Architect Tschekav Münch, corporate building projects expert at Endress+Hauser, orchestrates the company's construction projects and spurs improvements in this area.

3 questions for Tschekav Münch

Your position is new at Endress+Hauser. How did this come about?

Endress+Hauser continues to grow, which means that in coming years the Group will be building or renovating production and sales centers around the world. I work at corporate level with teams on the ground to make sure these construction projects are not only completed successfully and efficiently, but also create long-term added value – for the company, its employees and customers.

What does it take to achieve this?

Construction projects keep growing in complexity, with increasing requirements from all stakeholders. So it matters more than ever to have structured and uniform processes, along with clear internal guidelines. The buildings must also be future-proof, for example in terms of climate protection or being suited to a productive and collaboration-oriented work environment. This calls for the right quality and the right design.

What are the architectural hallmarks of new Endress+Hauser buildings?

We aim for a harmonious blend of simplicity, functionality and sustainability. That means clean lines, intelligent use of space and resources, and integration of renewable energies. With innovative solutions around sustainability in particular, we want to keep on minimizing our environmental impact and stay ahead of current requirements. This will make us a pioneer in sustainable industrial architecture.

500

personnel managers, HR business partners and Endress+Hauser managers recently underwent 'unconscious bias' training. It's a kind of bias we all have without knowing it, which can hinder companies in their drive for diversity. Unconscious bias may lead hiring managers to instinctively select job applicants who closely match their own personalities, or stereotype applicants based on a particular trait or characteristic. "We reflected on our mindsets and scrutinized our behavior patterns," says Sandra Rubart, corporate director for brand management & communication.

Climate-conscious commuting

Plenty of people drive to work each day, frequently over long distances and alone in their cars. Not only does that overcrowd the roads, it also harms the climate: the average gasoline combustion engine emits 120 grams of carbon dioxide per kilometer. Several Endress+Hauser locations in Switzerland and Germany now use software to connect employees who have similar commutes. Forming car pools becomes quick and easy, the CO_2 footprint shrinks significantly, and there is the added benefit of getting to know new colleagues.

2023

The financial year at a glance

> We recorded strong organic growth in 2023, with individual markets and industries developing very differently. While growth in the Middle East was especially dynamic, business in the Americas and Europe also grew at an above-average pace.

Net sales

€3.72 bil.

(+11.0%)

Sales by region

Europe
€1,497 mil.
(+11.5%)

Americas
€953 mil.
(+13.7%)

Africa, Middle East
€155 mil.
(+39.0%)

Asia-Pacific
€1,114 mil.
(+5.2%)

Net income

€409 mil.

(+14.5%)

> We have invested 1.1 billion euros over five years in new production capacity and expanding our sales locations – all with our own financial resources.

Operating margin

15.4%

(2022: 14.2%)

Investments

€261 mil.

(2022: €240 mil.)

> Strong business growth enabled us to create new jobs around the world in all areas of activity.

Employees

16,532

(+715)

EcoVadis rating
Gold status

71/100

points

(2022: 76 points)

> While stricter reporting requirements led to fewer points in the EcoVadis sustainability ratings, we are still ranked in the top five percentile of our comparison group – and are continually working towards greater sustainability.

R&D ratio

7.2%

(2022: 7.2%)

> Expenditure on research and development grew at nearly the same pace as sales, meaning an unchanged R&D ratio.

Patent applications

257

(2022: 235)

> How did Endress+Hauser perform in the past year?

Strong growth

Sales for the Endress+Hauser Group once again showed a strong increase in 2023, underpinned in part by a record volume of orders in hand. This was despite foreign exchange effects costing us nearly four percent in growth. Momentum slowed in the second half of the year, but we were still able to maintain incoming orders at a solid level and close out the year once more with a high backlog of orders.

As a family company, Endress+Hauser has access to extensive strategic financial resources. Depending on how the capital markets developed, these resources have repeatedly had a strong impact on our result in the past. For this reason we will focus our future balance sheet reporting on the operative business. This leads to a significantly lower equity ratio. But as in the past, we are not dependent on external creditors and have reduced bank loans to nearly zero.

DR LUC SCHULTHEISS, CFO

Step-by-step progress

Although Endress+Hauser is in great shape, the company must continually change to stay successful. In an interview, Supervisory Board president Matthias Altendorf and CEO Peter Selders discuss the dynamic between continuity and transformation.

