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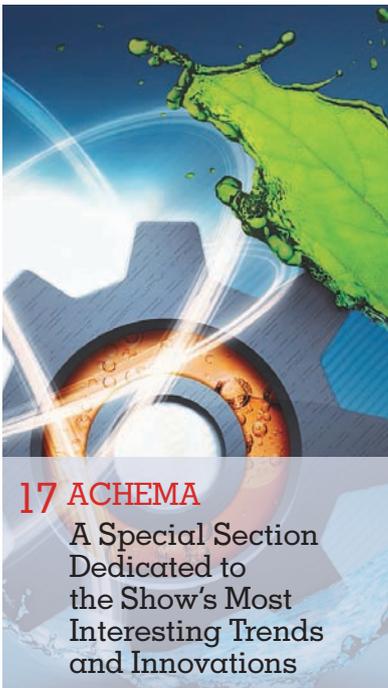
PCN Europe

processing & control news

ACHEMA SPECIAL

The Challenge of a Flexible Dosing System

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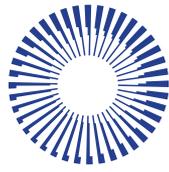
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Sara Ibrahim
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editorial

Wind of Change

Three years have passed very fast from the last **ACHEMA** show and now the most important appointment for every player in the process industry is fast approaching.

On this occasion, our May issue is traditionally devoted to **ACHEMA**, with special focuses, interviews, insights and previews. Three years ago, we had the wonderful possibility to collaborate directly with **DECHEMA** and to publish one of their catalogues, which was connected to the focal topic "**Process Analytical Technology**". A great experience that let us see first-hand the backstage of the exhibition and put us through to the very heart of the show: the high-profiled exhibitors and major companies of the process industry.

This year, with the upswing of the process industry and the evolution towards the IoT, the angle of the show has changed in a somewhat radical way: themes such as **Flexibility and Modularization** and **Logistics** have upstaged and are now of paramount centrality. These are not the traditional topics you would expect to see developed in this very context. This means that also the heaviest and most conservative industries are responding to the **4.0 revolution** to adapt themselves to the general wind of change.

For the **Chemical and Pharmaceutical industry**, for example, this implies a strong focus on each part of the process, making it less strict and **more adaptable** to different production needs, without affecting the productivity but increasing the overall efficiency and performances.

Logistics, and especially **Logistics 4.0**, is another key trend when it comes to the Chemical and Pharmaceutical environment, but not only. Digitization also debuted in this domain, where the need for higher-level solutions is very urgent. The traditional **supply chain management** and distribution are becoming more and more interconnected and this opens the doors to faster, more complex and intense supply operations.

As usual, in May we also deal with **Industrial Biotechnology**, but the new entry this year is the **Medical** feature, which is very much linked to bio-based processes.

Don't miss the opportunity to meet us and explore all these themes together at **ACHEMA!** You can find us in **Passage Hall 5.1 - 6.1, booth B12!**

Sara Ibrahim

Editor of PCN Europe

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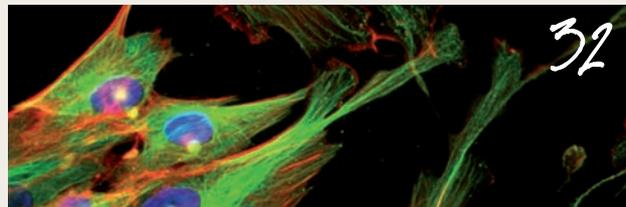


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Asahi Kasei Europe Started a Demonstration Project for the Production of Green Hydrogen

Asahi Kasei is intensifying its activities in the field of hydrogen production in Europe. The Japanese technology company is a leading supplier of chlor-alkali electrolysis systems, which are used in 126 production sites in 26 countries worldwide. Based on this technology, the company developed an alkaline-water electrolysis system which is suitable for use with fluctuating power input such as from renewable energy sources. The highly efficient system offers scalability up to 10 MW, allowing the customer to produce a large quantity of hydrogen with a single unit. On April 27 2018, Asahi Kasei Europe, the Asahi Kasei Group's European operational headquarters, started a demonstration project to produce hydrogen from simulated wind energy in the Hydrogen City of Herten in the German state of North Rhine-Westphalia. The joint project together with the Hydrogen Competence Center h2herten will contribute to the development of an electrolysis system to produce green hydrogen on a large scale.



TE Connectivity celebrated 75 Years of PIDG Terminals and Splices Production

TE Connectivity (TE) celebrated 75 years of production of its PIDG (Pre-Insulated Diamond Grip) terminals and splices. TE's predecessor company AMP began making PIDG products in 1943, when company founder, Uncas A. Whitaker, invented a breakthrough insulation support sleeve that offered better terminal performance under high stress. PIDG became the terminal of choice for aerospace manufacturers and quickly spread to other industries. PIDG can be found in most

manufactured products where wires and cables are used including control cabinets, power supplies, transportation equipment and appliances. The many millions of PIDG terminals that are still deployed decades after installation are a testament to the rigorous testing and research that went into their design and manufacturing. PIDG terminals and splices are designed for complete and uniform reliability in the most difficult circuit environments, with high resistance to vibration. They consist of a nylon or PVC insulation, a tin-plated copper body and a copper sleeve that crimps to the wire insulation for added support.

Porvair Sciences Appointed a New OEM Business Development Manager

The appointment of Bob Brino as OEM Business Development Manager for microplate and sample prep product lines was announced by Porvair Sciences and J.G. Finneran. Bob came to Porvair-Finneran with twenty years' experience in microplate design, manufacture and marketing across North America with Greiner Bio-One. As a Biology Major from Temple University, Bob brought invaluable experience to the Microplate Business Unit within Porvair-Finneran. Using new and expanded facilities at J.G. Finneran's Vineland NJ manufacturing plant, Porvair Sciences is introducing their full line of ultra-clean polypropylene microplates to the North American market. These superior quality plates are available through a comprehensive US dealer and international distributor network in addition to many blue-chip private-label companies.



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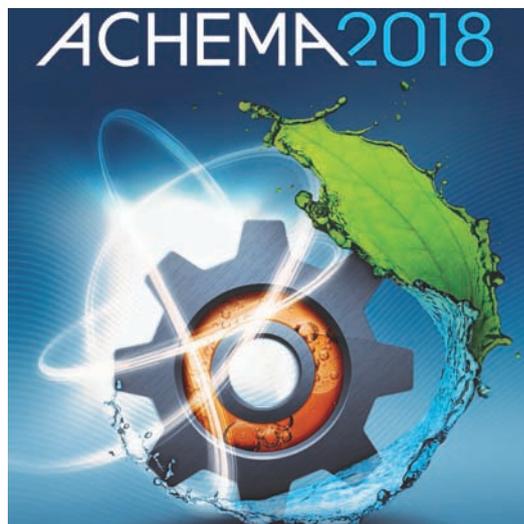
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The Look of the Process Industry in 2025

Experts say that in 2025 the process industry will look more flexible, more integrated, more biological. At ACHEMA 2018, three focal topics bring “Flexible Production”, “Chemical and pharma logistics” and “Biotech for Chemistry” to the forefront. Megatrends affect whole industries from equipment to processes to business models. Consequently, they cannot be covered within one exhibition group. ACHEMA answers to this by defining three focal topics that draw attention to developments affecting all stakeholders in the process industry, from lab supplier to pump developer to plant engineer and operator. Thus, aided by markings at the stand to dedicated topical magazines, visitors can get an overview on where the process industry is headed.

THREE TRENDS AT ACHEMA 2018

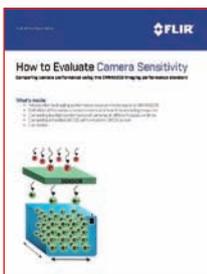
Digitization has been a major driver of the process industry for some time – and it’s no end in itself: “Future chemical production has to react more flexibly – to different raw materials, to a volatile energy supply, and to customer demands for more individualized products”, said Dr. Andreas Förster, Subject Matter Expert Chemistry at DECHEMA e.V. The focal topic “Flexible Production” at ACHEMA 2018 specifically addresses these aspects: Modular plants that can be assembled from „plug and play“-components; Robust technologies that allow for variations of production volume; Automated process control that uses real time measurements to optimize processes. Closely related to flexible production are chemical and pharma logistics. These used to be perceived as something happening outside the factory gate, but in times of integrated supply chains they have become a significant factor in production. The third focal topic „Biotech for Chemistry” showcases the integration of chemical and biotechnological methods.



white papers

How to Evaluate Camera Sensitivity

Flir System. Comparing basic camera specifications such as frame rate, resolution and interface is easy. Comparing imaging performance of cameras such as quantum efficiency, temporal dark noise and saturation capacity is not. First we need to understand what these various measurements really mean. What is quantum efficiency and is it measured at the peak or at a specific wavelength? How is signal to noise ratio different from dynamic range? This white paper will address these questions and will explain how to compare and select cameras based on the imaging performance data following the EMVA1288 standard. EMVA1288 is a standard that defines what aspects of camera performance to measure, how to measure them and how to present the results in a unified method. The first section of the white paper will help to understand the various aspects of imaging performance of an imaging sensor. It will outline the basic concepts that are important to define the performance of the sensor.



