



APPLICATION REPORTS2025

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Our customers have once again provided us with exciting insights: They explain how they have overcome challenges and successfully implemented innovative ideas thanks to our automation and digitalisation solutions.

So you can look forward to yet more inspiring reports on practical examples such as digitalised beverage filling, the way mobile robots use 3D camera technology to avoid obstacles, and leak testing of aluminium wheels.
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acs Attendorn
Digitalised press
monitoring



Maximum transparency during the pressing process

How development and series production benefit from stroke monitoring with “ifm SmartStamp”

Automotive Center Südwestfalen in Attendorn, Germany has been advancing efficient, sustainable and technologically advanced production processes for more than a decade as a research facility and service provider for the supplier industry and OEM. “ifm SmartStamp” press monitoring software from the automation specialist ifm, is used on a servo press.

Automotive Center Südwestfalen (acs) aims to support customers with bundled development expertise, to harness synergies and thereby relieve the individual companies of financial and time burdens. acs provides comprehensive capacities in various areas such as virtual development, joining technology, plastics technology, forming technology and component testing.

Different forming shapes in quick succession

“For forming technology, we can use our servo press with its pressing force of 1,000 tons to carry out all the forming tests relevant to the automotive sector, as well as process development, prototyping and small series production,” says Jan Böcking, who heads the forming technology department at acs.

“In addition to cold and hot forming of steel and aluminium, we can also form fibre composites. The advantage of servo technology is the high flexibility with which we can carry out the forming processes. This enables us to carry out forming processes using force or displacement control. This allows us to precisely adapt the speed profile to the different forming processes.”

Precise analysis for efficient development

To further increase the precision of the results and to gain an even better insight into the force progression of a test, in 2023 acs equipped its servo press with additional sensors and the “ifm SmartStamp” software.

“At acs, we generally do not carry out series production but prototype runs with a few strokes. To efficiently advance the development of the component and the forming process, the tested component and the pressing process itself are evaluated after each stroke,” says Böcking. “We previously lacked the appropriate sensors and software to give us a comprehensive view that would enable us to precisely analyse and evaluate each individual stroke. ifm’s press monitoring software now enables us to do exactly this.”

Minimal integration effort, high ROI

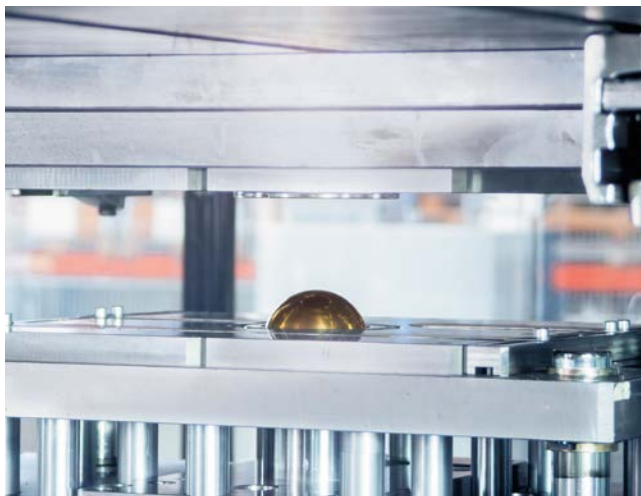
With “ifm SmartStamp”, the automation specialist ifm offers a software tool that detects tilting, eccentricity and the resulting tilting moment on forming presses within milliseconds. The plant operator is promptly alerted if the press moves outside the target range.

“If the ram is tilted too far, the press guides are subjected to excessive strain and are damaged in the long term,” says Christoph Schneider, Vice President Product Management Applications at the automation specialist ifm.



The test specimen shows the crack formation typical of the Nakajima test. The targeted overloading of the material provides information about whether it can be formed into an automobile part, for example.

The formability of metal sheets is investigated at acs using the standardised Nakajima test. Standardised samples are deformed using a hemispherical punch until the sample cracks.



” The advantage of moneo is that we have access to the process data and status data of the press from every single workplace. We can, thereby, effectively prevent serious damage to the press and tool.

“Damage to the bearings or gears and cracks, for example in the head of the press, can also result. Due to design reasons or misalignment during a tool change, the press may also be subjected to an off-centre load, which increases the tilt torque. With ifm SmartStamp, this incorrect loading and its costly consequences can be prevented with minimal effort. To use the software effectively, just four high-precision position sensors need to be retrofitted to all four press stands to detect the tilting.”

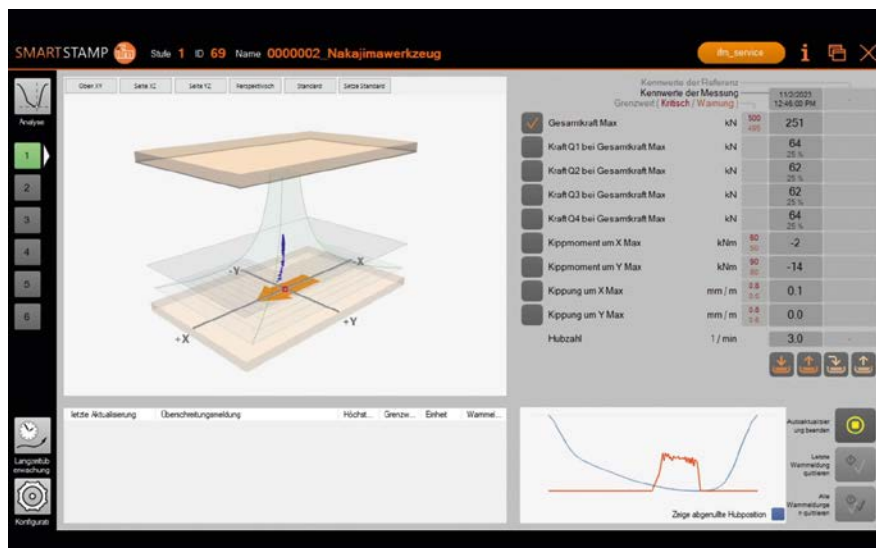
Existing sensor data is included in the calculation

Data from the force sensors that are usually already installed, and information on the tool number and stroke rate, which can be read via the control system, are also incorporated into the software.

“In ifm SmartStamp, all this data and values are processed into clear, meaningful information. This means that the machine operator can see during the first stroke cycle whether, for example, the tool is correctly mounted or whether adjustments need to be made,” says **Schneider**.

Precise analysis, stroke for stroke

acs also makes use of these precise readings for each individual stroke, as **Böcking** explains: “This exact data helps us



The force curve during the pressing process can be precisely tracked in the ifm SmartStamp software. The software can be easily and seamlessly integrated into ifm's moneo IIoT platform.

to precisely analyse the actual pressing process and how the material and tool behave in the prototype tests. This allows us to make changes for each stroke and immediately understand the effects on the tool and workpiece. We can also reuse the recorded data in a virtual simulation, which brings the real process and IT-supported simulation closer together."

Seamless integration into the moneo IIoT platform

Data analysis is simplified by ifm's moneo IIoT platform, into which ifm SmartStamp is seamlessly integrated.

"The advantage of moneo is that we have access to the process data and status data of the press from every single workplace," says Jan Böcking. "moneo's alarm function allows us to react in real time if the defined limits are exceeded and, in an emergency, stop the press. Therefore, we can effectively prevent serious damage to the press and tools."

Eleven modules for the complete, digital overview of the press

In addition to the software for analysing the actual pressing process, ifm offers ten additional software modules that can be seamlessly integrated into the company's moneo IIoT platform.

"We offer modules for monitoring hydraulics, compressed air and the lubricant circuit," says Christoph Schneider. The main drive – whether servo drive, hydraulic drive or conventional drive – can also be monitored using a software module. "The user can integrate the existing sensors into the software to generate the data; alternatively, we offer the appropriate complete hardware and software solutions. This gives the operator of the press the option to easily monitor all the system components directly and indirectly involved in the pressing process through a centralised, meaningful complete overview and to have them evaluated independently or automatically by our AI tools," says Christoph Schneider.

acs aims to create a digital twin

Automotive Center Südwestfalen is also aiming to create a full digital map of the press, as Jan Böcking emphasises: "Our goal is to make more and more use of the advantages of digitalisation and to map out process-related digital twins. With the SmartStamp software, we have now taken the first step in precisely recording the press kinematics and pressing forces. In the future, we would like to record all process-relevant variables in real time and use them to actually validate the processes and accompany each product with a digital twin from the

very first moment of development, to be able to make assertions about the limits of the forming and the sustainability of moulded parts even more precisely and by using fewer materials. We expect many benefits to come from this for us and our customers – both in terms of development speed and in terms of saving resources."

Conclusion

The ifm SmartStamp software enables Automotive Center Südwestfalen to analyse pressing processes even more precisely. As a result, the competence centre is taking a significant step towards its goal of carrying out forming processes for material research and product development even more efficiently. The software is also an essential building block on the path to creating a digital twin.

AWO Siegen

Labour market inclusion
with ifm mate



Inclusion through digitalisation

How the worker assistance system ifm mate facilitates access to the regular labour market for persons with disabilities

The Arbeiterwohlfahrt (AWO, workers' welfare association) in the German district of Siegen-Wittgenstein uses the worker assistance system 'ifm mate' to qualify persons with disabilities for manual tasks requiring a zero-defect quality level and to integrate them into the regular labour market. The project is a tangible example of how technological innovation and social commitment can go hand in hand to foster real change and create a more inclusive world of work.

”For us, the decisive factors for choosing ifm mate were the ease of use, the greatly reduced installation effort and the good visualisation during operation.

AWO in Siegen-Wittgenstein operates six sheltered workshops that not only employ people with disabilities, but also help them prepare for the regular labour market.

“Inclusion is a statutory requirement, but above all a social concern: Through targeted support and qualification, our workshop employees and training participants are empowered to enter and stay in the general labour market, while also experiencing strengthened social inclusion,” says **Michael Dietermann**, Operations Manager at AWORK.

Assembly and packaging tasks, which require a zero-defect quality level in production, pose a particular challenge. People with cognitive and mental health impairments often struggle to complete complex workflows without errors that require a high level of accuracy and very close attention.

ifm mate – developed out of own needs

For such tasks, “AWORK”, an organisational unit of AWO in Siegen, uses the ifm mate worker assistance system. The automation specialist ifm originally developed the system for in-house use to support its own production staff at manual assembly and packaging workstations. It facilitates the daily routines while also helping new and existing employees to familiarise themselves with new workflows. The aim was to develop an easy-to-use system without compromising on functionality.



ifm mate as a complete solution: Camera (above the workstation), software and PC can be easily extended with a touch screen, a signal lamp (bottom right) and an O2D5 vision sensor (far left, mounted on crossbar).



An easy-to-use and comprehensive solution

ifm offers the worker assistance system ifm mate as a complete solution. It includes a 2D/3D camera which records both video and 3D images and a box PC with a powerful software program at its heart that uses artificial intelligence to precisely detect the position, height and orientation of the worker's hand. This information is compared with the stored manual workflow. Visual step-by-step instructions on the screen guide the user through the production process. Unlike other systems on the market, ifm mate does not require any additional gadgets such as tracking wristbands to detect the worker's hands reliably.

Handling in preparation has also been simplified for ease of use. The positions of containers with components can be defined in the system via touch screen. Depending on the process requirements, the user can then choose between fixed-order processes with a fixed sequence of work instructions and free-order worker guidance with any sequence of work steps. Mixing both sequence types is also possible. Through step-by-step guidance, workers can complete even complex tasks with zero errors. The system not only displays the individual work steps clearly, but also recognises deviations and immediately alerts the user. The worker can rectify errors instantly and independently, which significantly increases the

quality and improves the learning curve. For even more effective quality control of the workpieces, an O2D vision sensor can be integrated into ifm mate, e.g. to analyse object surfaces and contours and determine if the components are assembled correctly.

"For us, the decisive factors for choosing ifm mate were the ease of use, the greatly reduced installation effort and the good visualisation during operation," says Michael Dietermann. At "Siegener Technik Service" (STS), a sheltered workshop that currently employs 130 persons with chronic mental illnesses, two systems are used.

"Thanks to our well-equipped CNC area, we can offer nearly everything a metal-working company on the regular labour market offers," says Thorsten Mieske, Production Manager at STS. "Another focus of our work is electrical engineering, where we cover a wide range of services from cable assembly to control cabinet construction. Thanks to ifm mate not only our clients can complete more complex tasks independently. The group leaders are relieved as well as the time for checking is considerably reduced. This frees up more time for the core tasks."





Left photo: After successful contour verification by the O2D5 vision sensor, the system provides positive feedback to the worker in the form of a green frame around the inspection image.

Right photo: If a deviation from the specified process occurs, the worker is instantly alerted. The digital process is stopped until the worker acknowledges the error message. The process then continues, starting with the previously faulty step.

Easy to (dis)assemble: STS has developed a mobile workstation solution to also be able to support its clients in the field.

Inclusion through mobile, network-independent assistance

Before working at the actual production premises of the customer, ifm mate helps the workshop employees prepare for the job through targeted training.

"The employees can familiarise themselves with the workflows in a sheltered environment without being involved in the production process right away," says **Michael Dietermann**.

"This helps them gain confidence and trust in their ability to get the job done."

STS also uses the worker assistance system at the customers' premises to support its clients.

"The mobile version can be set up at different workstations with little effort. The system runs independently without having to be connected to the customer's network. All it needs is an electric power supply. This means that we can use ifm mate flexibly for different use cases and support the inclusion of our clients holistically," says **Michael Dietermann**.

A vital contribution to the labour market

The cooperation between AWORK and ifm creates an ideal symbiosis of two fields of interest: The industry needs skilled staff to achieve a zero-defect quality level and AWORK can train and deploy its employees for precisely this purpose.

From the very beginning, the ifm experts maintained a close cooperation with AWORK: *"From the moment we got in touch with ifm, we noticed a high level of customer focus,"* confirms **Michael Dietermann**. *"After we had made the decision to adopt ifm mate, we always had direct access to ifm's experts, who also came promptly to support us on site. We never felt that we were on our own. This allowed us to quickly familiarise ourselves with the system, and we are now able to use it independently."*

Conclusion

Thanks to the ifm mate worker assistance system, AWORK in Siegen can fulfil its social mission even better. People with disabilities can optimally prepare for, and successfully participate in, the general labour market with the help of innovative technology. Industrial companies gain qualified, digitally supported staff for production tasks that require a zero-defect quality level – a win-win model that not only sustainably improves the world of work, but also the social inclusion of people with disabilities.