Questions: Martin Raab
Photography: Andreas Mader

Mr Altendorf, 2023 was your last year as CEO. How did Endress+Hauser perform?

Altendorf: Overall we had a good year, even though we still had challenges with the supply and logistics chains and had to contend with the upheavals caused by the energy crisis. Foreign exchange rates worked against us as well. We nevertheless experienced strong organic growth, improved our result, created jobs around the world and invested like never before.

What impacted the growth of the business?

Altendorf: Some customers reduced their inventories after the situation in the procurement markets had eased somewhat. We felt this impact in various areas, such as the food & beverage industry and machine engineering. In the chemical industry we're seeing a shift in investments from Europe to the Americas, Asia and the Middle East, as well as a relocation of production from China to Southeast Asia and India. Electromobility, renewable energy, resource efficiency and energy savings were once again the drivers of our business.

Dr Selders, you took over as CEO at the turn of the year. Will you be able to present similarly good numbers for 2024?

Selders: Incoming orders have weakened since mid-2023 to varying degrees, depending on the industry and region. We have not yet gotten past that. A lot therefore depends on a potential economic recovery in the second half of the year. But we started the year with a solid order backlog and our salespeople are doing everything they can to bring the numbers up. After years of double-digit growth, we will probably have to be satisfied with single-digit growth again.

What do you see as the challenges for the current year?

Selders: The first major issue for the Group will be to ensure growth and profitability. We are facing different challenges in different regions. In Germany we need to acquire new customers because some segments of industry are leaving the country. In the US the focus is on protecting the strong growth of recent years. And in China we need to position ourselves so that we remain successful in what is now a lower-growth environment. The second major issue is the planned strategic partnership with SICK. Assuming the negotiations are successful, this project will keep us extremely busy – integration of the sales organizations, collaborative innovation and production in a joint venture; something on this scale is new for us.

“The best solution can always be found by addressing an issue from various perspectives.”

Peter Selders,
CEO of the Endress+Hauser Group

How does the planned cooperation with SICK fit into the Endress+Hauser strategy?

Selders: I see it as a perfect fit, not only on paper but also from everything we learned during our discussions and visits. SICK and Endress+Hauser share a similar culture and many values. Both companies are people-oriented and act with a long-term mindset. In addition, we both see climate and environmental protection as an opportunity. And we have no overlap in our process industry portfolio. SICK’s products supplement our own, which allows us to support our customers even better.

Altendorf: Our customers must design their production for greater sustainability and a reduced CO_2 footprint. The planned partnership would allow us to offer them a comprehensive portfolio to address these challenges. Gas flowmeters and analyzers from SICK should help our customers to operate their plants more efficiently, make better use of resources and precisely monitor the environmental impact.

What remains to be done to make this cooperation possible?

Selders: There are still a lot of details to clarify, such as legal and business issues and how to integrate the IT platforms. Our goal is to have a seamless transition. The start of the cooperation must be completely unnoticeable to our customers. What’s crucial for us is that people are on board with the plan. We operate in a technology environment. Whether it’s innovation and production or sales and service, our success rests on our employees’ knowledge and skills. We have to inspire them and convince them to go down this path with us in order to complete the agreement. Openness and transparency is how we want to get there.

Altendorf: We must make it clear that this is not simply some acquisition. It’s about a long-term partnership between two successful family companies that can be even more successful together.

WELL PREPARED

Dr Peter Selders (54), who has a PhD in physics, took over as CEO of the Endress+Hauser Group in January 2024. Prior to that he worked at the product center for level and pressure measurement in Maulburg in southern Germany where he was appointed managing director in 2019. Inspired by mountain climber Rainer Petek, he says: “We overestimate our ability to plan things and underestimate our ability to deal with uncertainty.” A passionate hiker, he considers good preparation a must, not least when hiking in the mountains with his wife and five children.

Looking ahead, Dr Selders, in what direction do you want to develop Endress+Hauser?

Selders: First things first, Endress+Hauser is in excellent shape. We have no reason to abandon the path we are on. But of course as a company we can’t afford to stand still. To stay successful in the future, we must continually develop. As a family-owned company we are ideally situated to do this because we act with a long-term mindset and foster a culture of cooperation and solidarity. This culture will develop too, in order to preserve what defines and distinguishes us today.