A Close Look at Vision Guided Robotics

Teledyne Dalsa. We’ve all seen videos of robots rapidly assembling cars with little or no human intervention. Industrial robots like these have cut costs and increased productivity in virtually every manufacturing sector, but they have a major shortcoming—they can’t “see.” Programmed to repeat exactly the same motions over and over again, they are unable to detect and maneuver objects of different shapes, sizes, and colors, or objects that touch and overlap. So if a product changes or is added to the production line, the robots must be reprogrammed. Now a new generation of robots guided by advanced machine vision is taking robots far beyond the repetitive tasks typically found in mass production. Fuelled by smaller, more powerful and less expensive cameras and other vision sensors, sophisticated robotic algorithms and processors, these Vision Guided Robot (VGR) systems are rapidly transforming manufacturing processes.



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ROOM SENSORS

Measure the relative humidity and temperature



The relative humidity and temperature in commercial and residential buildings can be measured with EE10 room sensors from **E+E Elektronik**. The sensors are now also available with Modbus RTU or BACnet interface,

which facilitates integration into modern climate control systems. The functional enclosure allows for fast and easy installation. The EE10 room sensors family includes models for humidity and temperature measurement as well as for temperature measurement only. Featuring analogue (current/voltage) or digital (Modbus RTU / BACnet) outputs, EE10 is particularly versatile. Digital EE10 devices calculate additional physical quantities such as absolute humidity, mixing ratio, enthalpy.

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CALIBRATION VERIFICATION SYSTEM

Reduces flow meter operating costs



The time-consuming and costly task of traditional flow meter calibrations, which requires shutting down the line, pulling the meter, installing a spare and paying a lab fee, is no longer a painful or costly process with the

innovative VeriCal In-Situ Calibration Verification System for the ST00 Series Flare Gas Flow Meter from **Fluid Components International** (FCI). This industry unique calibration verification system reduces flow meter operating costs in flare gas applications aboard offshore platforms, at land-based oil/gas facilities and in petrochemical plants. The ST100 Flare Gas Flow Meter with the VeriCal In-Situ Calibration System is designed to meet the US Minerals Management Service (MMS) Rule, 30 CFR Part 250.

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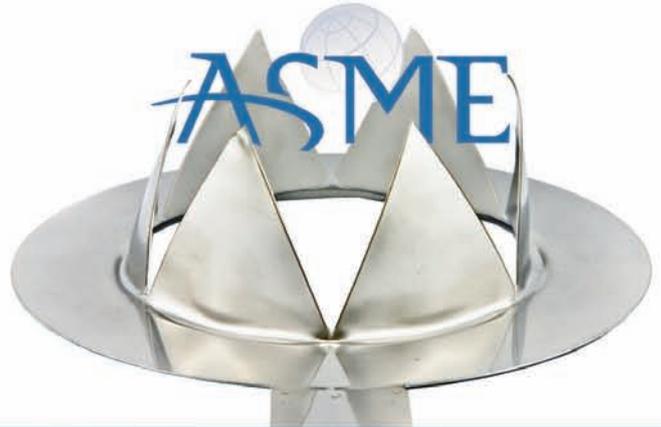
of being able to offer precise loads, no lugs to interfere with other components, and a full 360° contact surface. Once assembled the WaveRing can reduce end-play, vibration and eliminate tolerance stack up in an assembly. Designed to fit into a groove, the WaveRing from **Smalley** applies pressure in two directions; against the groove wall and against the mating components. Single, double or multiple turns in the WaveRing are possible, as well as a choice of materials. The following standard stocked parts are available in carbon steel or 17/7PH stainless steel.

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Are Off-the-Shelf Optics Always the Best Choice?

Mark Pontin, Managing Director of Resolve Optics Ltd., explained in this exclusive interview how optics have played a central role in the transformation of modern manufacturing processes. Despite it, companies tend to prefer off-the-shelf lenses over customized systems, even though this is not always the best choice. Let's find out why

PCN Europe: The process industry is a large, diverse and growing marketplace. What function do optical instruments and sensors play in helping manufacturers and suppliers?

Mr. Pontin: Modern manufacturing processes have been transformed by the use of optics, which can both improve current manufacturing capabilities and enable new ones. Light directed by optical systems can be used to process or probe materials remotely, even through windows isolating harsh or vacuum environments. With no surface contact, there is no contamination of the process by the optical light beam. Optical techniques such as Near Infrared, Short Wavelength Infrared, Mid Infrared and Raman spectroscopy are being used to provide information about and help improve a manufacturing process or to perform manufacturing as in the case of photolithography or materials processing. Independent market research reports

indicate that the global market for process spectroscopy equipment to already be worth over \$1 billion annually.

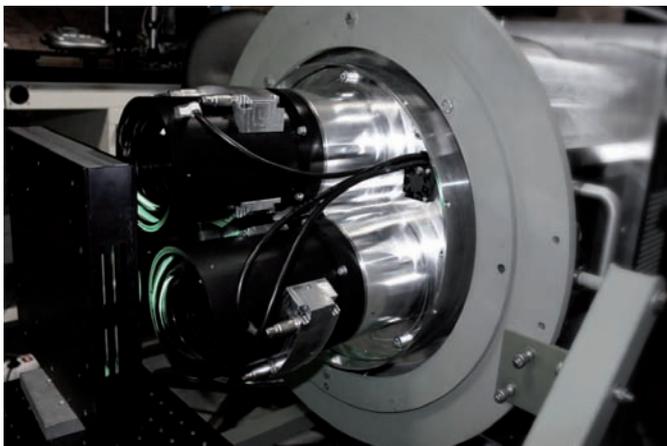
PCN Europe: Resolve Optics is well known for its OEM lens design service. What are the benefits of opting for a custom lens rather than an off-the-shelf lens for your process instrument and sensor?

Mr. Pontin: Typically, off-the-shelf lenses are manufactured for the mass market where unit cost is the dominant driving force. However, when it comes to an application that optically requires something a little more demanding such as high performance, high-resolution, compactness or a large format image, using an off-the-shelf lens will force you to accept a compromise in one or more aspects of optical performance. The result of this compromise can be a reduction in optical performance (restricting process measurement advantages and possible ap-



Mark Pontin, Managing Director at Resolve Optics Ltd.

plications), a bulkier less attractive product, shorter product life and loss of competitive advantage – all of which ultimately lead to lower profitability. As a result, demand for custom lens designs for process instruments and sensors that meet the exact needs of the customer application are rising dramatically.



Ultra large format lenses mounted in B66 Aerial Surveillance camera



B66 Aerial Surveillance camera installed in an aircraft



PCN Europe: Can you give some examples of process applications where Resolve Optics custom lenses have helped manufacturers or suppliers?

Mr. Pontin: I cannot give specific details of process applications helped by optimised bespoke lens designs due to customer confidentiality. However, it is true to say that, driven by the desire to measure or identify something in a process, more accurately, at a lower level or even just faster than process operators want a custom lens design that meets or exceeds their application need without compromise. Our optimised custom designs enable process customers to get the maximum performance from their instrument or sensor without the lens being a bottleneck. We also endeavour to design the lenses to be as future proof as the budget will allow.

PCN Europe: Flexibility and modularization have become more and more important in the process industry: How is Resolve Optics

adapting its lens design, testing and manufacturing capabilities to best suit the current needs of the sector?

Mr. Pontin: Our lens designs are driven by each customer's specific requirements. We ensure that we understand exactly what the customer is trying to achieve, and then specify, design and produce a lens or lens system to exceed those expectations. You could say that we are as flexible as the customer requires us to be. As an organisation committed to reproducibly producing key optical components and systems for our customers of the highest quality we operate to strict ISO9001 guidelines and invest in advanced testing equipment and highly trained staff.

PCN Europe: Do you think that - generally speaking - the successful company of the future will aim more at readiness or at customization in its approach to end users?

Mr. Pontin: Often a lens or optical system is one of the last components of an instrument

or sensor to be considered by a company designing a product. This is not because the optics are considered less important but rather due to the fact that many customers would prefer to go for a readily available off-the-shelf lens. While this may be a suitable optical component sourcing strategy for some process applications, if the target application is a bit more demanding (high performance, available space, wavelength) – an off-the-shelf lens is often not available. In such scenarios, choosing to develop a custom lens system optimised to the exact requirements of the application is the best option. Not only is an optimised sensor / instrument more likely to do the job, but it can give the supplier a competitive edge over other suppliers' products that try to utilise non-optimal components.