"From the moment we got in touch with ifm, we noticed a high level of customer focus. After we had made the decision to adopt ifm mate, we always had direct access to ifm's experts, who also came promptly to support us on site."



Coca-Cola

Digitalised filling down
to the sensor



Coca-Cola digitalises down to the sensor

Predictive maintenance using ifm IO-Link sensors.

Coca-Cola, the world's largest beverage producer, operates over 50 filling plants in Western Europe alone. To address maintenance and faults quickly and precisely, the group is digitalising all filling systems and developing a digital twin for this purpose. This enables production processes to be monitored in real time and optimised immediately if necessary – even remotely, from anywhere in the world. Coca-Cola works closely with the automation specialist ifm to develop the necessary reliable sensors.

Edelstal in Austria is home to one of the flagship locations. *"We are a licensed filling plant for Coca-Cola and fill almost all products here,"* explains **Christian Kohlhofer**, Plant Manager, Coca-Cola HBC Austria.

Filling over 500 million litres of beverages each year, the plant is one of the group's largest.

"We are increasingly focussing upon automation and digitalisation. Much of what we implement is also later implemented by the group's other plants," says **Christian Kohlhofer**.

The plant in Edelstal also operates as a contingency plant: if production bottlenecks occur at other locations, the Austrian plant can step in to help.

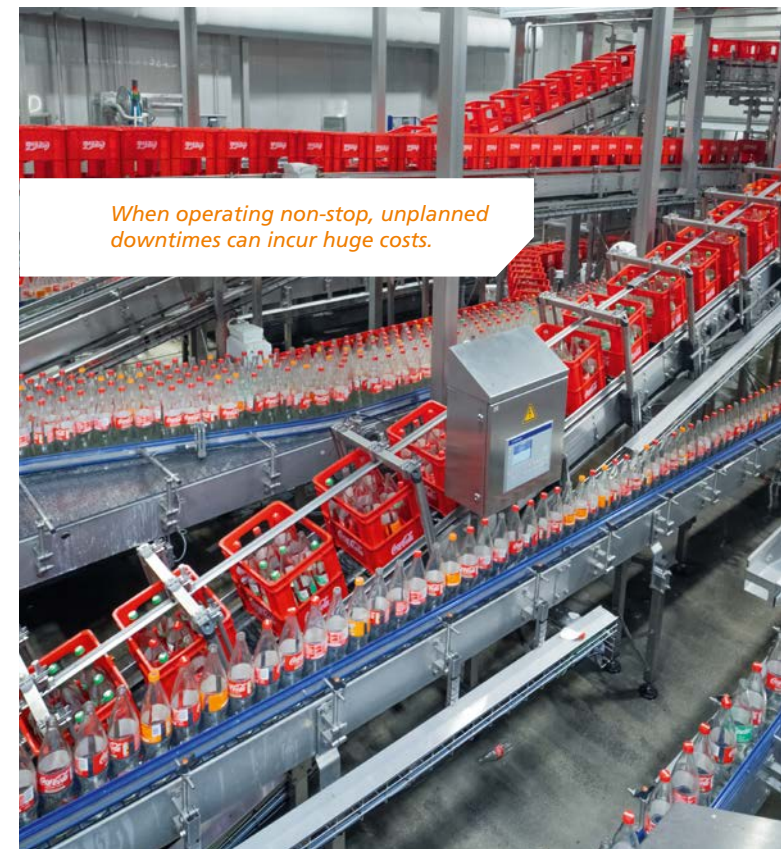
Condition monitoring prevents unplanned downtimes

System availability is a top priority for the international beverage producer. *"At our location, we pick up on every single system downtime immediately,"* explains the plant manager.

The plant follows the principles of just-in-time manufacturing, rather than working to stock. This is why predictive maintenance with condition monitoring is so important. In other words, the condition of machines and systems is constantly monitored so that maintenance can be carried out exactly when it is needed. Real-time sensor data is used to promptly recognise wear, tear and other maintenance requirements. The aim is to avoid unplanned downtimes, reduce maintenance costs and extend the service life of the systems. Modern technologies such as IO-Link, IoT (Internet of Things) and machine learning enable maintenance work to be planned to take place at exactly the right moment – not too soon and not too late.

"The numerous installed sensors enable us to significantly increase system availability," says a delighted **Kohlhofer**.

"Maintenance is no longer time-based, but condition-based. This significantly reduces our costs."



When operating non-stop, unplanned downtimes can incur huge costs.

A close-up, perspective view of a row of industrial valve sensors. Each sensor is a black, rectangular unit with a yellow circular logo and a yellow cable. They are mounted on a metal structure. In the background, several green status lights are visible, indicating the sensors are powered on. The image is slightly blurred, emphasizing the sensors in the foreground.

IO-Link-capable valve sensors not only detect the flap position, but also recognise wear, blockages or build-up on the valves, thereby supporting preventive maintenance.



A wireless vibration sensor on the circulating pump for reliable, intermittent monitoring of the total vibration in accordance with DIN ISO 10816.

IO-Link sensors monitor complex processes

Sensors with an IO-Link interface are the first choice when it comes to digitalising systems. These intelligent sensors use a standardised, bidirectional communication interface to communicate with controllers and other systems. In contrast to conventional sensors, they not only enable the exchange of simple switching signals, but also of extensive process data and diagnostic information. Because the transmission of the measured values is digital and not analogue, it is also interference-free and accurate, as no conversion losses occur as with analogue transmission.

The sensors are easy to install and configure and provide precise data in real time. Acyclically retrievable diagnostic data such as minimum or maximum values, pollution degree or errors such as wire breaks or short circuits optimally support condition-based maintenance.

IO-Link sensors also ensure high flexibility and efficiency in automation. Their high level of compatibility allows them to be seamlessly integrated into existing systems and easily integrated into the IT level through digital communication.

One example is the use of IO-Link vibration sensors in the can sealing process. *"Quality in the can sealing process is a matter of thousandths of a millimetre,"* explains **Gerhard Wieszmüllner**, Maintenance & Spare Parts Manager at Coca-Cola HBC Austria. *"The ifm predictive IO-Link sensors enable us to detect the smallest vibration deviations and thereby guarantee a completely, permanently sealed can."* ifm's IO-Link valve sensors are used on the bottle washing system flap valves.

"We notice in advance if a flap seal is broken or needs to be replaced – without any loss of material," says **Gerhard Wieszmüllner**. *"This means, for example, that we don't need to drain any alkaline baths and can thereby avoid protracted machine downtimes. This saves time and money."*

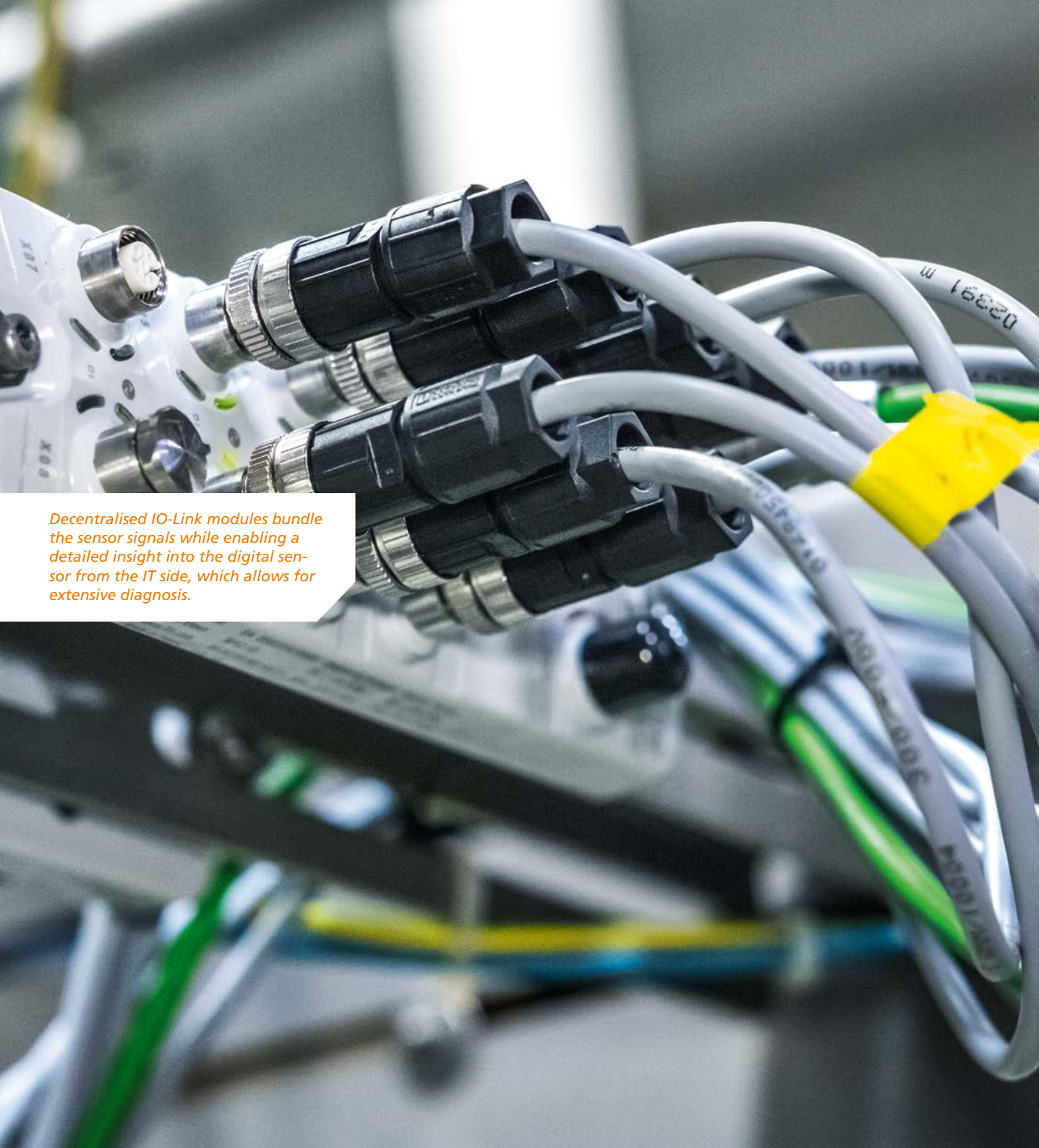
Digital twin via the Y path

All of the system's sensor data is recorded in order to accurately assess the condition of the machines and their components. The Y-path is used to split the sensor data into two paths in real time: the first path transmits the data to the PLC, which

handles the conventional control and regulation of the system. At the same time, the digital sensor data is channelled into the IT level via a second path. At Coca-Cola, the signals from the numerous sensors are automatically transferred in this way to the "Pocket Factory" IT platform. As a digital twin, this virtual image mirrors the real system exactly and is continuously updated with real-time data.

Digitalisation down to the sensor level gives Coca-Cola full transparency over its global production. The digital twin, based on data from ifm's IO-Link sensors, enables condition-based maintenance of the systems. Machine learning and artificial intelligence are used to promptly predict wear, production errors and other anomalies in the process.

"This data enables us to carry out the right maintenance measures proactively and at the optimum time to ensure product quality," explains **Wieszmüllner**. This prevents unplanned downtimes, minimises costs and guarantees high quality standards.



Decentralised IO-Link modules bundle the sensor signals while enabling a detailed insight into the digital sensor from the IT side, which allows for extensive diagnosis.



LED signal lights provide a quick overview of the machine status on site.



Maximum transparency: The digital twin allows global access to the filling system right down to the digital IO-Link sensor. Anomalies are promptly detected.

Another important aspect of digitalisation at Coca-Cola is sustainability. By using digital technologies, the group can reduce its ecological footprint. For example, the precise monitoring and control of production processes enables more efficient utilisation of resources such as water and energy. This not only benefits the environment but also helps reduce costs.

Cybersecurity requirements met

Cybersecurity plays a central role in a production plant such as Coca-Cola's, as it is not only important to protect sensitive company data, but also to protect critical production processes from unauthorised access and manipulation. The increasing networking of machines and systems in Industry 4.0 increases the risk of cyberattacks on infrastructures. A successful attack could not only result in production downtime, but also considerable financial damage or loss of reputation. Plants also often use systems that process production-critical data for quality assurance or to increase efficiency, for example. Protecting this data ensures that company secrets are safeguarded and

processes run securely and stably. In a highly regulated environment such as Coca-Cola's, all components, including sensors, must meet strict cybersecurity requirements to ensure the safe operation of the plant and the integrity of production.

"In collaboration with our internal cybersecurity team, ifm has found ways to comply with all standards," praises Plant Manager **Christian Kohlhofer**. *"Data is stored, processed and analysed in such a way that all cybersecurity guidelines are adhered to."*

Close partnership with ifm

Coca-Cola has been working closely with ifm as automation partner at its Austrian site for many years. Plant Manager **Christian Kohlhofer** praises this partnership: *"ifm's slogan is 'Close to you'. This fits in with our company value 'We over I'. We work together well and are both keen to find quick solutions,"* says the manager. *"ifm is always there when you need it and the response time is extremely fast when there are problems."*

Conclusion

Digitalisation and automation at Coca-Cola is an ongoing process that is steering the group into the future. By using state-of-the-art technologies and working closely with partners such as ifm, Coca-Cola can increase efficiency, optimise its production processes and ensure the quality of its products. Simultaneously, digitalisation is helping to improve sustainability and reduce environmental impact. The clear focus upon innovation and continuous improvement means the partnership between Coca-Cola and ifm is ideally equipped to continue successfully into the future.



CVA

Digitalised hydroelectric
power plants



Using the power of water efficiently

The energy company CVA relies on condition monitoring solutions from ifm

The energy company Compagnia Valdostana delle Acque (CVA), based in the Italian Aosta Valley, generates electricity from renewable sources, in particular by harnessing the power of water. The energy is generated mainly in the region's 32 hydroelectric power plants with a total capacity of over 900 MW, to which more than 800 MW of wind and photovoltaic capacity will be added by 2027. To ensure reliable operation of all remote-controlled power plants, the company relies on sensors and software from the automation specialist ifm.