What issues will keep you busy in the coming years?

Selders: Our two major issues are sustainability and digitalization: sustainability because unless we protect the climate and the environment, our planet will no longer be livable. But that can’t be solved through idealism and sacrifice alone. We must succeed in combining sustainability with economic advancement and achieving this at competitive cost. That applies to our customers just as it does to us as a company. Digitalization, the second big issue, is the key to a number of things. Those include sustainability as a means to consuming fewer resources and making smarter and more efficient use of them, and for dealing with the challenges of an aging society and the shortage of skilled labor. Digitalization is an extremely important enabler for us. It comes down to making the best possible use of all available technologies in our products, in our interaction with customers and in our internal processes, just the way we formulated it in our strategy.

How will you approach your responsibilities as CEO?

Selders: First off, I don’t consider myself a one-man show. I’m a team player and I always work together with people. I’m convinced that the best solution can always be found by addressing an issue from various perspectives. This is why I listen first to understand and work out what has to be done – and then

FIRMLY ROOTED

Matthias Altendorf (56) began his Endress+Hauser career with a mechanics apprenticeship, followed by studies, stays abroad and further education. He was appointed CEO of the Group in 2014 and president of the Supervisory Board in 2024. He balances his professional life by sailing, playing chess, riding his motorcycle and spending time doing forestry work. Travel, the arts and reading round out his hobbies. Matthias Altendorf is married and the father of a grown son.

“It’s also about supporting the generational change within the Endress family. This continuity is important for us.”

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

resolutely follow through. That sometimes requires more time and energy, but it produces a more enduring result. This is why it's important to get people on board. Every new development requires effort. Things seldom happen by themselves. It requires perseverance so that you don't give up. And success is much easier when you trust each other.

Mr Altendorf, you are stepping down after 10 years as CEO. What will you remember as your biggest success and your biggest defeat?

Altendorf: Shutting down the business in Russia was very painful for me personally. I took the job with the goal of never having to let employees go for operational reasons. We had to do exactly that in Russia and part ways with many good colleagues. Although it was obviously a consequence of Russia's invasion of Ukraine and Western sanctions, it was still my biggest defeat, if you will. We also went through two difficult crises during my time as CEO: the oil price crisis right at the beginning of my tenure and then later the coronavirus pandemic. We did an outstanding job of managing both situations together with our customers, employees and shareholders. And we were able to use them as an opportunity. Endress+Hauser emerged from both crises stronger and with momentum. I see that as our biggest success.

You will continue to have an active presence in the company as president of the Supervisory Board. How do you view your new role?

Altendorf: I will of course do everything I can to make sure Dr Selders gets off to a good start. And I will lead the Supervisory Board and maintain close contact with our shareholders. It's also about supporting the generational change within the Endress family. This continuity is important for us as a family-owned company. I will continue to travel, visit our entities and customers and represent Endress+Hauser. I want to remain close to the company, the people and the technology, not least so that I can understand decisions made by the Executive Board.

Endress+Hauser will no longer be taking up all your energies, though. What plans do you have for this next phase of your life?

Altendorf: Not to worry, I will continue to have a full working life just like before! Apart from my responsibilities at Endress+Hauser I teach, I'm active in associations and I also sit on other supervisory boards. Where my private life is concerned, I will have more time for my wife and hobbies.

Dr Selders, Mr Altendorf, what will be your personal challenges for 2024? What would you like to have achieved by the end of the year?

Selders: Together with my colleagues on the Executive Board and the entire Endress+Hauser team, I want to do a good job of managing a rather difficult year for business. If by the end of 2024 we can say that we have done our best under the circumstances and developed a bit further, then I will have had a good first year as CEO!

Altendorf: If we're successful in doing that, and if we find a good common path together as CEO and president of the Supervisory Board, then we will have done everything right!

BUNDLING STRENGTHS

Endress+Hauser and German sensor specialist SICK are seeking a strategic partnership. The companies signed a joint memorandum of understanding related to SICK's process automation business in October 2023. The goal of the partnership is to supplement the Endress+Hauser product portfolio with process analysis and gas flow measurement engineering from SICK. The sales and service teams working for SICK's process automation business will become part of Endress+Hauser's global sales network. A joint venture will be established for the production and further development of SICK process technology. This segment of the SICK business currently employs around 1,600 people and generates more than 350 million euros in annual sales.

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