Sara Ibrahim

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Configured Products: The Magic Words

Install, control, and report in hazardous areas. Pepperl+Fuchs can provide assembled enclosures in just five days thanks to the intelligent configurability, meeting the needs of installers that expect quick delivery from electrical equipment suppliers

Pepperl+Fuchs has been a well-established name in the automation of process plants with hazardous areas for many years. Its products, equipment, and solutions for electrical installation in hazardous areas ensure very short delivery times thanks to stockable or configured products. This experience has now been put to good use so that installers and users benefit from electrical components that feature compact dimensions, well-thought-out designs, and are specifically intended for quick and simple installation.

DEDICATED ASSEMBLY LINE

“Configured Products” are the magic formula: a strict, rule-based configuration ability incorporated into the corresponding software tools turns enquiries and quotations into child’s play. The ensuing fully automated engineering process also includes certification, thereby saving time and money on the way to installing a perfectly suited box on the wall.



Buzzer with optional flash function in a stainless steel or GFRP housing

Terminal boxes with Ex e approval are typically ordered “on demand.” “I confirm the required number of terminals, fittings and the various accessories with my customers directly over the phone,” says Julian Weiß, engineer and expert for electrical explosion protection. He adds: “After all of the requirements have been clarified, I send a quotation in just a few minutes by email.” This means that, in addition to the parts list, the quotation contains all necessary drawings to clearly indicate the arrangement of the terminals, cable glands, and accessories.

Jobs are allocated to a dedicated production line at the manufacturer’s Bühl plant. A detailed examination is no longer necessary thanks to the configurator. The mounting unit is designed for use in Kanban processes. A CNC machine creates the cable entries on an order-specific basis. A Kanban system is used for the mounting procedure to ensure all parts are easily accessible.

Up to ten identical terminal boxes can be manufactured per order using this line. The production line has been in operation since September 2017 and has been able to fulfill all orders in a timely manner. A new engraving machine means that the parts can be labelled in the factory. The delivery also contains the complete documentation, including certification for operation in hazardous areas.

Pepperl+Fuchs is particularly proud to offer cable glands made from polyamide, which

exhibit the full impact resistance of 7 joules as required by the standards. This means that there is no need for additional mechanical protection on the outside of the housing, which would be a hindrance during assembly. These cost savings also reduce the on-site costs as installation is quicker and simpler.

ALL-IN-ONE SOLUTION: WIRELESS COMMUNICATION IN “EX”

Configured products with short delivery times are only one end of the delivery spectrum— the experts at Pepperl+Fuchs also design tailor-made solutions in cooperation with the customer. They are based on housing solutions with flameproof enclosure “Ex d,” with type of protection “Ex e,” or a clever combination of the two. “Electrical components that do not have their own approval for hazardous areas are installed

in the flameproof housing,” says Jürgen Bächtle, Sales Specialist for System Solutions Ex e, Ex d: “We recently integrated a Bluetooth receiver in a flameproof enclosure with inspection



Tab-Ex® 02 from the Pepperl+Fuchs brand “ecom”



glass. This meant the customer was able to equip its installers with explosion-protected smartphones and tablets. The intrinsically safe Tab-Ex 02 tablet and the Smart-Ex smartphone from the Pepperl+Fuchs brand "ecom" support the latest Bluetooth standards, meaning users can communicate in real-time with both Bluetooth Smart Ready Low Energy (BLE) 4.2 devices and devices that conform to older Bluetooth standards." A connection to the company network

is then made via the Bluetooth receiver, which can be activated on site. The installer activates the receiver on site via a switch and receives access to the works order and documentation. They can directly connect to the instrumentation and read out diagnostics and statuses. The switch simultaneously reports its status to the control technology, so that colleagues in the control room are also notified about the process. "By combining the mobile solutions avail-

able from ecom, digital communication is possible throughout the hazardous area," adds Bächtle.

Pepperl+Fuchs wants to offer its customers a better service from a single source—by expanding the portfolio to include electrical explosion protection. Users appreciate the wide range and the comprehensive automation and installation in process plants.

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Improving Level and Flow Measurement in Petrochemical Plants

Complex processes happen in petrochemical plants. Monitoring operations and preventing accidents is therefore of fundamental importance to improve production. Two case studies from Magnetrol explain how

Monitoring a variety of complex processes is essential in petrochemical plants. Also preventing accidents is of key importance, as well as ensuring that no product is lost and that the highest quality is maintained. The level and flow instrumentation used to monitor these processes often makes a significant impact on plant efficiency and safety.

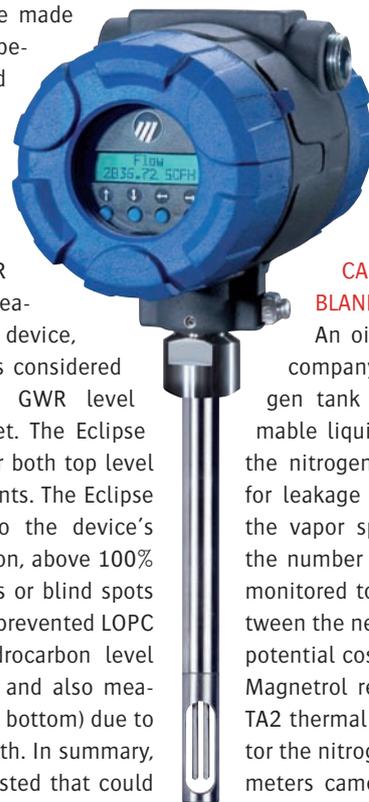
Magnetrol produces a wide range of level and flow instrumentation that can be used in petrochemical plants. Here you find the stories of two plants that improved their petrochemical production and better monitored their facilities by using Magnetrol products.

CASE STUDY #1: NOT ALL GUIDED WAVE RADAR IS CREATED EQUAL

One of the world's largest oil & gas and petrochemical companies was having problems with multiphase applications involving hydrocarbon level with water bottoms and gas vapor space. Guided wave radar (GWR) technology was introduced to monitor these applications. However, the GWR devices selected did not produce a reliable signal throughout the measurement range, and the

dynamics of the interface made it difficult to distinguish between the upper level and the water below. There was a threat of loss of primary containment (LOPC) due to these measurement errors.

Magnetrol pioneered GWR technology for level measurement and its latest device, the Eclipse Model 706, is considered the highest performing GWR level transmitter on the market. The Eclipse Model 706 was tested for both top level and interface measurements. The Eclipse 706 tracked level up to the device's flanged process connection, above 100% level, with no dead zones or blind spots at the top of the probe. It prevented LOPC by tracking the top hydrocarbon level through the vapor space and also measured the interface (water bottom) due to the superior signal strength. In summary, it was the only device tested that could



produce reliable measurements with a completely dry probe, a probe having only one of the two process media present, and under varying interface conditions.

CASE STUDY #2: MEASURING BLANKETING GAS TO REDUCE COST

An oil & gas and petrochemical company in China required nitrogen tank blanketing for their flammable liquid containment. Monitoring the nitrogen was essential to account for leakage and verify flow going into the vapor space of the tanks. Due to the number of tanks, the gas flow was monitored to find the right balance between the necessary nitrogen usage and potential cost savings.

Magnetrol recommended its Thermatel TA2 thermal mass flow meters to monitor the nitrogen for tank blanketing. The meters came fully calibrated and configured so the company could simply install them and power up. Thermatel TA2 flow meters are very effective in extreme low gas pressures, such as in tank blanketing applications.

In addition, total cost of ownership was reduced with calibration verification procedures that could be performed in the field. Since calibrations can cost tens of thousands of dollars and cause process downtime or loss of measurement, this saved money and increased efficiency for the company.



A Thermatel® TA2 monitoring gas flow in a petrochemical plant

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With an off-line or in-line unit



The LSS Vial and Bottle Labeller is specified for vials and bottles made of glass or plastic with a product diameter between 14 and 35

mm and a minimum height of 30 mm. The machine labels up to 250 vials or bottles per minute. The LSS Vial and Bottle Labeller is available both as an off-line or in-line unit. Due to its small footprint and modular design it can be easily integrated into existing production environments. The labeller achieves maximum efficiency not only during the period of time when the machine is running but also by enabling quick and safe batch start / stop, format changes, line clearance, cleaning, maintenance and service. The labelling solution optionally features format parts for multiple product sizes, print on label with thermal transfer printer or laser. Further options include a height adjustable version of the labeller.