Since its foundation in 2001, CVA has generated an average of around three billion kilowatt hours of electricity per year. The hydroelectric power plant with the highest annual production is the Valpelline power plant, which was built in the 1950s and is fed by the Place Moulin reservoir. A 155-metre-high dam closes the lake, which has a usable capacity of 93 million cubic metres of water. Due to the 1,000-metre difference in altitude between dam and power plant, the water reaches the turbines through the pipeline at a pressure of 100 bar.

Systemic network

The hydroelectric power generated in this way is sufficient to drive two 65-megawatt turbines that produce up to 330 gigawatt hours per year. These performance data make the Valpelline power plant important not only for supplying energy to the population in the Aosta Valley, but also for Italy's strategic energy plans: the fact that it can be started up in the event of a blackout make it one of the power plants that would help restore Italy's 220-kilovolt grid in such a scenario.

No possible malfunction must go undetected

All the more reason for CVA's engineers to guarantee the functionality of this and other CVA power plants at all times, as **Antonino Sannolo**, who is the engineer in charge of the Electromechanical Engineering Division of the Operations Department, points out. „Among other things, our department is responsible for the maintenance of around 70 hydroelectric power generators. To be able to plan maintenance work accurately, we need to know the condition of the plants at all times. For this purpose, we carry out non-destructive tests on the main mechanical components, as well as thermal inspections, electrical protection measures, electrical checks on the generators and vibration tests on the turbine supports. Any developing fault going undetected could lead to machine failure and therefore economic loss.“

”With the help of companies such as ifm, we are now in the process of digitalising all of our plants in order to reduce the monitoring effort and the need for on-site inspections.“

Condition monitoring through retrofitting: numerous sensors on turbines and power generators record the vibration behaviour of rotating components as well as the temperature, pressure and flow of coolants.

Control and monitoring system standardisation

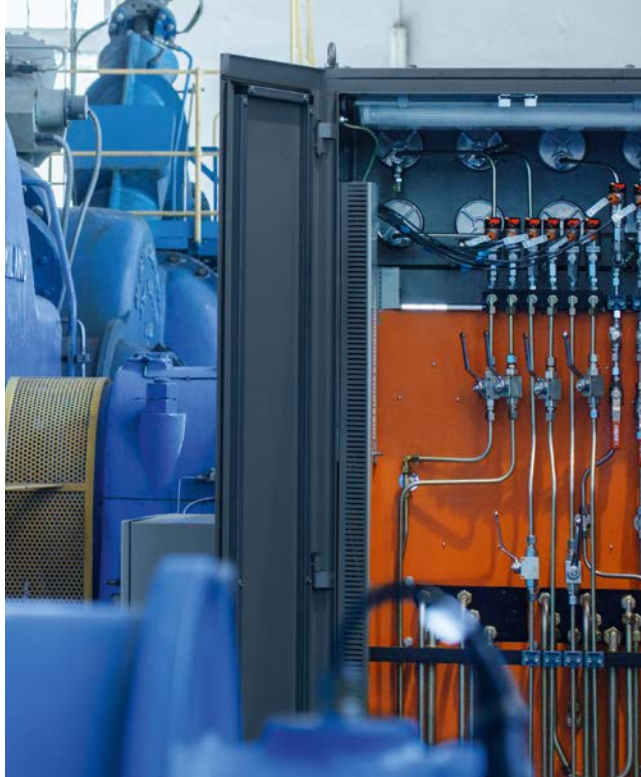
The main challenge of these tests lies in the geographical location of the hydroelectric power plants, which cover the entire Aosta Valley - an area of around 3,200 square kilometres.

„The generators are also not always easily accessible and some of them were built in caves in the mountains,” explains Sannolo. „With the help of companies such as ifm, we are now in the process of digitalising all of our plants in order to reduce the monitoring effort and the need for on-site inspections.”

In this respect, the existing control and monitoring systems of 22 hydroelectric power plants in the Aosta Valley are to be upgraded in a standardised way and made centrally available at IT level. In line with this goal, the Valpelline power plant has already been equipped with vibration sensors from ifm in order to keep a close eye on the maintenance requirements of the turbines and power generators at all times. Additional sensors monitor the pressure and temperature of the coolant.

The cooling circuit and water supply are also monitored

CVA is also already using state-of-the-art digitalisation solutions in several of its plants. At the Covalou site, for example, many important plant data are recorded by ifm sensors and transmitted to the IT level in order to ensure the operation of the 41-megawatt hydroelectric power plant built in 1926. In addition to temperature and pressure, the coolant flow is also monitored here. Combined with the data from the vibration sensors, a precise overview of the plant's condition can thus be obtained.



Some of CVA's hydroelectric power plants are almost 100 years old, others are difficult to access and all are scattered throughout the Aosta Valley.

IIoT platform: centralised data analysis and alarms

CVA also relies on state-of-the-art systems at the IT level. One example of this is moneo, ifm's IIoT platform. It not only enables central parameter setting of IO-Link infrastructures and the use of transmitted sensor data for process optimisation.

moneo|RTM also evaluates the data from the vibration sensors and alerts the plant operator if pre-set thresholds are exceeded.

„With moneo, we are able to collect a wide range of data that allows our technicians to analyse all vibration trends in real time,” explains Sannolo. „Over the past few years, we have developed a new analysis method that essentially consists in reducing on-site condition checks to a minimum, using them only when the online test systems indicate a fault.”

Long-term goal: predictive maintenance

Integrating all this data into a centralised system allows CVA's technicians and engineers to track and compare all information more easily at any time. *„We transfer all this sensor information into a database. In the long term, we want to create genuine predictive maintenance. We believe that the starting point for this ambitious goal is the implementation of a good vibration analysis.”*

With the **moneo|Industrial AI Assistant**, ifm already offers the possibility of using artificial intelligence to monitor the health status of plants very precisely and to react even earlier to imminent damage. To do this, the tools use historical data to learn the normal state of the plants. Drawing on this knowledge, SmartLimitWatcher can precisely monitor the dynamic oscillation behaviour, while PatternMonitor examines individual values of relevant data – such as temperature, pressure or flow – for rising or falling trends, increasing volatility or jumps.



Reliable sensors even in challenging environments

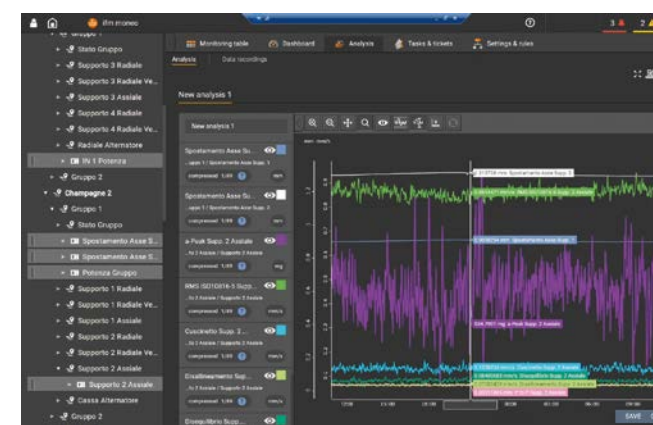
„Overall, we are very satisfied with the products from ifm. During the tests and in operation, we have found that they are suitable for use in industrial environments such as ours,” summarises **Manuel Bonjean**, contact person for the automation of CVA's hydroelectric power plant.

„The sensors work perfectly in humid environments, such as those found in our hydroelectric power plants, and also in the very low temperatures that often prevail in Alpine winters. The solutions from ifm enable us to monitor our systems increasingly better. Moreover, we have also been able to standardise the sensor technology used in all our hydroelectric power plants, which has significantly reduced the number and variance of spare parts in stock. This relieves our budget and makes maintenance planning much easier for our maintenance department.”

Antonino Sannolo adds: „At first we only bought components from ifm. When we then realised that we could also obtain a turnkey system from them, as well as the expertise for IT-based vibration analysis, we decided to work even more closely with ifm and to carry out the installation and commissioning on site together. The fact that we can still rely on their expertise and support even after all the systems have been implemented, is certainly something that not every system supplier can offer in this form.”

Conclusion

With the help of effective, integrated digitalisation solutions, ifm is supporting the energy company CVA in operating the plants that are necessary to supply the population and companies in the Aosta Valley with sustainably generated electricity - reliably and permanently.



The data from all ifm diagnostic electronics is collected centrally at the IT level, where it is analysed with moneo, the IIoT platform from ifm.



Danone

Digitalisation of
a new oat drink plant



Oat drink production: into the future with AS-i and IO-Link

Danone relies on digitalisation solutions from ifm to modernise
a production plant

Danone is one of the world's leading suppliers of dairy products. The ever-growing consumer demand for plant-based beverages, which Danone also offers to markets worldwide, prompted the company to convert one of its largest plants in France from dairy production to that of oat drinks.

Thierry Pasquet is the director of the Danone plant in Villecomtal-sur-Arros and explains the reasons for converting the plant: "80 per cent of our customers say they want to change their diet from animal to plant-based proteins. We would, of course, like to take this into account by increasing our capacity for producing oat drinks. The decision also contributes to Danone's global corporate goals of reducing CO₂ emissions and water consumption by 80 per cent."

The company has invested around 50 million euros in the plant in southwest France. "When modernising the production facilities, we opted for the best technologies available on the market to ensure that this investment and the plant itself will last for decades to come," says Pasquet.

Digitalising the future with ifm

From storage tanks to pipelines, valve islands and CIP systems, everything was switched from milk to oats – and all within twelve months.

"During this period, all the old equipment had to be dismantled and rebuilt at other locations," says Sébastien Peres, who is responsible for automation at the plant.



The striking yellow AS-i flat cable runs through the entire process chain. The information from Definox's Sorio valve control heads is also transmitted seamlessly.



AS-i meets IO-Link: The two digital communication technologies can be ideally networked with each other, harnessing the benefits of both. Here for example, flow, pressure and temperature are transmitted to AS-i via IO-Link.

"At the same time, the new plant components for oat drink production, including automation technology, were gradually installed."

It was no coincidence that ifm was chosen as the automation partner for the plant's modernisation. Danone has been working with ifm in Villecomtal-sur-Arros for around twenty years. *"So it was almost logical that we would work together again on this project."* For digitalisation, Peres' team, supported by integrator Boccard, relied on two automation technologies: AS-Interface (AS-i for short) and IO-Link.

"Compared to a conventional wired system, we benefit from simple cabling with AS-i and IO-Link. AS-i enables us to lay the cable over long distances and flexibly connect sensors wherever we need them," says Peres.

Danone also uses AS-i Safety for the entire management of safety-related sensors, which monitor, for example, whether manholes or other process access points are correctly closed.

AS-i – digital data transmission over long distances

A key characteristic of AS-i is the yellow, two-core flat cable, which can be laid over distances of up to 1,000 metres and in both line and star topologies. By adding fibre optics, distances of up to 3,000 metres can be overcome. Sensors and actuators can be easily connected to the flat cable at any point using AS-i modules and insulation displacement technology. Optionally, actuators with higher power requirements can be supplied with additional energy via an additional 24-volt flat cable that runs parallel to the data cable and through the modules. A further benefit of AS-i technology is the IO-Link connection option. Special field-compatible IO-Link masters bundle the digital signals from the IO-Link sensors and forward them to the AS-i level.



The LDL200 conductivity sensor ensures the correct, efficient execution of the CIP process.



” *The IO-Link sensors offer us many more diagnostic options than conventional automation systems, which results in a high level of process transparency.*



Interface between OT and IT. The control cabinet contains AS-i power supply, safe AS-i output modules and AS-i Ethernet/IP gateways.

IO-Link – greater transparency and more data per measuring point

"IO-Link technology was new to us. But we were happy to take the step towards digital data transmission for future-proofing and operating the plant as efficiently as possible," says Peres. "The IO-Link sensors offer us many more diagnostic options than conventional automation systems, which results in a high level of process transparency. We also benefit from simple cabling with standardised M12 connectors."

Many IO-Link sensors transmit additional data and information in addition to the actual measured value. For example, a pressure sensor can also measure the temperature at the measuring point. Flow meters transmit the current flow rate, pressure, temperature of the medium and total flow as digital measured values via IO-Link. Another useful feature of IO-Link is the option to store the parameters of a sensor on the IO-Link master that the sensor is connected to.

"This makes it very easy for us to replace the sensor if it becomes defective. Thanks to the automatic transmission of the stored setting parameters to the new sensor, sensors can also be replaced by non-specialist colleagues." This relieves the burden on specialists, who can now concentrate on their core tasks thanks to the simple replacement process.

Those responsible at Danone also brought external expertise on board to assist with selecting the initial sensors: *"With our integrator Bocard and ifm as automation specialist, we have set standards for all the necessary sensors for measuring pressure, temperature, flow and conductivity,"* says Peres.

"By working closely with ifm, and thanks to the comprehensive range of product variants available, we were able to ensure that we always use exactly the right type of sensor."

Thanks to the many years of close cooperation between Definox and ifm, the seamless integration of Definox's Sorio valve heads, which are also used in the modernised system, via AS-i and IO-Link is ensured.