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For clean rooms



The food industry puts very high demands on machine constructions, even the tiniest

component has to comply with the hygienic rules. Therefore Enemac has developed several variants of couplings. For clean rooms, the torque limiter ECR and the bellows coupling EWC would be a good fit. The torque limiter ECR, made for torque ranges between 15 and 350 Nm is completely made of stainless steel, even the enclosed disc spring. The bellows coupling EWC, available for nominal torques between 5 and 1300 Nm, consists of stainless steel bellows (1.4571), rust free hub (1.4301/V2A), as well as VA screws. Those elements get bonded by a patented micro-plasma-welding method, to avoid adhesive residue. But even for the not so highly challenging areas there are solutions such as types ECI, ECE and ECG, which are available on request in stainless steel.

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FREEZE DRYER

For pharmaceutical formulation



SP Scientific announces publication of an independent study evaluating their LyoCapsule Freeze Dryer for pharmaceutical

product formulation and process development. The development of biopharmaceuticals often requires lyophilized formulations to produce stable drug products, beginning with laboratory experiments followed by scale-up to larger lyophilizers. Limited supply and high cost of Active Pharmaceutical Ingredient (API) can present major challenges during formulation and process development. It's necessary to have enough API to properly screen formulations for freeze drying feasibility, to understand critical product attributes, and to define product and process design space in order to create a robust freeze-drying process.

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Efficient Supply and Transport of Goods

Transport robotics concept for the security area at Oslo Airport Gebr. Heinemann required an automated transport solution and relied on EK Automation for replenishment of products at duty free shop

Any passenger at the airport opt for a stop at the duty free shop. They always expect the shelves to be filled with wine and liquor, cosmetics and sweets. This requires the smooth-functioning flow of goods – a special challenge for the shop operators, because any logistics concept within the security area of an airport is subject to stringent regulations. Gebr. Heinemann of Hamburg operates one of Europe’s biggest duty free shops at the new international terminal of the Oslo Airport that opened in 2017. The goods for this shop are delivered from the main warehouse in Hamburg to the airport’s goods receipt department. From there, they have to be transported to the duty free shops according to demand.

FIRST TRANSPORT ROBOTICS SYSTEM AT AN AIRPORT

For the efficient supply of goods, the operator of the shops, Gebr. Heinemann, required an automated transport solution and decided to introduce the world’s first driverless transport system into its duty free area at Oslo airport. Gebr. Heinemann chose EK Automation based in Rosengarten near Hamburg to implement the

solution. With about 180 employees worldwide, the company specialises in Automated Guided Vehicle (AGV) and materials handling systems, and is one of Europe’s leading manufacturers of driverless transport systems (DTS), also known as transport robots. The specialists at EK Automation develop intelligent and efficient transport robotics solutions that are customised to individual requirements.

Felix Schad, the EK Automation project manager for this job, describes the special challenges of this project: “The pallets have to be transported over several levels by using elevators and by driving through long, narrow passageways at the Oslo Airport. This takes place in different security areas of the airport. It is therefore necessary that the goods will not be manipulated during their transport passages. Gebr. Heinemann decided to work with EK Automation for the implementation of a 3D simulation to develop the ideal transport concept and to determine the optimum number of transport robots. A model of the AGV system simulated different versions of the process flows, from which the best solution was cho-



The control system of the transport robots ensures a safe and controlled vehicles guidance

sen. The simulation made it possible to identify unforeseen challenges, planning risks and bottlenecks. Thanks to the simulation tool, the company was able to realize their automated transport system at its optimum and to achieve maximum efficiency, despite all its special requirements and circumstances.

Based on the simulation results, it was possible to determine the right number of automated guided vehicles needed for this transport solution, means the material flow crossing several airport areas with direction to the ‘departure area’. For this purpose, the specialists modified standard forklifts. These forklifts were retrofitted with straddle legs and equipped with a laser navigation system.

The goods will be transported on pallets from the airport’s goods receipt department to the delivery points. In order to pick up the pallets, the AGV control system sends signals to the vehicles for starting collection of the goods and their transport way to the shops. The transport control system from EK Automation remains permanently in communication with the vehicles at every point along the route.



The sensors enable exact positioning of the pallets of goods on the vehicle’s forks for the on-demand delivery to the shops



Standard fork lifts are equipped by EK AUTOMATION with laser navigation for their automated transport solutions





**INNOVATIVE LIGHT BARRIER
SENSOR PROTECTS GOODS**

The AGVs are equipped with a unique security system. "EK Automation transport robots protect the pallets by using an innovative sensor solution that creates a light barrier around the goods. This enables immediate detection of any intervention during transport through the supply passageways. In this case, an alert is sent and the transport robot drives to a checkpoint, where security employees can initiate the necessary measures" Felix Schad explains.



The goods for the duty-free shops are transported through the security areas of the airport in a fully automated process



On the way through the supply passages a light barrier sensor protects the pallets on the transport robots against unauthorised access

**CUSTOM SERVICE PLAN, SHORT
RESPONSE TIMES**

Another requirement of the project was to create a customised service concept to guarantee short response times for the operators of the duty free shops, including the fast supply of spare and wear parts. EK Automation provides a 24/7 hotline for the customers in Oslo. In the event of a service call, the specialists in Rosen Garten first establish a remote maintenance connection to decide whether the problem can be solved via remote control or if a service engineer is required on site. For this purpose, EK

Automation has engaged a local service partner who can be at the airport within two to four hours. "It has proven worthwhile to integrate and qualify this partner in the very early stages of the project. The service calls that have been necessary so far confirm the smooth-functioning chain in cooperation with the client and the local partner," according to Marco Bemmlotte, Head of Customer Relationship Management at EK Automation.

In retrospect, Felix Schad and Marco Bemmlotte, they both agree that the cooperation of the various partners was a major factor for the success of this demanding transport robot-

ics project. The client, Marco Rebohm, Director Global Logistics at Gebr. Heinemann, likewise draws a positive conclusion: "The AGV that we developed in cooperation with our project partner EK Automation, with an integral analysis of all relevant processes and requirements, provides for the efficient and reliable transport of goods in a structurally restrictive and highly dynamic environment. At the same time, the innovative scanner technology ensures the tamper-proof transport of goods within the security area in adherence to the regulations."

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A Smooth Upgrade for the Mont Blanc Tunnel

Accontrol S7 programmable controller simulation software from Delta Logic played a key role in the development and implementation of a new SCADA system for the Mont Blanc Tunnel. Thanks to this software, it was possible to achieve a smooth transition to the new SCADA system without interrupting traffic flow through the tunnel

Author: Thomas Hönle, CMO at Delta Logic Automatisierungstechnik

The Mont Blanc Tunnel provides a crucial road link between France and Italy. It is 11.6 km long and is used by around 12,000 lorries each week, plus a double number of cars, although the volume of car traffic is subject to seasonal fluctuations. The tunnel was completed in 1965 and was in continuous use until 1999 when a disastrous fire meant that it had to be closed for three years.

As part of the refurbishment following the fire, new control systems were installed for all the major functions in the tunnel including, for example, ventilation fans, toll barriers and lighting. Altogether, the tunnel's control systems used 41 programmable controllers (PLCs). A SCADA system working in conjunction with the PLCs was provided to allow operators working in the two tunnel control rooms – one in France, the other in Italy – to monitor and control the equipment in the tunnel.

By 2012, it was becoming clear that, while the PLC systems were still operating entirely satisfactorily, there was a need to update the SCADA system. The principle reason was that an update would bring the operator interface up to modern standards and provide valuable extra functionality. Another factor was that the old SCADA system was running on a version of Windows that is no longer supported by Microsoft.

Safety is key - the new SCADA system offers enhanced control over the airflow systems so that the spread of smoke through the tunnel is minimised ((Source: GEIE-TMB))

After a rigorous competitive tendering process, the contract to supply the new SCADA system was won by Giordano & C Spa, an Italian company with wide experience of developing and supplying electrical systems for major civil and industrial projects. However, in devising a SCADA solution for the Mont Blanc Tunnel, the Giordano engineers faced two daunting challenges.

GETTING READY FOR SIL2

The first was that the changeover between the old and new systems had to be accomplished without disrupting the traffic flow in the tunnel. Access for installing and commissioning the new system would only be available on 25 nights, for six hours each night. The second challenge was that tunnel operator GEIE-TMB specified that the new SCADA system should meet the safety requirements for SIL2 compliance in line with IEC 61508. This is an important step towards making the Mont Blanc Tunnel the first major road tunnel in the world with SIL2 compliant electrical systems.

To aid development of the SCADA system and

to ensure that it would meet all of GEIE-TMB's requirements, including those for new functionality, and also to guarantee fast problem-free installation and commissioning, the Giordano engineers knew that they would need to accurately simulate the operation of the tunnel's 41 PLCs. Carrying out trials of the new SCADA system with the live PLCs in the tunnel was impossible because of the disruption this would cause.

ACCONTROL S7 CAN SIMULATE 50 PLCS

Ultimately, it was found that the Delta Logic Accontrol S7 simulation software was the best match for the needs of the project. It could accept PLC programs directly downloaded from the live PLCs in the tunnel, which would save a lot of time and eliminate the risk of errors, it could also meet the timing requirements, it was intuitive in operation and it was affordably priced. There was, however, one remaining issue.

SMOOTH GO-LIVE ENSURING MAXIMUM SAFETY

With the new SCADA system up and running, the simulation packages are no longer routinely needed for development purposes, but they are still being used regularly to provide training for the tunnel operators. Each of the 25 operators, who between them provide coverage 24 hours a day, every day of the year, receives between one and two hours of training every week to help maintain and improve their skill levels.



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PCN Europe
presents

ACHEMA Special Section

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Riding the Process Upswing at ACHEMA

A new edition of the most important show for the process industry is fast approaching. In this rapidly changing industrial scenario, that is evolving to fulfill the transition to Industry 4.0, ACHEMA represents the most important litmus test for many sectors, from Chemical to Biotechnology. PCN Europe interviewed Dr. Thomas Scheuring to get the details of this revolution

PCN Europe: The process industry has seen a huge upswing in the last years. How has this impacted on ACHEMA and what's new compared to the last edition?

Dr. Scheuring: ACHEMA is much less prone to the cyclical up- and downswings every industry experiences. However, this year we notice the tailwind from our industries. Exhibitor demand has been large, even overwhelming in exhibition groups such as pharma, logistics and storage technologies where we rent an additional hall. In the automation sector, it's similar. But more "traditional" sectors such as mechanical engineering also see an increase. ACHEMA rests on the well-established pillars in the form of our eleven exhibition groups and the interaction between exhibition and congress. The details of the build-

ing change every time – we have three very well-received focus topics, we have expanded the PRAXISforums as special application-focused session close to the respective exhibition halls, and we are always adjusting some bolts and screws that you might not even notice as a participant, but which improve the overall experience.

PCN Europe: Biotech for Chemistry, Chemical and Pharmaceutical Logistics and Flexible Production are this year edition's focal topics. Can you tell us how these three features have changed the process industry?

Dr. Scheuring: Biotech for Chemistry has been on the agenda for quite a while now. For the longest time "biotechnology or chemistry" was a question of principle when it came to producing active pharmaceutical



Dr. Thomas Scheuring, CEO of DECHEMA Ausstellungs-GmbH



ingredients, polymers or fuel. In today's bio-economy more and more processes now use the best of both worlds.

The focal topic "chemical and pharmaceutical logistics" highlights the whole supply chain from intralogistics to intermodal transport. How flow of material is controlled within the plant is the responsibility of the company, but inbound and outbound transport is often taken care of by service providers. These are becoming increasingly system partners with higher-level solutions – the digitization of the logistics chain opens new doors in supply chain management and distribution.





If you want to compete in the dynamic world markets, flexibility is key – in every aspect. Smaller batches, more specialized products, faster cycles – in the end, the quality needs to be right. The digital integration of the value chain makes it possible. The focal topic “flexible production” highlights the current status of industry 4.0 and shows where the market is headed. This includes concepts for smaller and more specialized product batches, faster cycles, modular concepts and more.

PCN Europe: What are the expected figures at this year’s show and what’s the growth rate experienced in this years and forecast?

Dr. Scheuring: We are always very careful with predictions - there are too many factors that have an impact on event attendance. However, for this year’s edition, our expectations are optimistic. We expect slightly increased numbers in the exhibition and hope that this wears off on visitor numbers, too.

PCN Europe: Flexible Production is an important subject for the most competitive companies. It means being able to adapt the production to a more dynamic and fast-changing world, while fulfilling the transi-

tion to Industry 4.0. How does Modular Production help this transition process?

Dr. Scheuring: Modular production is key to more process flexibility. In Hall 9.2 on the showcase stand “The Age of Modular Production” you can experience how suppliers, researchers and users are cooperating to develop new concepts of modularization. Imagine a plant where by rearranging the components in their respective modules you can produce one thing today and another tomorrow? Where you can switch between different resources depending on their availability? Or that you can ship in a container to any place in the world and start right away to produce a vaccine to fight a local epidemic? Some of these visions have already come true – ACHEMA is the perfect place to make the others happen.

PCN Europe: ACHEMA vs ACHEMASIA or ACHEMA together with ACHEMASIA? Asia, and especially China, is a growing market which is far more competitive than Europe. In the light of this evidence, do you think that ACHEMASIA puts itself more in competition or in continuity with ACHEMA?

Dr. Scheuring: ACHEMA has seen a large increase in participation from Asia, especially

China. Still, ACHEMA and AchemAsia are two distinctly different events and each exists in its own right. ACHEMA is the global forum of the process industries; Chinese exhibitors account for one of the largest groups, but there is equally high attendance from many European exhibitors, e.g. from Italy or France, and Germany, of course. AchemAsia started in 1989 as a kind of “ambassador”, bringing the worldwide process industry to China. It has evolved into a forum where participants from different regions meet at eye level and learn from each other. We stay abreast of these changes and will relaunch AchemAsia next year, moving to Shanghai and focusing on what really moves Asia today: AchemAsia - International Expo and Innovation Forum for Sustainable Chemical Production.

PCN Europe: Resource, Digitization and Energy Climate are among the hottest discussion topics highlighted at ACHEMA. How would you start the conversation for each of these thematic points?

Dr. Scheuring: We need to protect our resources – for material use as well as for energy generation – and our environment, and the process industry is already doing a lot in this way. To find out more on this topic, it would be worth to visit ACHEMA on Monday where we have bundled a lot of the congress sessions along with a panel discussion in the theme day “Resources”. For visitors more interested in energy and climate change, Wednesday is the day to mark on the calendar; among others, we will have a plenary tandem lecture on sector integration. While to learn how digitization affects the chemical industry, there will be the chance to hear about technological opportunities but also about new business models in the theme day “Digitization” on Tuesday.

Sara Ibrahim

►► 55154 at www.pcne.eu



The Challenge of a Flexible Dosing System

In chemical and pharmaceutical environments, it is sometimes hard to maintain the integrity of the product during dispensing operations, especially in IBC. This challenge was accepted by CO.RA. with its DUK, a flexible and easy cleanable system that features accurate and repeatable dosing

The use of modular solutions in the process industry is able to guarantee production flexibility to the pharmaceutical producer who can thus afford production lines dedicated to several products, managing to amortize the cost of the plant in a shorter time and have less impact in terms of overall dimensions in the factory.

At each production stage, maximum efficiency is required without sacrificing the quality typical of the pharmaceutical sector. All this requires procedural solutions that are increasingly automated and technologically advanced.

One of the areas that are most subject to the optimization process is that of Solid Handling. And it is in this area and in the associated area of logistics that cost containment efforts are concentrated.

Often the tendency is to specialize more and more the departments and the personnel involved, dividing the skills that are specific to the production areas from those of the packaging areas. In this context, we often come up against organizational challenges that sometimes can hardly be overcome. For example, let's take the need to transfer the raw materials and the active ingredients inside an IBC to proceed with the preparation of a mixture.

Maintaining the integrity of the product is essential and is a problem with which Dispensing departments in the pharmaceutical world are confronted daily. The Dispensing area is one of the key production areas, it is here that contamination is possible as the product is very exposed to the environment and where it is possible to commit mistakes during the dosing of various ingredients.

The challenge accepted by CO.RA. in this case, concerns the transfer of raw materials such as excipients or active ingredients inside an IBC. The solution developed, the CO.RA. DUK is a point of pride for the complexity of the project. Among the project specifications that CO.RA. took into account, is the need to have accurate and repeatable dosing ($\pm 100g$), a flexible and easily cleanable system.

The system must be a safe and ergonomic working environment for the operator as well as ensure that it can fill the various IBC's with the different products that are found in the various containers that can be: drums of different sizes or paperboard sacks.



Gripping element with load cells

DUK SYSTEM

The flexibility of the system CO.RA. DUK is evident from the beginning of the handling cycle, with the use of the semi-automatic manipulator that has a lifting column function: rotation and tilting. The careful design and the care in the manufacturing of the CO.RA. DUK ensure it operates safely, according to the highest GMP standards and with a reliability that is typical of ball screw solutions in pharmaceutical environments.

Thanks to the quick release gripping system it is possible to load different types of raw materials stored in just as many types of different packages from time to time.