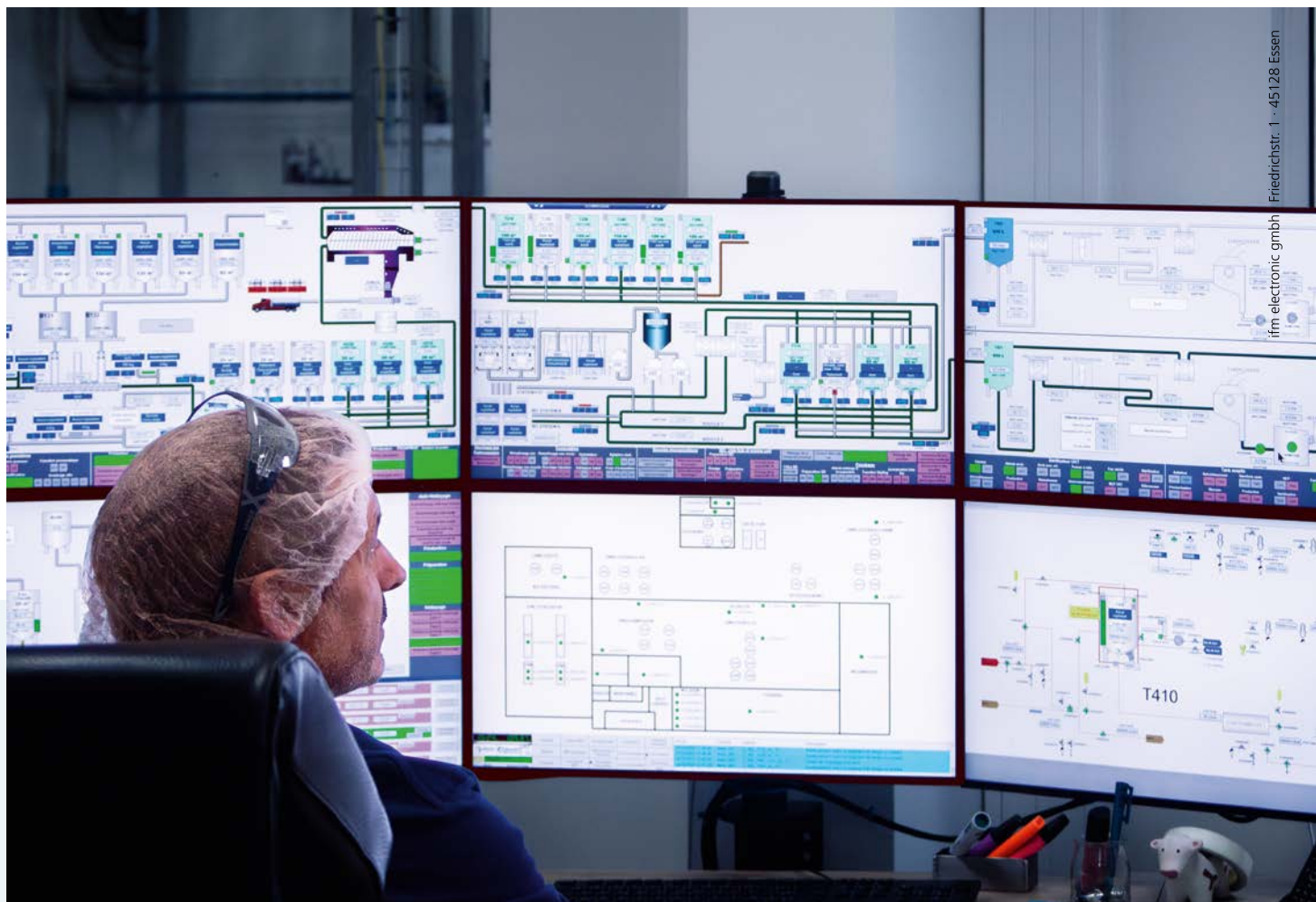
Digitalisation and conversion to oat products successfully implemented

Production of oat-based drinks has now started. All information can be monitored centrally in real time.

"As a result of the digitalisation, we are kept informed about all processes and key figures. This allows us to react quickly to deviations," comments Peres. *"This helps us to produce efficiently, safely and, therefore, with the required high quality. Overall, we are very satisfied with the implementation of the digitalisation project. The positive cooperation has met all our expectations and requirements for a project of this scale."*

Conclusion

As a long-term automation partner of the plant in Villemontal-sur-Arros, ifm was able to use its expertise in food production to support Danone in the modernisation and conversion from dairy production to the that of oat drinks. The close customer contact emphasised in the slogan "ifm – close to you" has also been reflected in this project.



Centralised process monitoring: Thanks to digital communication via AS-i and IO-Link, the entire process can be monitored centrally.



Ford-Werke Plant

Comprehensive plant
monitoring



Ford Cologne: increased energy efficiency with mioty

ifm's wireless monitoring solutions also boost system availability

The Ford plant in Cologne's Niehl district has been manufacturing vehicles for the global market since 1930. The Electric Vehicle Center has been one of the car manufacturer's most modern production sites since 2023.

Reducing energy consumption, avoiding emissions and using resources efficiently are key to further reducing the plant's energy and emissions footprint. The plant's paint shop also has its part to play, relying on sensors from automation specialist ifm – and on mioty wireless technology – for essential data acquisition.

Detecting wear and tear on conveyors

The car bodies have to travel a fair distance within the paint shop: after arriving, they are cleaned, then protected against corrosion through phosphating before receiving a final coat of paint. The body parts are then transported to the assembly floor on conveyors. These are powered by motors that have to constantly function reliably.

"We monitor the condition of the motors using ifm vibration sensors. This enables us to promptly identify impending damage and to utilise planned downtimes for maintenance," says Stefan Blatt, responsible for Condition Based Maintenance at Ford-Werke GmbH. "We also measure the electricity consumption of the motors. If this increases, it is an indicator of wear or insufficient lubrication of the conveyor chains. Continuous, combined monitoring enables us to carry out maintenance work in a targeted, timely manner, thereby extending the service life of the systems and reducing operating costs."

mioty: Wireless data transmission through concrete and steel

The electricity consumption is recorded via Sentinum's Hyperion electricity meter. The ifm subsidiary specialises in wireless sensors for smart buildings and production facilities through to fully networked smart cities. Sentinum's portfolio ranges from level sensors, floor monitoring systems, tracking sensors, through to electricity meters. All sensors are equipped with common Low Power Wide Area Network (LPWAN) technology, including mioty, an extremely robust wireless system that transmits data over several kilometres – or, in the case of Ford, through several thick concrete ceilings and steel structures.

"We monitor the condition of the motors using ifm vibration sensors. This enables us to promptly identify impending damage and to utilise planned downtimes for maintenance."



*Important mode of transport:
defects on the conveyor would result in costly downtimes.*

*"Using mioty has brought us many benefits," explains **Stefan Blatt**. "Starting with installation complexity. In the first test phase, we installed a mioty gateway in the paint shop, covering a large part of our work area. In total, the paint shop covers around 60,000 square metres, spread over the ground floor, first floor and top floor, separated by a great deal of steel and concrete. For example, the electricity meters are located under the roof of the paint shop. They send their data powerfully and reliably to the gateway, which is located deep within the building complex."*

Roller shutter monitoring to reduce heating costs

The same applies to the ifm sensors used to monitor a heavily used access roller shutter, and which transmit their data using a mioty adapter. Here too, the focus is upon saving energy.

"We can use the data to quickly identify whether the roller shutter is permanently open. If a defect is the cause, we can quickly repair the door. It is particularly important in winter that the roller shutters are mostly closed to reduce heating costs. On the other hand, during warmer days we can keep the roller shutters open for longer in order to cool and optimise the temperature of the working environment."



If the heavily used roller shutter door is left open for too long on cold days, the cost of heating will increase.

Simple retrofitting

In addition to an optical distance sensor, which recognises whether the door is open or closed based on the thickness of the roller, ifm temperature sensors were installed near the roller shutter both inside and outside.

*"All we had to do was ensure there was a power supply to the sensors, which was not a problem," says **Stefan Blatt**.*

"It would have been more complex, if not impossible, to install a wired network infrastructure on site."

Not just because the kilometres of cable required would have been hugely expensive.

"Here in the paint shop, we have a combination of explosion-protected areas and structural fire protection requirements, plus a solid construction. It is virtually impossible to plan an efficient cable route in a set-up like this at a later date. In addition, there are IT-related expenses that come with each new IP address in the system. Thanks to mioty technology, we were able to implement data collection for energy savings in a simple, uncomplicated way and make our contribution to increasing efficiency."



A photoelectric sensor checks whether the door is open or closed.

Positive conclusion and outlook

ifm's mioty solution was convincing from the very first field test: "We will now definitely expand the mioty network with additional access points to supply the entire paint shop with wireless solutions. Expanding the network will enable us to collect and analyse even more data in real time, which will result in further optimisations and cost savings."

Conclusion

With ifm's mioty solution for wireless data transmission, Ford has succeeded in realising important goals such as energy savings, predictive maintenance and system availability in the paint shop. The easy retrofitting of the wireless technology offers many more options for optimising energy efficiency and increasing system productivity.

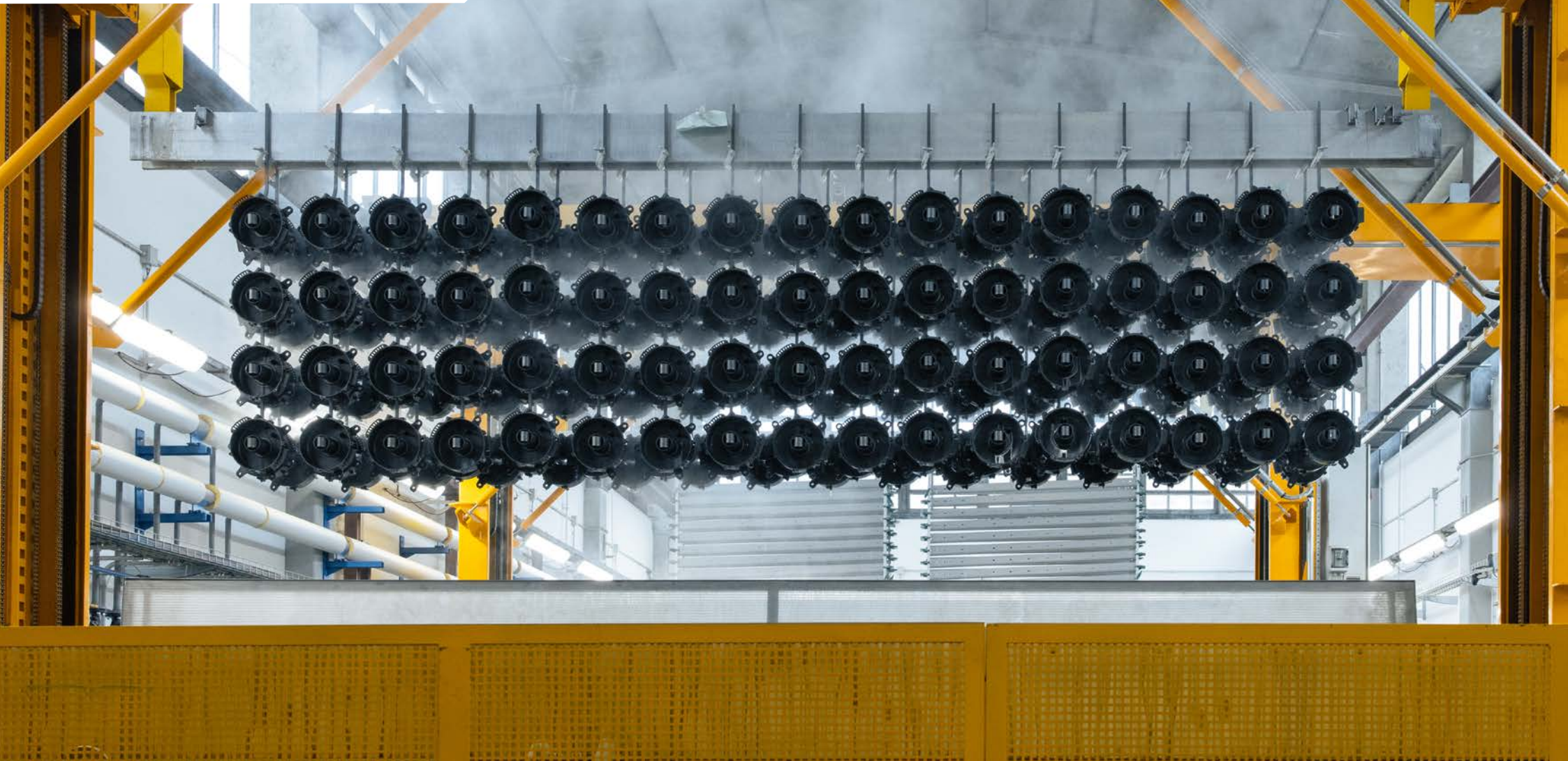
Energy consumption as an indicator of wear: the electricity sensor from ifm subsidiary Sentinum transmits the data to the IT level via mioty.





GASER

Digitalisation supports
anodising trade



Digitalised surface finishing

How GASER and ifm are optimising the anodising process together

The GASER Group specialises in the surface treatment of metals. In order to meet the growing demands of, in particular, the automotive and aviation market for traceability and process monitoring, the company is deploying a digitalisation strategy in cooperation with automation specialist ifm.

Whether screws, furniture frames, brake discs or aircraft engine components: metal components requiring particular durability or aesthetic properties undergo galvanic surface treatment. Common processes include anodising, nickel-plating, galvanising, heat treating and spray painting. The aim is to maximise corrosion protection, resistance and the appearance of the treated parts.

The GASER Group, with nine sites in Italy and one in India, has been providing these and other surface finishing processes to its customers since 1950. In order to ensure it is fit for the future, the Group has decided to digitalise all of its processes.

Heterogenous technology

"The digitalisation is fundamental for ensuring the traceability and monitoring of our processes", explains **Enrico Galliani**, General Manager at GASER. "Our company has a long tradition, but has grown again considerably in the past 15 years. This means that our technology is very heterogenous. With this systematic digitalisation, we hope to standardise the digital level across the entire group so that we will be able to provide our customers with consistent information on our quality certificates."

Individual solution for every system

GASER chose automation specialist ifm to implement this digitalisation strategy.

"We have been impressed with the cooperation for several reasons. Firstly, the experts at ifm have adapted perfectly to our needs by meeting us at our particular industrial reality. This shouldn't be taken for granted, as our industry can most certainly be considered a niche sector", says **Galliani**.



GASER will continue to rely upon the experience of its staff in future. The digitalisation is intended to help them in their work.

Examples of transformation and surface deposits. From unfinished to an aesthetic, technical artefact: GASER offers many coating options.



"Secondly, ifm has demonstrated a high level of flexibility. Instead of offering a generic solution for all our requirements, we have been able to target each individual system and each individual site together and develop bespoke solutions for the upgrade we wanted."