DISCHARGING HOPPER

In order to load the most common excipients like sugar or starch it is necessary to have a solution that will allow you to break the various bag formats safely and ergonomically. That is why CO.RA. designed a hopper with a "bag breaker" which is able to ensure discharge of powder under totally safe conditions. The hopper is equipped with a safety grid: to prevent the entry of foreign bodies in the product; a



Discharging hopper





Duk Systems

suction point: to limit dust clouds derived from violent discharges of powder; and a safety cap: to ensure the confinement of the powder discharged. The structure's particularity is the disconnection system between the hopper and the trolley below, which imply benefits in the treatment of the product. By leaving the

wheels on the ground and not bringing them over the bin it is guaranteed that the product is never contaminated by external agents.

GRIPPING ELEMENT WITH LOAD CELLS

While loading the various excipients it was necessary to weigh the product both when loading these into the hopper as well as when discharging them in the bin.

The addition of this weighing system inside the gripping element allows us to constantly monitor the quantity of product present in it. Furthermore, thanks to the display, it is possible to dose the product with an accuracy of ± 100 gr which makes it a very precise system in comparison to many other systems where the weighing process is carried out directly in the bin, resulting in loss of resolution due to heavy loads.

CYCLONE

The cyclone located above the suction point, allows the recovery of product sucked up into a tank. In this case disposed of thrown away directly, so it does not clog the filters of the aspiration system.

ROTARY VALVE

By capsizing the drum or by simply discharging the product into the hopper, the powder is then conveyed to the dosing valve which is com-

posed of a Rotary Valve.

In this case the control of the rotary valve is not carried out by an automated system (PLC) but by a simple pneumatic control panel in order to simplify the operator's activities. The achieved accuracy of ± 100 g was more than satisfactory in this case. For safety reasons the rotary valve is equipped with sensors to avoid hazards during the cycle start-up.

CONNECTION SYSTEM

Prior to the actuation of the rotary valve it was necessary to ensure a connection system between the Bin and the bag breaker and between the Bin and the gripping element for drums.

The most flexible solution was found to be a silicone cap with a center hole.

This ensures an easy connection and above all avoids operations by the operators under the suspended load.

Thanks to the limit switches installed on the CO.RA. DUK it was possible to precisely center the loading inlet of the BIN after lifting the product. In this way, with a simple rotation and descent the connection is made automatically. The connection is provided with mechanical sensors to ensure that the Rotary Valve will not open before the connection has successfully taken place.

CONCLUSION

With this new application we are able to handle 15 different types of drums and 8 different types of cardboard bags without having to make changes to the system.

This ensures a wide range possibility to work with almost all types of pharmaceutical containers and not only.

The proof lies in the fact that we have made four of these identical systems for the subject customer, who has chosen to follow the route of flexibility and speed even with vastly different packaging conditions.

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Duk System with discharging hopper



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Remote Maintenance “Recipes” for the Pharmaceutical Production

For a service provider in Düren, Germany, an automation retrofit includes secured remote access to ensure high equipment availability. To that end, the firm relies on Security Modules and a new Network Management Platform, which allow secured VPN connections to various Ethernet systems to be easily set up

Author: Maximilian Korff, Product Sales Development at Siemens AG

Automation, consulting, servicing and retrofit services for machinery and equipment – primarily in the pharmaceutical production – are the domain of the ACSR-Solutions GmbH in Düren (North Rhine-Westphalia, Germany). Some of its employees have decades of experience in the development as well as construction and support of the systems employed.

For that, the company has created a tailor-made product range. It includes standardized hardware and software solutions for the efficient operation of tablet presses (TabControl), fluid bed dryers (FluidBedControl), blister packaging lines and cartoner machines (PacControl), as well as granulators (MixControl)

from practically any manufacturer. These form the electronic core for retrofit projects and can be configured with minimal effort for individual tasks. Various applications in the food and chemical industries have also already been implemented.

The standards are regularly reviewed and updated when new functionalities provide added value. Like last year, when Siemens introduced its new Network Management Platform for remote maintenance – Sinema Remote Connect.

USED IN THE PHARMACEUTICAL PRODUCTION

One of the first users to benefit from that

is the Aesica Pharmaceuticals GmbH from Zwickau, Germany. The organization belongs to the British Consort Medical Group and produces various active pharmaceutical ingredients and bulk preparations such as capsules, pills and tablets for various pharmaceutical companies. The production capacity at the Zwickau site is over three billion “units”. The production processes are regularly audited by health authorities from different countries as well as by the customers. The quality management meets the German and European Good Manufacturing Practice (GMP) standards, as well as the guidelines of numerous health authorities around the world – such as the FDA.

Correspondingly high are the demands on the production equipment used and the effort to keep it at a high technical level. Due to its experience and know-how, ACSR was commissioned by Aesica to retrofit two tablet presses. A single and a double rotary press were to be thoroughly overhauled mechanically, and the electrical and automation technology be brought up to date. To once more ensure the long-term availability of spare parts, ACSR replaced the original control of both presses with its PC-based TabControl system. The control cabinets were completely rebuilt, and the main and feeder drives equipped with compact Siemens Sinamics G120C inverters. As the centerpiece for secured remote maintenance, a Siemens Scalance S615 Security Module each was installed in both cabinets. The devices are the link to the new Sinema Remote Connect network management platform set up at ACSR.

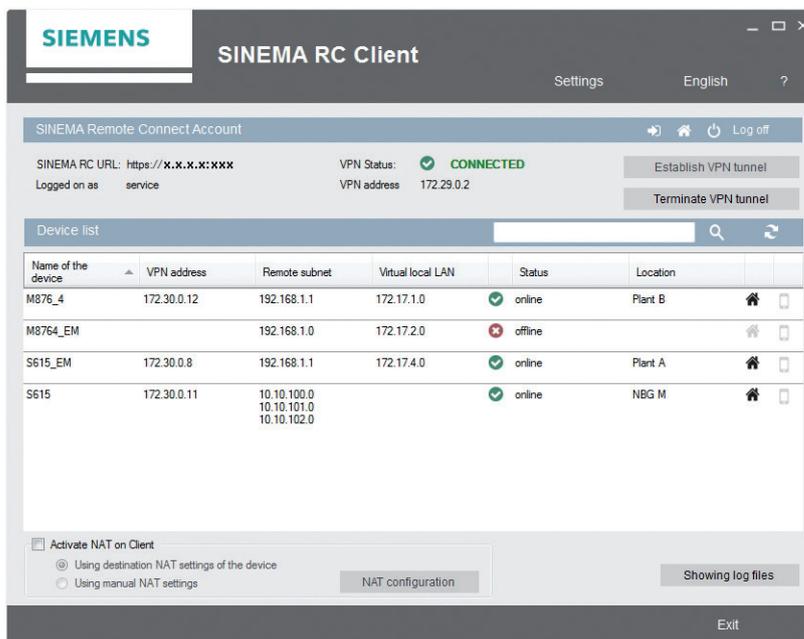


ACSR has already modernized two tablet presses at Aesica and future-proofed them with its TabControl system. Further modernizations are planned





The control cabinets at Aesica were completely rebuilt



With the server application, secure VPN connections can be conveniently created, configured and managed; and be easily selected and established from the address book of the Sinema RC Client

CONVENIENTLY ESTABLISHING A SECURED CONNECTION

With Sinema Remote Connect, secured remote access connections can be very easily and conveniently configured, managed and established using virtual private network (VPN) tunnels.

The communication between the network participants is IP-based and protocol-independent – and therefore universally usable. Via Sinema Remote Connect, the remote access to all communication-capable participants in the local network is possible. Direct access to the company network into which machinery or equipment is integrated is prevented through the firewall settings of the Scalance S615 – the network settings of existing participants do not have to be adapted. “This was also the prerequisite for our IT specialists to, in principle, permit such a remote maintenance system,” says Andreas Ritter, technical director at Aesica. “This gives us the ability to set up remote maintenance for existing plants as well, without having to interrupt the production,” says Klaus Rosenbach, managing director of ACSR responsible for automation. The service technician and the machine to be serviced separately establish a connection to Sinema Remote Connect using OpenVPN. Sinema Remote Connect determines the identity of the participants via the exchange of certificates and enables remote access after successful

comparison. The pharmaceutical company then goes two steps further. It sets up its own VLANs for remote maintenance tasks and only establishes the physical network connection on the Scalance Security Module when necessary and after talking to the service provider.

With the installation of the Sinema RC Client, an address book function is available to the user. With it, a service technician on the road can clearly identify, select and then remotely service machinery and equipment of relevance. This is a decisive advantage in the construction of identical series machines that have the same IP address in the field.

MULTIPLE SECURED VPN CONNECTIONS POSSIBLE

The connection to the Sinema Remote Connect management platform for remote networks can be established using various means such as mobile communications, DSL or existing network infrastructures. For all variants, Siemens offers Scalance routers, which can be easily parameterized by auto-configuration and integrated into existing structures.

Just like the Scalance S615 Security Modules utilized here. The devices are DHCP-enabled and can automatically obtain their IP address from the higher-level company network, which is connected to the Internet. On the automation side of the Scalance S615, each device can have

identical IP subnets, which are then clearly assigned through address translation (1:1 NAT – network address translation) by Sinema Remote Connect. The Sinema Remote Connect server application can receive and manage a large number of VPN tunnels via OpenVPN and IPsec.

SECURED REMOTE ACCESS – WITH GREATER EASE, CONVENIENCE AND FLEXIBILITY THAN EVER BEFORE

Conclusion of Klaus Rosenbach: “The new Network Management Platform from Siemens makes our work as service provider in the field of servicing easier and more convenient. With this central server application and, theoretically, any number of Sinema RC Clients and Scalance S Security Modules, we are able to even better and more flexibly support our system users located anywhere from anywhere. We can remotely intervene in case of malfunctions and minimize downtimes to keep equipment availability and productivity high.” All this with the IT security necessary in the pharmaceutical industry. The access options are flexible and always secured. They have no impact on the operator network – resulting in a high degree of acceptance in the sensitive environment of the pharmaceutical industry.

Hall 11.0, Booth C3

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Containment as a Challenge

Safety is a paramount concern nowadays and in Oral Solid Dosage production the main challenge is the protection of operating staff. This is why containment solutions for OSD are primarily focused on the safety of those involved in producing life-saving medication

By Marcus Behrens, Vice President Sales Pharma Solid at Bosch Packaging Technology

Isolator technology has been an integral part of pharmaceutical liquid filling operations for decades. Many of these parenteral drugs must comply with the highest possible quality standards and are therefore protected from contamination during production and filling. Consequently, the main task of isolator technology is to ensure absolute sterility, thus protecting the product and hence the patient



from any kind of exterior influence. In OSD production, it is of course equally important to protect drugs and patients from any harm. However, the focus is slightly different and more towards the operational part.

OPERATOR PROTECTION IS PARAMOUNT

In OSD production, the main challenge lies in protecting the operating staff. Just imagine an operator who has been working with hypnotic agents for an entire day without the obligatory containment protection. How is he supposed to perform his tasks for an entire shift, or even drive his car home? The same – and worse – is true for extremely potent drugs such as oncology therapeutics or hormones, which are also rapidly advancing in OSD. The need for appropriate containment solutions has evolved with the toxicity of the drugs. Containment prevents biological agents from escaping either both into the working surroundings and the external environment. During capsule filling and even more during tablet compression, operators risk exposure to extreme dust development. Containment protects them from the harmful effects of product contact and product residue during all steps of the manufacturing, pressing and filling process.

It is quite difficult and awkward to protect staff with Personal Protective Equipment (PPE). Highly potent APIs require closed processing and the use of self-containing equipment. Moreover, containment solutions must also be implemented for sampling, cleaning and maintenance activities. Very strict boundary levels have been defined, which make sure

that even an unforeseen leakage will have no negative impact on the operators' health. These levels are expressed in two different ways: the Occupational Exposure Limit (OEL) is defined in microgram per cubic meter, and is related to the maximum permissible API concentration in the air at a workplace during an eight hour shift. The Occupational Exposure Band (OEB) relates to the toxicology of the API. OEB 5 is the highest level of toxicity, corresponding to a maximum OEL of just $1 \mu/m^3$. If transferred to the Empire State Building in New York, the entire building would only be allowed to be exposed to one-twentieth of a teaspoon of this API. Depending on the predefined OEB or OEL, different containment technologies are required to ensure the best possible operator protection.

CONTAINING ALL PROCESS STEPS

Containment systems can be built around existing equipment. They require closed containers or biological safety cabinets, rooms with specially designed air handling and secure operating procedures, as well as containment interfaces, such as infeed, outfeed and de-dusting. What makes them so complex is the required sealing properties. Containment systems must be sealed as completely and as reliably as possible according to the defined OEB and OEL levels – not only during filling or pressing operations but also during sampling, maintenance and cleaning operations. All-round, inflatable seals make sure the contained equipment is optimally closed. Moreover, pressure measurements in the sealing enable operators to react very quickly in case of an unexpected leak.



As far as cleaning of contained capsule filling systems is concerned, we can distinguish two main technical options. The more cost-effective solution for products with a lower toxicity level such as orphan drugs or immunosuppressants includes dry, manual cleaning and an optional wetting function. The use of glove ports and hand-held spray nozzles is probably the easiest way to clean the interior. The nozzles and the use of fine mist enable the operator to accomplish the task up to OEB 4 with as little water consumption as possible while binding airborne particles. The most important prerequisite is that all corners and components are easily accessible.

PROVEN PROCESSES FOR NEW CONCEPTS

At OEB 5, Washing-in-Place (WIP) is not only the safest but realistically the only option. At this level of toxicity, it is even more important to prevent operator faults and to ensure reproducible results. If the washing program is able to store and recall cleaning protocols, WIP processes are reproducible at any time. This is easiest to accomplish with proven technologies and equipment that have been in use for decades.

Relying on established processes also enables an easier transfer of containment technologies to other equipment, such as tablet presses. While the main principles of

containment remain the same, there is one significant difference: tablet pressing operations develop a much higher amount of dust. These large material agglomerations are difficult to bind with mist. However, the operator can still save large amounts of water resources – if the equipment is designed according to the criteria of accessibility and reproducibility.

FROM R&D TO COMPLETE SYSTEMS

With the emergence of more and more highly potent OSD, R&D activities are especially important – not only for the development of new drugs, but also of new containment solutions. Since you never know exactly how toxic a drug is going to be until it has been thoroughly tested, R&D processes require especially flexible containment solutions. Before proven otherwise, a new drug will usually be classified as highly toxic during the first phases. Equipment that is able to handle both very small R&D batches and small to medium production batches is the safest option, both in terms of process stability and containment. Some drug manufacturers have already constructed entire containment facilities, where building and equipment are optimally fine-tuned to one another. Involving the equipment supplier at an early planning stage can help save time, space and costs by integrating all required equipment to complete systems, including elements such as the air management system, a WIP center to supply cleaning materials, or an automated remote monitoring system for lights out operation capabilities. Thanks to the use of sensors and the increasing connectivity of machines and facilities, manufacturers can further increase production flexibility and efficiency – and are well equipped for future containment challenges.



Hall 3.1, Booth C71

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FREE DIGITAL SUBSCRIPTION

N° 5 - MAY 2018

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“Process Industry 4.0”: Modularization Paves the Way

Shorter product cycles, a changing raw material base, more individualized customer demands – the process industry is facing a range of challenges. To answer them, more flexibility is called for. Modularization is one approach that helps move the process industry into the “4.0” age

Author: Dr. Kathrin Rübberdt, ACHEMA Communications

Individualization does not only apply to cars, clothes or your breakfast cereals. The chemical and pharmaceutical industry is also facing an increasing demand for customized products. The resulting short development and product life cycles are a challenge to conventional plant concepts; changeover takes long, components cannot easily be replaced.

Modular plants are globally on the rise in order to meet the changing customer expectations. They allow for flexibility in terms of production capacity, product variety, raw materials and location. Broadly available standardized modules increase competitiveness, especially if they are used by many companies and are thus produced in large numbers at low cost.

SHORTER TIME TO MARKET

The benefits from modularization can be reaped right from the planning phase. Reusing engineering information and closed data handling throughout the projects phases can lead to an accelerated engineering phase and shorter time to market because the wheel does not have to be reinvented for each new production process. To achieve this goal the utilization of a standardized modular planning workflow is essential prior to physical modularization. Once the process is designed and proven, capacities can be increased fast and without scale-up adaptation by “numbering up”, i.e. building the same production line several times and running it in parallel. Modular equipment allows for this by definition: A single piece of equipment can be defined as modular if it provides one of the following features:

- inherent modular design, providing serial or parallel numbering-up of basic elements (e.g. channel reactor prepared for numbering-up of channel number and length) or another key feature dedicated for reusing the equipment.

- Inherent modular design, providing configurable elements to adapt to various operating conditions (e.g. modular process control systems providing variable integration of modules into the master system).

Series of equipment providing the same functionality at different operational scales (e.g. a pump series providing different volumetric flow ranges utilizing the same operational principal).

EASIER MAINTENANCE, REDUCED CHANGEOVER TIMES

Physical modularization can take place on the apparatus, plant or logistics level on site as well as in the production network. If a physical modularization is desirable, the compatible modules are constructed as adaptable units and are assembled to form multi-purpose plants. During the following operation, the exchangeability of single modules simplifies maintenance and service and reduces changeover times.