From skills to data-based decision-making

But for GASER, it was not just about process transparency for customers, as Innovation Manager **Graziella Galati** explains: "Of course we would like to reflect the growth of the group by creating a sound database that provides an objective picture of where the company is at and that serves as a basis for decision-making. But the digitalisation process also helps our staff in their daily work. The skills and experience of our staff are very important for GASER."

Step by step towards the goal

In spite of initial challenges due to the complexity of the project, **Galati** is positive about the outcome: "Our cooperation with ifm has allowed us to grow internally, expand our capabilities, and thus reinforce and consolidate our position overall. The results have borne this out and show that we're on the right track."

The GASER Group is just as optimistic about tackling the other goals together with ifm: "We wish to identify challenging but realistic goals together that suit our competences. ifm will gradually open the door to more complex projects, for example using predictive approaches and AI."

Sensor data for quality and traceability

The projects primarily involve sensors for temperature, pH-value and current, as **Antonio Rendina**, Automation and Digitalization Manager, explains: "These parameters are crucial for understanding whether a treatment has been successful. In this way we can monitor the process and identify any anomalies for quality assurance."

Old and new sensors combined

GASER had to overcome two challenges along the way to digitalisation: older systems also had to be made fit for the digitalisation. "Together with ifm, we have managed to integrate smart sensors with IO-Link technology into outdated production lines", says **Rendina**.

While most of ifm's sensors feature IO-Link technology, which enables seamless, straightforward data transfer to the IT level

without compromising communication with the PLC, older analogue sensors also had to be included in the digital data collection as part of the digitalisation of GASER's systems. ifm has just the solution for this challenge in the form of converters that convert the analogue signals into digital information.

IT-based process optimisation

The second challenge was to make the data obtained available to the staff in production. It was agreed to use moneo, ifm's IIoT platform.

moneo is a user-friendly, very powerful ifm software that allows its customers to easily review and optimise process sequences. moneo enables them to keep an eye on fill levels, temperature trends and the maintenance requirements of systems. Unexpected downtimes caused by a failure to replenish or system malfunctions can be avoided, as can quality losses caused by process deviations.

Easier controls, faster response

GASER uses the software to collate the relevant process data in easy-to-read dashboards, which can be provided on the system monitors.



The moneo dashboard with the main process data is highly visible in the workshop. The response time is much shorter when intervention is needed.

"Thanks to the rollout of the new software, things such as checking the temperature of the basins are much easier for me now", confirms **Matteo Margiotta**, plant technician at GASER. "I can see immediately on the dashboard whether the values are within the target range. If there is a risk of quality problems, the display changes colour. Therefore, I know exactly when a problem is looming and I can act quickly. For example, we used to just take the temperature manually with a thermometer. It took a lot of experience to keep the processes within the ideal range."

From production line to management level

As well as production, the management also benefits from the transparency. Thanks to moneo, those in charge can monitor all the systems and sites centrally. By integrating the sensor data into the GASER Core ERP system, production and company data can be combined and used for strategic analyses. "ifm was hugely supportive in helping us to develop all of these ideas", says **Antonio Rendina**. "Besides training and skills development, there are still almost daily discussions to explore new approaches and overcome obstacles together. Thus their claim to be 'close to you' is spot on in my eyes."

Conclusion

ifm is supporting the GASER Group on the path to digitalisation with comprehensive, flexible solutions. GASER itself is already reaping the reward from this step – with optimised processes, greater quality assurance and an efficient, networked shop floor.



Temperature probe, evaluation unit and cables withstand the harsh environmental conditions of the anodisation process.

” Together with ifm we have managed to integrate smart sensors with IO-Link technology into outdated production lines.



HARTING

Sensors ensure transparency and efficiency



Keeping a keen eye on the product carbon footprint

HARTING relies on digitalised production processes to monitor energy use

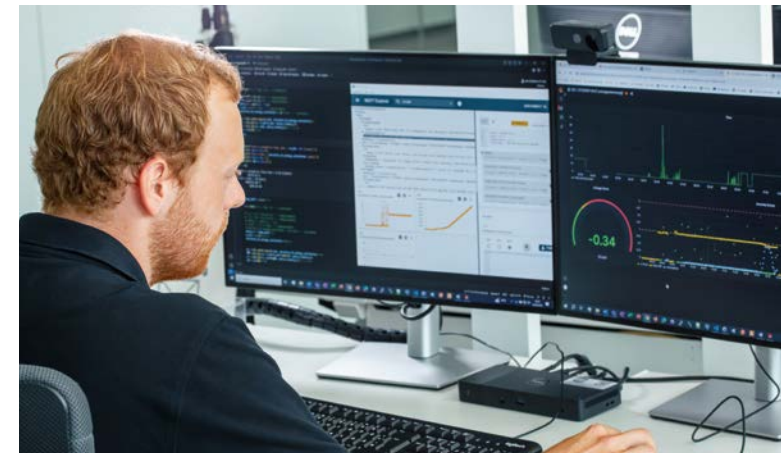
The HARTING Technology Group is a leading global supplier of industrial connection technology. Around 6,200 employees work for the group in 44 sales companies and 15 production facilities across the globe. In addition to the aim of supplying its customers with products of the best possible quality at all times, the family-owned company is also committed to sustainability. In order to produce as efficiently as possible and minimise its environmental impact, HARTING focuses on the digitalisation of its production plants at its headquarters in Espelkamp.

"The high degree of data transparency we have achieved in our three plants enables us to take an objective look at our production processes," says **Thomas Kämper**, Head of IIoT Solutions & Services at HARTING Electronics. Several hundred machines transmit their data to the IT level where it is continuously analysed by Thomas Kämper's team.

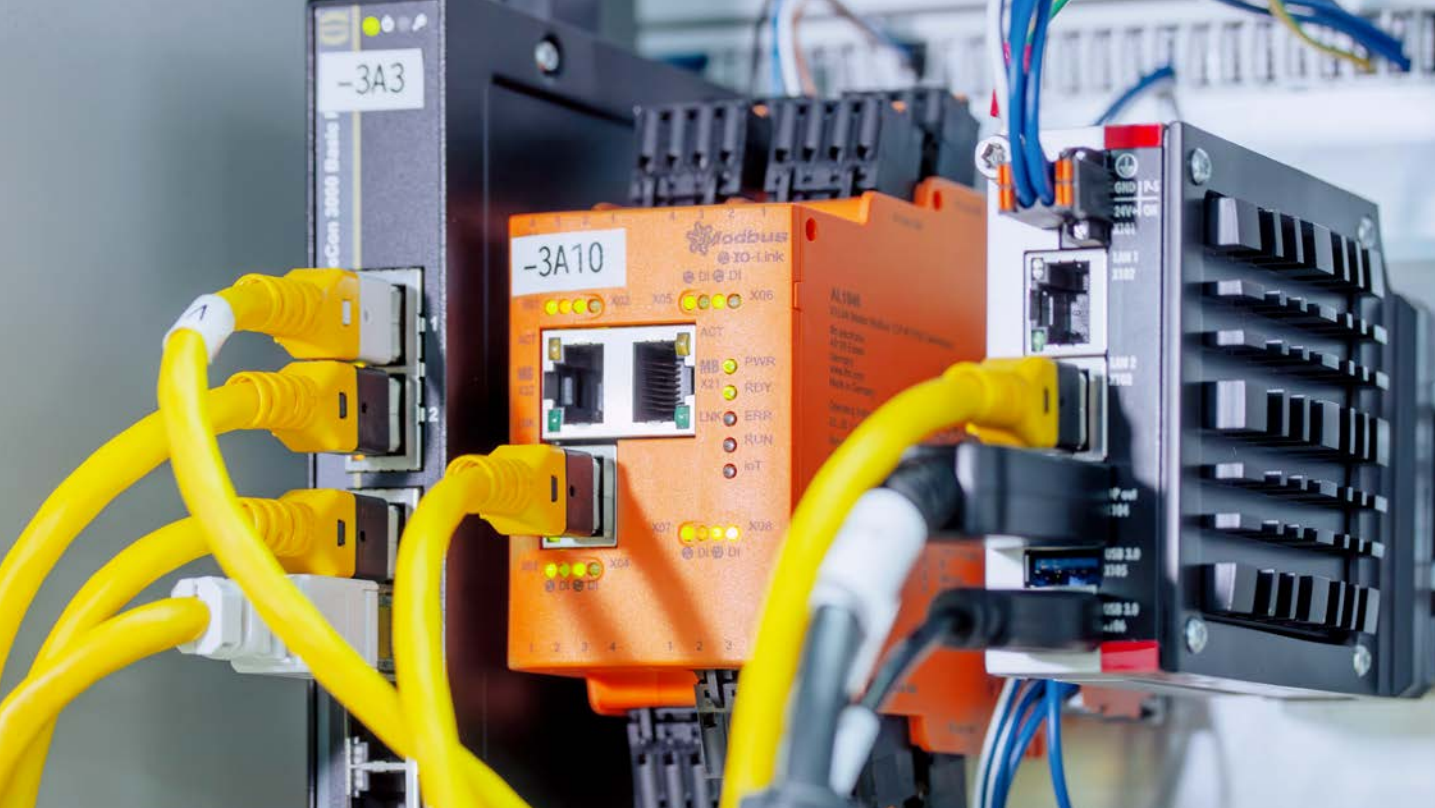
Retrofit standard for heterogeneous machine park

Luca Manuel Steinmann, Process Data Engineer IIoT at HARTING Electronics, describes the challenges associated with implementing a central data evaluation solution: *"We have very heterogeneous systems with diverse interfaces and protocols in our machine park which already provide a lot of relevant process data and information, e.g. on cycle times and downtimes. To make this information accessible for analysis at the IT level, we needed to integrate it into the data infrastructure of the OT level. We also added additional sensors, e.g. for monitoring of cooling water, compressed air and electricity consumption."*

After considering different retrofit standards for plant digitisation, HARTING quickly opted for IO-Link. IO-Link masters installed on the machine receive data from the sensors mounted at the machine location and transmit it to the IT level. This creates the information interface between the Operational Technology (OT) level, i.e. the machines, and the Information Technology (IT) level.



All machine data is collected and transmitted to the IT level to be analysed by HARTING's data analysts.



The IO-Link master collects the data from the connected sensors and transmits it to the fieldbus and to an edge gateway.

IO-Link: one sensor, a wealth of information

"The advantages of IO-Link are evident," says Thomas Kämper. "Thanks to this widely used open standard, we can easily connect additional sensors to further sharpen the digital machine image. Using standard interfaces such as Modbus TCP or IoT Core, we are able to collect the data in a standardised and intuitive way."

Another benefit: The sensors can transmit several important process values at the same time. For example, HARTING uses the SD compressed air meter from ifm to precisely monitor compressed air consumption. This sensor not only transmits the current flow values via IO-Link, but also provides other relevant data such as pressure, temperature and total quantity, which are relevant for compressed air monitoring. To give an example: For reliable operation, machines usually require an operating pressure of 6 to 6.5 bars. If this value drops, this could indicate a leak in the piping system.

” *Compressed air is one of the most expensive forms of energy in industry. Thus, it is important to closely monitor its consumption.*

Cost reduction through continuous pipe monitoring

ifm offers a comprehensive range of products for pipe sizes from DN8 to DN250 for continuous compressed air monitoring – from the compressor through to the machine – and data transmission to the IT level. This makes it possible to quickly and precisely locate and eliminate any occurring pressure loss in the piping system, which, in the long term, is much more cost-saving and effective than increasing the pressure of the compressor to compensate for pressure drops: In fact, a reduction of 1 bar in operating pressure can reduce the energy costs by up to 7%. With its IIoT platform moneo, ifm offers a software tool that automatically calculates the pressure difference, providing a quick and easy way to detect leaks, clogged filters and other issues leading to excessive compressed air consumption.

Keeping an eye on the most expensive energy resource

Already at a very early stage of its digitisation journey, HARTING focused on compressed air monitoring.

"Compressed air is one of the most expensive forms of energy in industry," says Luca Manuel Steinmann. "Thus, it is important to closely monitor its consumption in order to identify any leaks in the compressed air system early. As compressed air is an invisible resource and leaks are difficult to detect in noisy production surroundings, we initiated the 'leakage detection' project."

The SD compressed air meter is offered for pipe sizes from DN8 to DN 250.



Valuable insights into the compressed air system. Clearly recognisable: Basic consumption (1) and production consumption (2) increase significantly after a leak has occurred (3). After its elimination, the basic consumption nearly drops to zero (4).

The savings potential became quickly apparent: "Based on the transmitted data, we observed a sharp increase in compressed air consumption at one machine. As this increase was not only noticeable during production, but also in stand-by operation, it was clear that the machine required maintenance. The inspection revealed a leak in the compressed air system. The leak was repaired at the next possible opportunity, meaning the maintenance time from leak detection to repair was significantly reduced," says Thomas Kämper.

Another benefit is the energy saved as a result. Thus, both financial and energy losses can be greatly reduced. Each machine transmits multiple measured values to the IT level.

"This is where the puzzle pieces of information come together to form a big picture, providing us with precise insights into the current health status of each machine," says Thomas Kämper. "In combination with the camera-based production quality analysis, we can not only guarantee needs-based machine maintenance, but also consistent high production quality. The high degree of process transparency we achieve through data analysis reduces our response time, enabling more targeted maintenance planning. All of this contributes to a higher quality level and product output, while at the same time reducing scrap levels."

*To achieve full data transparency,
all machines at HARTING's site in
Espelkamp are connected to the
network.*





HARTING is able to determine the energy consumption of each individual product. This is valuable information for the company - but also for its customers.

AI-optimised maintenance schedules

However, the optimisation process is yet far from being completed according to **Thomas Kämper** and his team: The analysts are working on a data-based solution to determine the best time to fix a leak.

"Immediately stopping a machine to perform maintenance is not always the most cost-effective option, as it's not just the leak that causes financial loss, but also the machine downtime. I'm convinced that with the help of artificial intelligence, we will become more efficient in this area in the future."

No out-of-the-box solution

The collected data not only helps HARTING with quality assurance. It also provides insights into the carbon footprint of each product manufactured at the plant in Espelkamp.

"We started digitally measuring and analysing energy consumption here in production as part of the ISO 50001 certification of our energy management system in 2017. As there was no out-of-the-box solution for this application, we brought ifm on board as a partner to support us with the necessary knowledge and products. The excellent and close collaboration quickly resulted in the first digitisation projects."

CO₂ transparency - also towards the customer

The sensor information and machine data has also helped HARTING take a leap forward in meeting their target of achieving a sustainable and resource-saving production, as **Thomas Kämper** explains: *"Since we perform every production step from raw material processing to the finished product on site, we can precisely determine the energy costs and the carbon footprint of each finished product. We also intend to pass this information on to our customers in the future to assist them in precisely determining their own carbon footprint."*

Convinced of the added value of digitisation

HARTING is convinced of the benefits of digitisation: More projects are planned to further enhance efficiency and quality assurance in production.

"We intend to closely monitor other forms of energy similarly to compressed air," says Thomas Kämper. "We also plan to centrally analyse quality assurance factors such as coolant / lubricant values in the future, e.g. by measuring conductivity."

Precise production efficiency analysis

As more and more machines continuously transmit increasing volumes of data, entire process sequences can be compared: *"The data enables us to objectively determine which machine is most effective in producing which product. By aligning our production planning accordingly, we can achieve further energy savings."*

Conclusion

With the support of ifm, HARTING has taken a big step towards full data transparency at its Espelkamp site and can now manufacture its high-quality products more efficiently thanks to IT-based analysis.



KNAPP

3D camera system
in mobile robots



Cameras at the wheel

3D camera system in autonomous mobile robots

In a world adjusting to the rapid changes and advances in the fields of technology and sustainability, the need to redesign intralogistics processes is becoming increasingly urgent. With their advanced autonomous mobile robots and powerful 3D camera technology from ifm, KNAPP Industry Solutions, a subsidiary of the Austrian company KNAPP AG, which is pioneering in the field of intralogistics, is setting new standards here.

The Austrian company KNAPP is based in Hart bei Graz and specialises in the development of customised logistics solutions.

"We help our customers automate processes along the entire value chain and drive digitalisation. We are divided into various business units, e.g. Food, Fashion, Retail, Wholesale and Industry. In Industry Solutions, we serve customers in the manufacturing industry and develop autonomous mobile robots, our so-called Open Shuttles," explains **Philipp Gotzmann**, Team Lead Software Development Shuttle Control.

The 'Open Shuttle Fork' is an autonomous mobile robot (AMR) for transporting standard pallets, racks and special load carriers.

The shuttles transport goods autonomously between different production sites or storage areas. They cover a wide range of applications, from transporting heavy pallets to small materials and cartons.

Unlike AGVs (Automated Guided Vehicles), for example, which follow a fixed route, Open Shuttles fall into the category of AMRs (Autonomous Mobile Robots). They are characterised by the fact that they can cover the distance between the starting point and the destination flexibly and without a fixed route. The advantage: AMRs can quickly adapt to changing layouts and processes. As a result, the set-up time for new tasks or in case of environment changes is minimised. This adaptability makes it easy to scale up or down as required, providing a cost-effective solution in the long term.

To avoid collisions with people or objects, reliable and continuous 3D detection of the surroundings is a key component of autonomous navigation.

The O3R camera is a combined 2D/3D camera for perimeter recognition.





The O3R camera accurately detects the pallet's position and orientation, enabling precise approach and smooth pallet pickup.

Usage of the O3R camera system

The key component in achieving this outstanding level of flexibility is the 3D camera technology developed by the automation specialist ifm. With the powerful O3R camera system, the Open Shuttles can precisely detect physical objects in three dimensions and move seamlessly and safely around the production facility.

"We use the O3R camera system from ifm in our Open Shuttles to detect obstacles in the travel path. The system provides full 3D monitoring of the complete travel path over the entire height of the vehicle. This means we are able to offer additional protection on top of the certified laser scanners already in place. It also allows us, for example, to detect objects protrud-

ing into the travel path, such as fork prongs. Furthermore, 3D monitoring gives us a reliable means of detecting the passage of gates and the like. We also use the O3R system on our 'Open Shuttles Fork' for load carrier detection, i.e. to detect pallets or pallet-like load carriers. This enables us to pick up load carriers that may have slightly different positions, e.g. after they have been set down by a manual forklift truck. The 3D sensors are used to measure the load carrier and determine its exact position in order to ensure that it can be precisely approached and picked up," says **Philipp Gotzmann**.

" We were not looking for a turnkey system, but for a solution where we could work together with a partner on a good product and concept and develop our own algorithms and processes.

Decision in favour of ifm

When it came to choosing a suitable 3D solution, ifm's developer-friendly and customisable technology was a key factor in the decision.

"We decided to go with ifm's solution while we were still testing it in the field. This was due to the promising concept of using distributed, relatively small camera heads and a central computing unit for evaluation, allowing for in-house software development. It is very important for us at KNAPP to be able to map and influence processes that are relevant to the system ourselves, including 3D obstacle and load carrier detection. We were not looking for a turnkey system, but for a solution where we could work together with a partner on a good product and concept and develop our own algorithms and processes. This way, we remain in control and can make adjustments. One of the O3R system's advantages is that it is very developer-friendly and excellent developer documentation exists. ifm also provides libraries for custom software development, as well as the means for integrating ROS drivers and the like. We really like that. The quality of the cooperation with our colleagues at ifm also deserves special mention," recapitulates **Philipp Gotzmann** at KNAPP.



The Video Processing Unit is the central component of the O3R system. It offers the possibility of connecting up to 6 cameras.

High-performance camera system

The O3R platform from ifm is the comprehensive solution for the centralised, synchronised processing of image and sensor information, specifically designed for use in autonomous mobile robots and other automated guided vehicle systems.

The core of the system is a powerful computing unit called Video Processing Unit (VPU). Based on a yocto-Linux and Docker architecture, open development environments such as Python, C++, CUDA and ROS are supported. The VPU evaluates information from up to 6 camera heads simultaneously and can bundle and correlate it with other important sensor information, such as that from a 2D lidar sensor, in a "sensor fusion" process to enable reliable and robust environmental perception. On this basis, efficient route planning and navigation tasks can be performed.

With up to six cameras, it is possible to achieve a seamless 360 degree coverage. The 3D cameras are also included in the platform solution. They have an aperture angle of either 60 x 45 degrees or 105 x 78 degrees and use advanced PMD time-of-flight technology.

The O3R system consists of a Video Processing Unit and up to six camera heads.



Patented "Coded Modulation Technology" ensures reliable detection of obstacles and foreign objects, even with increased exposure to ambient light and in the presence of many other interference signals. In addition to the 3D image as a point cloud, the cameras also provide a classic 2D image of the surroundings.

The interaction of cameras and sensors enables the robust implementation of relevant functions such as collision avoidance, localisation, navigation and positioning.

Philipp Gotzmann: *"To detect obstacles, we have installed two 3D cameras on our Open Shuttles. The idea is to exploit the different advantages of the camera heads. We have installed a camera head with a field of view of 60 degrees. The focus is on covering the main driving area and achieving the best possible illumination with time-of-flight technology for the monitored area. We also use a camera head with a 105-degree field of view. This allows us to cover the full height of the vehicle, as well as the maximum ride height when loaded. In this way, we can ensure safe and secure passage through gates and the like. Our 'Open Shuttle Fork' has an*

additional camera for pallet detection. It is used to ensure that the forks are positioned precisely in the pockets of the pallet. This combination of individual camera heads and a central computing unit is a great advantage in terms of cost-effective monitoring."

Conclusion

The innovative synthesis of KNAPP's Open Shuttles with ifm's O3R camera technology is more than just a technical solution – it is an important step in the future of intralogistics. Combining flexibility, precision and adaptability, this duo sets new standards in the intralogistics value chain.

The possibility of custom design and integration of advanced sensors opens new doors to greater efficiency and sustainability in production. This example highlights not only the technological advances, but also the importance of cooperation and open exchange between companies such as KNAPP and ifm in order to meet the challenges of modern industry and actively shape the future.



Omnia Technologies

Digitised brewing
systems



Efficient brewing through digitalisation

Easybräu-Velo enables transparent brewhouse processes through advanced sensor technology

Easybräu-Velo, a brand belonging to the Omnia Technologies Group, develops and manufactures complete brewhouses and equipment for industrial and craft beer production. The company is committed to optimising the brewing process through innovative automation solutions. To achieve this, it relies on a close partnership with the German automation specialist ifm.

"We realised early on that digitalisation is not just a passing trend, but a vital requirement for staying competitive in today's industrial landscape," says Stefano Giacobini, Business Unit Leader Beer at Omnia Technologies. "Our customers are also increasingly recognising the benefits of transparent monitoring in brewing and cleaning processes."

Giacobini pinpoints two core reasons why digitalisation is no longer optional. *"On the one hand, we aim to ensure consistently high product quality that meets the strictest hygiene standards for the benefit of our customers. On the other hand, we strive to use resources like energy and water as efficiently as possible to minimise both costs and environmental impact."*

Sensors from ifm provide data for analyses and production planning

Determined to meet these ambitious goals, Omnia Technologies teamed up with a trusted partner in automation: ifm.

"We chose to work with ifm to fully digitalise the entire production process and make it available to our customers in a systematic and reliable way," says Giacobini. "With each step forward in digitalisation, the demand for comprehensive, scalable and seamless solutions increases. ifm's product offering meets all these requirements. It allows us to provide our customers with detailed and precise insights into the process, which they can then use for analysis and production planning."

SM Foodmag: all-in-one sensor for flow, conductivity and temperature monitoring

In the brewhouse, where malt and water are processed into wort, various sensors from ifm are used to measure parameters such as level, flow, pressure and temperature. Since all sensors are equipped with IO-Link digital communication technology, the data is transmitted not only to the control system but also

"When it comes to selecting the right sensors for each individual system, we can rely on the expertise and competent advice of ifm."



The SM Foodmag simultaneously detects flow, conductivity and temperature – all at a single measuring point.

to the IT level, where it is analysed to optimise the brewing process. The new hygienic flow meter SM Foodmag is the first sensor of its kind to feature IO-Link. It bridges the gap in digitalised food processing and further enhances system monitoring and control: A single sensor can now simultaneously detect flow, conductivity and temperature – three key parameters. It also transmits information on flow direction and medium presence, offering comprehensive insights into the process. A large, easy-to-read display shows all relevant data directly on site. An LED ring around the display provides clear status indication, visible even from a distance.

"The SM Foodmag allows us to monitor our process in much greater detail and fine-tune settings in ways that simply weren't possible before," says Alessandro Sanson, Senior Software & Automation Specialist at Easybräu-Velo. "And all of that with just a single measuring point. For example, we can use the conductivity values to precisely dose the chemicals during CIP cleaning. We can also accurately determine when to stop the rinsing process, thereby minimising water consumption."

In the future, Easybräu-Velo's software will be able to determine wort density based on the collected data and, using artificial intelligence, automatically make adjustments – unlocking further potential for increased efficiency and improved quality.



Modern brewing systems rely on a wide range of sensors to monitor processes.



SU Puresonic: ultrasonic sensor accurately detects osmotised water

Sanson also sees key advantages in another sensor from ifm: *"The SU Puresonic ultrasonic sensor enables precise detection of osmotised water – something that was previously difficult due to its low conductivity. Here too, we can now reliably measure both flow and temperature with a single device. This supports stable product quality and enhances overall process efficiency."*

Faster and more efficient thanks to IO-Link

One of the key strengths of IO-Link is its ability to transmit additional data directly to both the control and IT levels. This is particularly valuable where digitalisation is intended to secure



The SU Puresonic can reliably measure the flow rate of water even at very low conductivity levels.



The field-compatible IO-Link master collects sensor data decentrally and transmits it to the controller in bundled form.

process efficiency and ensure production quality. Another key reason for **Sanson** to rely on IO-Link: *"IO-Link simplifies installation by combining standardised connection technology with a smart decentralised infrastructure."*

Field-compatible IO-Link masters collect and transmit bundled data from up to eight sensors each. Since the masters can be connected in series, overall cable lengths are significantly reduced. In addition, the use of standardised M12 connectors ensures error-free connection between sensors and masters.

"With IO-Link, we save measuring points, metres of cable and valuable installation time," says **Sanson**. If a sensor fails, it can easily be replaced with an identical model: The IO-Link master

can store the sensor parameters and automatically transfers them to the new sensor after replacement. *"We will now gradually adapt our plant software to make full use of the expanded data capabilities offered by IO-Link sensors. This will enable us to continuously improve efficiency and reduce resource consumption,"* **Sanson** concludes.

ifm supports its partner in overcoming technological challenges

Throughout this process, the Italian company values ifm as a dependable partner. *"When it comes to selecting the right sensors for each individual system, we can rely on the expertise and competent advice of ifm,"* says **Sanson**. *"This partnership is a key factor in the*

success of Omnia Technologies and enables us to develop and implement innovative solutions that meet the demands of the modern beverage industry."

Conclusion

The collaboration between Omnia Technologies and ifm demonstrates how digitalisation is helping to positively shape the future of the beverage industry. By deploying innovative sensor technology and intelligent networking, breweries can optimise their processes, use resources more efficiently, and further improve product quality.



Polyma

Mobile hybrid power generation



Generating electricity where it is needed

The hybrid power unit for flexible energy supply

Based in Kassel, Germany, Polyma Energiesysteme specialise in developing and manufacturing customised power generators. The customised power units are used in many different areas – from vital emergency response measures and stationary solutions in industrial environments to mobile power supplies at festivals or on film sets. To fulfil the requirements for maximum flexibility and ease of use, Polyma relies upon close, trusting cooperation with ifm, a leading supplier of automation technology. An innovative combination forms the core of Polyma's hybrid power units: a conventional motor-generator unit and a powerful battery.

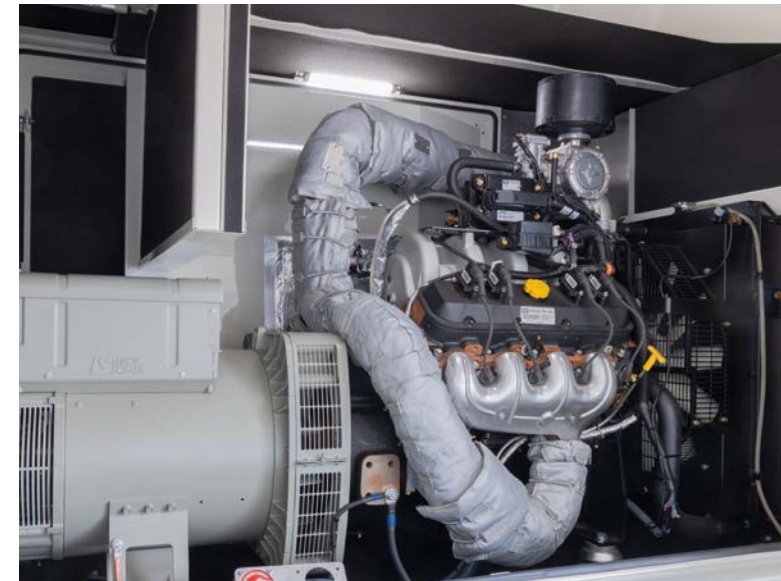
Mobile power generation for festivals or film sets, for example.

Daniel Andler, Development Engineer at Polyma, explains how they work together: *"This combination makes our devices extremely flexible and perfectly adapted to today's energy supply requirements. The motor can be operated with either diesel, gas or LPG, making it highly adaptable to different operating conditions. A powerful generator converts the mechanical energy into electricity, which can be temporarily stored in a modern lithium iron phosphate battery if required. This battery technology not only offers high energy density, but also excellent service life and safety."*

Advanced battery management

At Polyma, battery management is mastered through the use of advanced control systems. *"The integration of lithium iron phosphate batteries is more complex than that of conventional lead batteries; it requires a sophisticated management system for monitoring and control,"* explains Andler.

This is where ifm's expertise comes into play. A programmable logic controller (PLC) is responsible for the intelligent operational management of the entire system and ensures seamless coordination of the various components.



The motor-generator unit for mobile power generation.



The CR710S central mobile control unit has both a "normal" and a second independently operating safety PLC.



The control centre and the various power connections are located at the rear of the vehicle.

” *The combination of a conventional motor-generator unit and a powerful battery makes our devices extremely flexible and perfectly adapted to today's energy supply requirements.*

Powerful PLC

The robust, mobile ifm CR710S controller comprises two independently operating PLCs, one of which is a TÜV-certified safety controller. The powerful triple-core controller, combined with a large working memory, enables complex control functions. If required, the application software can be split so that the safe program part can be executed without interference from the general program execution. The various inputs and outputs can be configured as digital, frequency or analogue inputs with diagnostic function or as inputs for resistance measurement. Analogue inputs enable both current and voltage measurement. The outputs can be configured as digital or PWM outputs with diagnostic capabilities.

All inputs and outputs can also be configured as safe channels, so that safety-related sensors and actuators can be connected directly and their data processed in the application software. The device is also equipped with two Ethernet ports and four CAN interfaces. The CAN interfaces support all important bus protocols (CANopen, CANopen Safety and J1939) as well as

transparent, preprocessed data exchange. The control functions are easily integrated into the application program thanks to CODESYS programming.

The open programming interface enabled Polyma to implement its own software solutions, which are designed for maximum user-friendliness and efficiency.

Robust and reliable for mobile applications

The robustness and reliability of the technology are vital for mobile applications. Polyma prioritises ensuring that the housings and technology of the units function reliably even under harsh conditions.

*“The devices must be resistant to vibration and shaking, as they are often used on the move,” stresses **Daniel Andler**.*

This is precisely what the mobile ifm controllers are designed for. The units are equipped with ifm sensors for comprehensive condition monitoring, including, for example, a capacitive sensor for leakage detection. This sensor is located in the collecting tray under the unit. If a line is defective and fluid leaks out,



The central ifm CR1204 touch display is used to visualise all operating parameters and to set a wide range of functions.

it collects in the tray and is detected by the sensor. This then sends an alarm signal to the controller. This prevents fluids from leaking unnoticed into the environment.

Powerful visualisation and operation

The customised automation solution that Polyma has developed in collaboration with ifm gives the company and its customers maximum flexibility.

Thanks to the advanced battery technology, the motor can be switched off at low load, which enables considerable fuel savings while increasing the service life of the motor. The user always has full control of the system via the freely programmable CR1204 touch display. They can check the current status, apply settings and switch functions on and off.

The display has been developed for use in cabins and outside vehicles. A high protection rating of IP65/IP67 means it is optimally protected against moisture. It is resistant to strong impacts, permanent vibration and extreme ambient temper-

atures. The high-resolution RGB LED panel offers optimum readability even in a bright environment. The display has freely programmable buttons and a capacitive touchscreen for operation tasks.

The integrated powerful 64-bit PLC can perform visualisation and operation tasks and is freely programmable via CODESYS. Numerous interfaces at the back of the device, e.g. CAN, analogue video, USB 2.0 and Ethernet offer maximum connectivity.

Whether on a construction site, on a film set or in the event of a disaster, Polyma's hybrid power units, equipped with automation technology from ifm, guarantee an easy-to-operate, reliable and efficient power supply on site.

Close cooperation with ifm

From the initial contact with ifm, Polyma felt it was in good hands and a long-term partnership was formed.

"The expertise of ifm's telephone hotline cannot be taken for granted these days," praises Daniel Andler. He particularly appreciates the fact that ifm took the time to closely support the medium-sized company. "ifm really is 'close to you' – or, in this case, close to Polyma. I was very well looked after from the outset. The ifm employees took the time to solve any problems competently, which impressed me."

Conclusion

This innovative solution is a prime example of how customised technology and close cooperation between companies can result in outstanding products that not only meet today's requirements, but also contribute to environment protection by optimising energy consumption and reducing emissions. Polyma and ifm are thereby setting new standards in the industry and demonstrating that technological progress and sustainability can go hand in hand.



Fritz Studer AG

Software-supported
sensor management



Simple human-machine dialogue

How the moneo|configure free software helps to maintain the quality and availability of precision machines.

Fritz Studer AG, based in Steffisburg, Switzerland, develops, manufactures and sells cylindrical grinding machines that are used in a wide range of industries. To ensure that the workpieces to be produced are always of the required quality, great importance is also attached to the precision and durability of the machines. Digitalisation solutions from ifm help the company to live up to this maxim over the entire life cycle of each machine.

” Having used the LR Device parameter setting software from ifm since 2019, we are now relying on its successor, moneo|configure.

Swiss chronographs, aeroplane turbines, electric toothbrushes and, yes, sometimes even a patient's hip: Wherever high-precision manufactured components are used, they may have been machined in cylindrical grinding machines from STUDER. The Swiss manufacturer's machines have to grind to an accuracy of a tenth of a micrometre – only then can they leave the factory. The more demanding and complex the workpiece to be ground, the more complex and demanding the technology is that is incorporated in the machines themselves in order to perform the grinding processes with the required accuracy.

For more than 20 years, STUDER has relied on automation technology from ifm to ensure the habitual accuracy and durability despite increasing complexity.

Automation protects man and machine

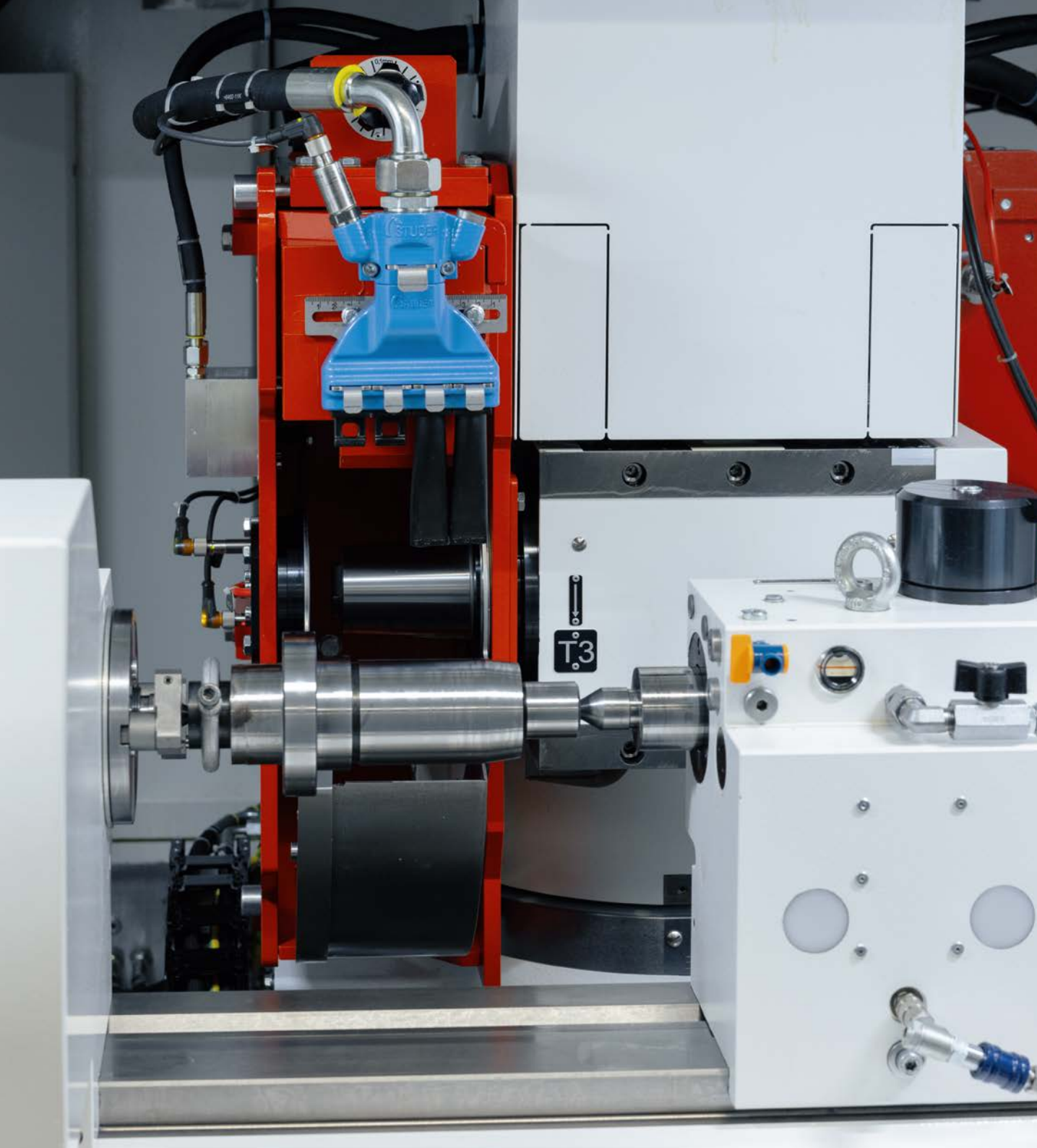
“Our machines are highly automated,” says Christoph Habegger, Service Instructor at STUDER. “For example, pressure sensors and flow sensors ensure that sufficient coolant is added to the grinding process to prevent damage to the workpiece and grinding wheel. There are also inductive safety sensors ensuring that the grinding head is in the correct position before the grinding process begins and that the machine is closed to prevent any danger to the operator. We also use vibration sensors on newer machines to further optimise condition monitoring and to maximise service life and process quality through predictive maintenance.”

” *Setting up new machines is also much more effective because we can clearly see the processes from the outset and set them up precisely.*

Direct connection to the IT level

Most of the sensors in STUDER's cylindrical grinding machines are connected to decentralised IO-Link master modules that, in turn, bundle the data and transmit it via field bus to the controller and also to the IT level in parallel. This simplifies sensor integration, as it reduces cable lengths and guarantees error-free connection between the sensor and the master thanks to standardised M12 connections. Another advantage of digital point-to-point communication via IO-Link: The parameters of the sensors can be saved on the respective master. If a sensor is defective and replaced by an identical sensor, the parameters are automatically transferred from the IO-Link master to the new device. This ensures safety when replacing sensors, and the replacement can also be carried out by people without specialist knowledge.

Numerous sensors ensure that the grinding process is carried out safely and correctly: A pressure sensor at the inlet for the coolant (centre of picture) controls the exact dosage, inductive safety sensors (left, above the workpiece) detect the position of the grinding wheel guard.





The flow monitor records the speed at which the coolant is supplied to the grinding process. The LED bar graph indicates the flow behaviour.



With moneo|configure free, users can enter into a dialogue with sensors and masters within the IO-Link infrastructure. Data can be read and parameters can be transmitted.

Software for simple IO-Link management

Since 2022, STUDER has been using moneo|configure free, the free software from ifm, in addition to the IO-Link hardware, to manage the IO-Link infrastructure conveniently and centrally. The scan function automatically analyses the existing network and virtually replicates it in a tree structure. With just a few clicks, IO-Link sensors can be specifically controlled and configured, and measured values and diagnostic data can be read out. Thanks to the online connection to the IODD database, the integration and configuration of IO-Link sensors is independent of the manufacturer. It is also possible to integrate more and more IO-Link masters from other manufacturers.

Data transparency brings many advantages

"Having used the LR Device parameter setting software from ifm since 2019, we are now relying on its successor, moneo|configure," says Daniel Josi, Service Instructor at STUDER.

"From our point of view, there are a number of aspects in favour of using the software. For example, it is no longer necessary to replace sensors preventively after a defined period of time. On the contrary, our colleagues in customer support can query the current status of every sensor in a machine and, therefore, quickly and precisely recognise and fix any malfunctions. Setting up new machines is also much more effective because we can clearly see the processes from the outset and set them up precisely. This is an advantage for us and especially for our customers, because it enables us to offer them even better support throughout the entire life cycle of their plant."

Data-based proof of quality

But STUDER does not just rely on the advantages of digital process analysis in customer service. STUDER also uses the possibilities of moneo|configure in the development, production and quality control of new machines.

"Thanks to the detailed database, we achieve a high level of process transparency. We can see, for example, where we can further optimise processes so that our machines run even more efficiently. We can also objectively log and verify the quality and accuracy of our systems based on real process data," says Daniel Josi.

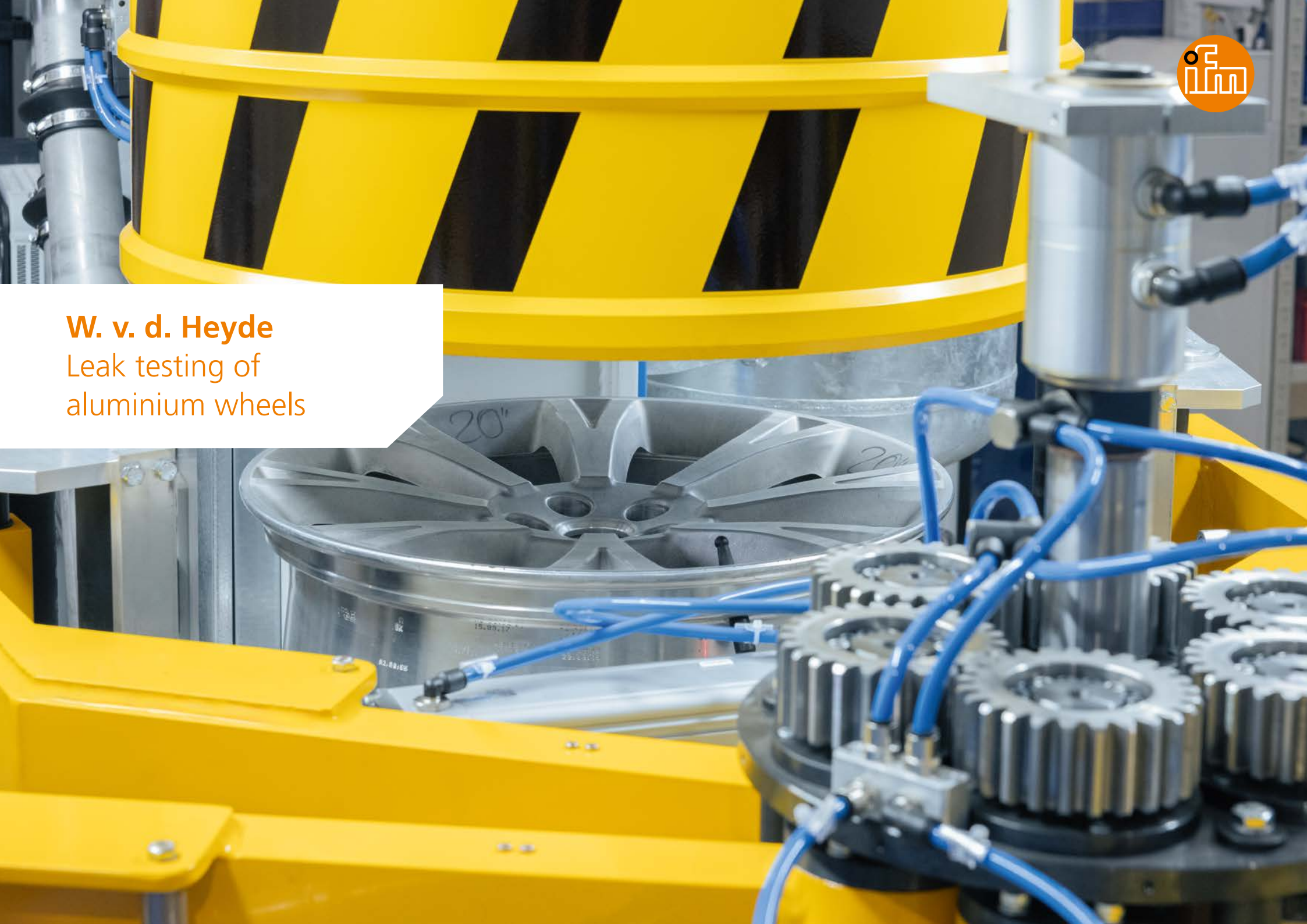
Conclusion

By using moneo|configure free in conjunction with IO-Link, Fritz Studer AG is accelerating and simplifying the handling of automation components in its cylindrical grinding machines. Both development and customer service benefit from the data transparency, and so do STUDER's customers.



W. v. d. Heyde

Leak testing of
aluminium wheels



All tight?

IO-Link helps with leak testing of aluminium wheels

If a car wheel loses air, most of us naturally assume a tyre puncture, and rightly so. But only few people are aware that rims can also leak air. The reason is that when making wheels, liquid lightweight metal is poured into a mould. During this process, fine pore cracks or leak paths can occur through which air can later escape. This is why manufacturers of aluminium wheels thoroughly inspect the rims for leaks before putting them on the market.

W. v. d. Heyde, a family-run medium-sized company based in Stade, Germany, has specialised in the production of industrial leak detection machines for the automotive industry. Managing Director **Gerald Lüdolph** explains: *"With a current staff of about 90 employees, we design and manufacture customised solutions for leak testing with test gas against vacuum. Our expertise dates back to the mid-1990s, when we began developing leak detection machines for aluminium wheels. Today, we distribute our products globally and have established ourselves in this field as a world market leader."*

Aluminium wheels are checked for leaks using vacuum technology.

Test procedure

The leak detection machines rely on vacuum technology and gas injection. For leak testing, the wheel rim is sealed on both sides using a rubber plate and a cover. Then, the outside and inside of the rim are evacuated using vacuum pumps. Finally, a test gas is admitted to the sealed exterior of the rim. Helium is typically used for this purpose as it is particularly effective in detecting even fine leaks.

Due to the pressure difference between the exterior and interior of the rim, the helium gas mixture will pass through any potential pores or capillaries into the inner area of the rim. Here, the helium concentration is measured using a high-precision mass spectrometer. As long as it does not exceed a certain threshold, the aluminium wheel is considered tight, otherwise it is rejected.



Leak tester of the company W. v. d. Heyde.



Flow sensors detect compressed air as well as a helium test gas mixture.

”Efficiency and quality have greatly improved through the use of IO-Link sensors when compared to analogue signals.

Before the wheel is approved, the helium test gas mixture is extracted and recovered. *“Thanks to this process, we can offer our customers a high level of cost efficiency, as the used test gas is not released into the atmosphere but recycled,”* says **Jens Westmeier**, Team Leader Mechanical Design at von der Heyde.

Machine redesign

In the past, leak testing and test gas processing occurred in separate parts of the machine. This has changed fundamentally with the redesign.

“The key objective of the redesign was to turn two separate machines into one in order to reduce the footprint and offer our customers a compact solution that incorporates all the necessary functions previously performed by two machines. This saves a lot of space in the customer’s production hall,” says **Jens Westmeier**.

Automation with IO-Link

As part of the redesign, the sensor level was completely converted to IO-Link, which offers many benefits. **Joost Bochynski**, responsible for control technology, explains: *“We use a variety of sensors from ifm, including photoelectric, flow and pressure sensors. Thanks to IO-Link, we can optimally analyse these sensors and obtain a lot of previously inaccessible information. One example is the SD flow sensor, of which we use several*

All sensors and actuators communicate with the machine controller via IO-Link master modules.

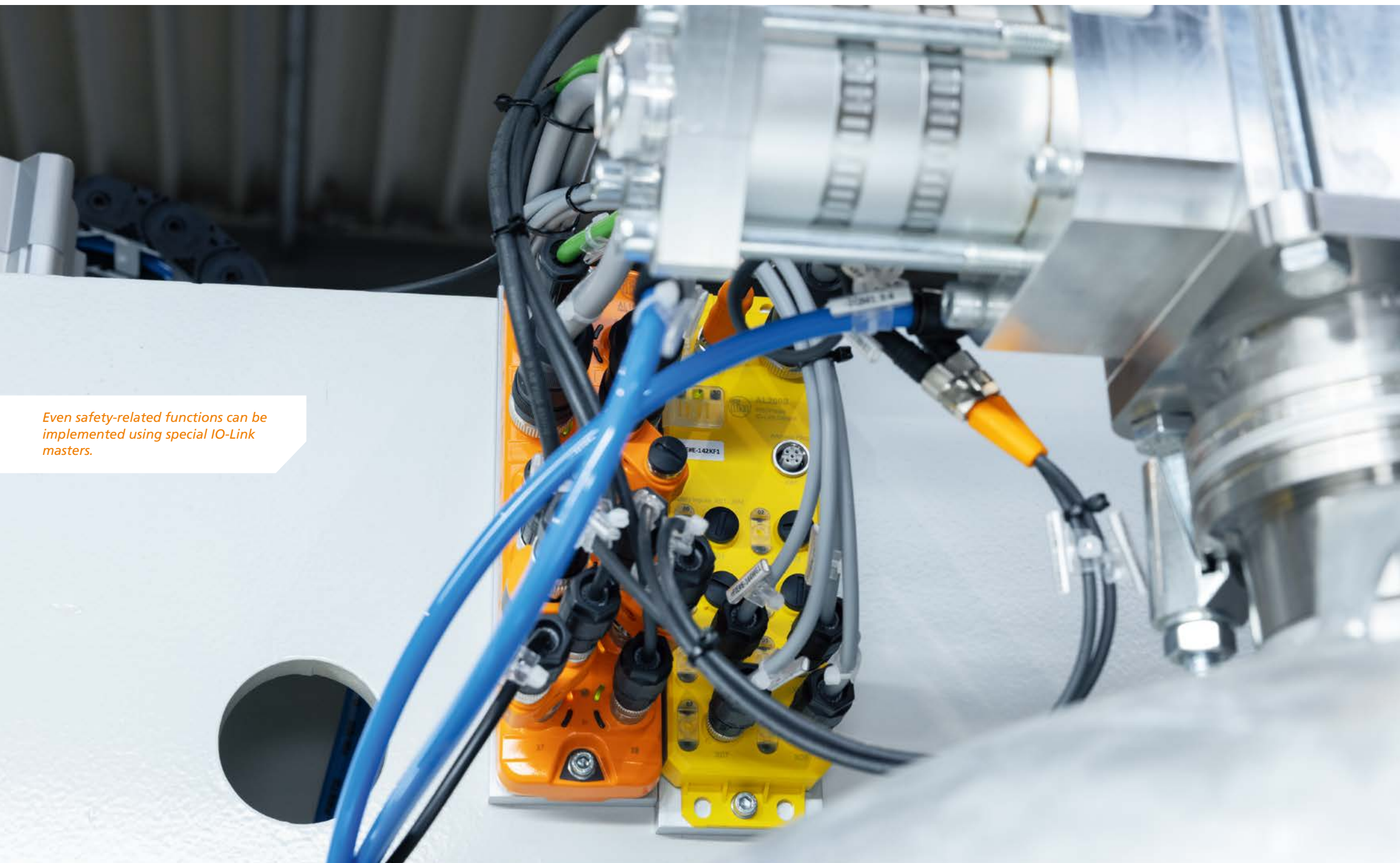
versions: SD6500 for compressed air, SD6600 for forming gas and SD6800 for helium. The sensors allow us to derive consumption trends, which would not be possible with such precision without IO-Link. Thanks to the extended information from the sensor, we can collect daily, weekly and monthly consumption data in the controller, provide customers with insights into important trends and detect internal leaks in machine lines. Our customers ultimately benefit from cost savings. Efficiency and quality have greatly improved through the use of IO-Link sensors when compared to analogue signals. We can now determine much more accurately whether a sensor, e.g. the pressure sensor, has a problem or functions reliably. Our diagnostic capabilities were not as extensive before, which meant that automation was much more difficult. Thanks to the diagnostic function via IO-Link, we can stop the process in time and avoid expensive subsequent faults."

Connecting analogue sensors via IO-Link

In addition, conventional analogue sensors with 4...20 mA output can be seamlessly integrated into the IO-Link infrastructure using the DP2200 converter plug. One example are the vacuum pumps, which feature high-precision absolute pressure transmitters (PT0505) with analogue current output. The converter plug integrates these sensors digitally into the IO-Link infrastructure and connects them to the controller.



Even safety-related functions can be implemented using special IO-Link masters.



” Thanks to the diagnostic function via IO-Link, we can stop the process in time and avoid expensive subsequent faults.



The IO-Link-based LED light tower is clearly visible from a distance and features an integrated buzzer.

Safety over IO-Link

Even safety-related signals can be transmitted via IO-Link. W. v. d. Heyde uses the AL200S PROFIsafe IO-Link module from ifm.

Thorben Reyelt, Team Leader Electrical Engineering: *“We have integrated the AL200S IO-Link module into the machine so that we can safely stop the movement of the actuators. This means that our machine remains in a safe state and stops when the door is open. Operator safety is ensured as no movement can take place in the machine in this state. This is especially important when performing maintenance work or checking processes within the system.”*

The PROFIsafe IO-Link module has safety-related digital inputs and outputs that can be used, for example, to connect safe mechanical contacts, actuators or OSSD sensors. It is controlled via the PROFIsafe telegram, which is tunnelled via IO-Link. The AL200S module features eight digital inputs and four digital outputs, the latter with a maximum rating of two amperes.

Status indication

The status of the test system is clearly indicated by optical signals. The test area is equipped with coloured LEDs, which light white during system set-up. Once the rim test is completed, the LED colour visibly changes to green or red depending on the test result.

In addition, the machine and test status is displayed in colour on the machine roof using a 3-segment LED light tower of type DV2310. The light tower can also be conveniently controlled via IO-Link.

Moreover, W. v. d. Heyde took advantage of a special feature of the light tower: If the flow sensors detect a leak in the pipes of the system, a leakage detector is used to find the leak, which the user manually guides along the pipes. The measurement signal from the leakage detector controls the audibility of the buzzer integrated in the light tower in the range from 0 to 100 per cent via IO-Link. So, the closer the detector gets to the leak, the louder the buzzer signal becomes. This acoustic feedback enables the user to easily and quickly pinpoint leaks on the machine, even in noisy production environments.

Conclusion

By switching to IO-Link-based technology, the company W. v. d. Heyde was able to significantly improve its leak testing process for aluminium wheels. Through the integration of IO-Link into the sensor level, not only are conventional sensors used more efficiently, but safety-related signals are also transmitted safely. The possibility to signal both the machine status and the test status visually and acoustically improves ease of use for operators and helps to identify problems quickly. Overall, the IO-Link technology used at W. v. d. Heyde enables more precise, more efficient and safer leak testing of aluminium wheels, which ultimately leads to higher quality and cost efficiency in production.



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