By changing reaction modules or downstream processing steps ideally following a “plug & play” philosophy, a variety of products becomes accessible.

Operational data obtained during production can be directly used by the plant engineer to define maintenance strategies and to op-

imize already planned modules for prospective projects. Following the production phase, the plant will be dismantled while information and physical components can be reused. This ensures continuous improvement and the reapplication of operational experience.

PED: THE HEART OF MODULARIZATION

To implement a systematic modularization approach from the process development to the dismantling of the plant, a process is first virtually divided into equipment groups that belong to the same part of the process. This reduces the complexity of a process and creates reusable building blocks. All planning documents required for the construction of such modules are merged in functional process units that are called Process Equipment Design modules (PED) which are saved in databases. A PED incorporates at least one main equipment item, providing the desired unit operation together with all needed peripheral components. Within each PED the main equipment items can be exchanged to adapt to different operating conditions. Each PED is stored as a database element containing all information and documents.

PEDs should be accompanied by simulation models, which allow for the configuration of modules, starting from a description of the PED functionality. The PEDs are then categorized in functional units, the process and service units. Process units are in direct contact with reactants, process or waste streams (e.g. storage and dosage, reaction, downstream, formulation, and packaging). Service units have supporting functions for one or more





process units such as utility and energy supply, and do not have direct contact to the process streams. This distinction and the related database should allow for different reuse scenarios to speed up the time to market.

Single PEDs can be combined to form a Process Plant Design (PPD). The PPD conforms to the scope of performance of a modular plant and comprises all documents that are needed

for a successful construction and operation. It defines the positions and connections between PEDs and virtually represents the desired process.

MAKING THE JIGSAW FIT: STANDARDIZATION Nonetheless, building modular plants is a completely new approach. In order to reach the goal of a completely modular

designed and built plant, a lot of effort especially regarding the standardization of equipment and automation technology is still necessary.

A key prerequisite for the modular approach will be the development of standard solutions for problems occurring repeatedly and the definition of guidelines for designing new PEDs. Examples for standard applications are storage, dosing or mixing. These typically do not represent competitive knowledge and can be developed in a joint effort by multiple companies and manufactured by suppliers. This could substantially reduce plant manufacturing costs. On the other hand, PEDs will have to be designed individually or existing PEDs need to be modified, either because no suitable PED is available, or because certain boundary conditions make individual design inevitable.

KNOWING MORE ABOUT MODULARIZATION

For anyone who wants to know what modularization is about, visiting the joint stand "Process INDUSTRIE 4.0: The Age of Modular Production" in Hall 9.2 is a definite "must". Visitors can learn first-hand what modularization looks like and how intelligent automation and MSR technologies can increase productivity. Organized by ZVEI, NAMUR, VDMA and ProcessNet – an initiative from DECHEMA and VDI – the stand shows how solutions from suppliers such as ABB, Emerson, Endress+Hauser, Festo, Finesse, HIMA, Huber, Pepperl+Fuchs, Phoenix Contact, Samson, Siemens, SpiraTec, Wago and Yokogawa work together to create more flexible and at the same time efficient processes.

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N° 5 - MAY 2018

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Getting Ready for the Process of the Future

Endress+Hauser will be exhibiting at **ACHEMA 2018** its portfolio of lab and process application solutions. The company is ready to face the challenges connected with industrial digitalization through a range of automation and measurement technologies

MAKING STRIDES THROUGH EFFICIENT PRODUCTION PROCESSES

Endress+Hauser is ready for the industrial 4.0 revolution and is closely following the process industry's focus on reliability, leading to the development of more smart measurement instruments. Plant operators can now monitor how to improve their manufacturing processes and reliably check their instrumentations to watch performances. Endress+Hauser's Heartbeat Technology breathes life into your measurement instruments, supplying diagnostics, verifying performance and monitoring process data to help you develop the right predictive maintenance and process optimization strategies.

READY FOR DIGITALIZATION

Together with customers and technology partners, Endress+Hauser is striving to tap

into the new value chain opportunities made available by the Industrial Internet of Things (IIoT). The People for Process Automation help plant operators utilize process and instrument data in order to increase system availability, reliability and efficiency. With its product portfolio, application know-how and technological vision, Endress+Hauser is ready for the IIoT.

The new iTHERM TrustSens hygienic thermometer is designed for the life sciences, biotechnology and food & beverage industries. For users who require full compliance with FDA and GMP regulations, iTHERM TrustSens offers a high degree of process reliability and system availability thanks to permanent inline self-calibration, thus eliminating the risk of nonconformities during production.



SIMPLY RELIABLE

As a leading provider of technology for system and process reliability for more than 65 years, Endress+Hauser helps its customers to deal with the most demanding safety requirements. Users can rely on the company's know-how and extensive expertise throughout the entire safety life cycle in the areas of explosion protection, functional safety and overflow protection in line with the German Water Resources Act (WHG) and the EU Pressure Equipment Directive (PED).

FROM LAB TO PROCESS

The acquisitions of Analytik Jena, Kaiser Optical Systems and SpectraSensors have enabled Endress+Hauser to expand its analytics expertise from the production environment to the lab. "We often encounter the same customers in both the process control and laboratory businesses. Our goal is to be able to support these companies along the entire value chain, from research, to product and process development, to production and quality control," explains Matthias Altendorf, CEO of the Endress+Hauser Group. The specialists at Endress+Hauser can now illustrate how "laboratory and process" are tied together using examples from various industries.



Hall 11.1, Booth C27

►► 55159 at www.pcne.eu



INDUSTRIAL TABLET

For hazardous areas Tab-Ex



The Pepperl+Fuchs brand **ecom** will be presenting the next generation of its groundbreaking tablet series for hazardous areas Tab-Ex. The industrial tablet Tab-Ex 02 combines top performance with innovative applications such as augmented reality.

Based on the latest Samsung Galaxy Tab Active2, the Tab-Ex 02 commands

the high-performance Android 7.1 Nougat operating system and features a powerful Octa Core processor with 1.6 GHz and 3 Gigabyte RAM. It is ideally suited for IoT-capable applications and simplifies data exchange with SCADA / DCS systems, enterprise resource planning systems (SAP, IBM Maximo), project management systems and computer-aided system planning.

▶▶ 55186 at www.pcne.eu

Hall 11.1, Booth A41

ADVANCED OUTDOOR SHELTERS

With a cooling system on a hybrid combination



Featuring a cooling system based on a hybrid combination of unpowered passive and active powered technologies, the new style of outdoor shelter for process plant application by **Intertec** helps to ensure stable and highly reliable operating environments for control, analyzer and instrumentation electronics. The new shelters can greatly simplify the operation of field

equipment in hazardous and remote areas. Passive cooling of field equipment enclosures is an influential weapon in the battle to protect electronics installed in hot and harsh environments. When configuring passive cooling systems there is a need for a fairly large difference between night and day temperatures.

▶▶ 55188 at www.pcne.eu

Hall 11.1, Booth F61

DRIVE SOLUTIONS

In ATEX versions



Nord supplies application-specific drive solutions with individual configurations and equipment from its modular system. The company offers flexible drive concepts with motors which are optionally designed for use with

inverters as well as the option of IEC or NEMA motor mounting, or directly on the gear unit for an especially compact solution. The manufacturer's explosion protection range features the integration of external fans, back stops or brakes (depending on the zone); on request, combined dust/gas explosion protected systems for ambient temperatures up to + 60 °C and delivery world-wide with documentation in more than 20 languages.

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Hall 5.0, Booth D51



FREE DIGITAL SUBSCRIPTION

LASER PARTICLE SIZER

For easy and short analysis



Due to its especially wide measuring range of 0.01 - 2100 µm, the new Analysette 22 NanoTec from **Fritsch** is a Laser Particle Sizer for efficient particle size analysis down into the

nano range - in production and quality control as well as in research and development. Here are some interesting features: simple operation, short analysis times and consistently reproducible and reliable results. And a convincing combination of price and performance. With the new Analysette 22 NanoTec the precise measurement of particle sizes becomes easy - even for employees with brief instructions and no prior knowledge, e.g., in merchandise receipt or shipping departments.

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Hall 4.1, Booth J49

PROGRESSING CAVITY PUMP

With EvenWall technology



In the food, pharma, and cosmetics industries, and in the chemical, color, paint, and paper industries, the MX pump from **Knoll Maschinenbau** has been recognized due first and foremost to its design featuring EvenWall® technology. Here, the stator sheathing is adapted to the contour of the rotor, and - in the standard model - it has an elastomer coating with an even wall thickness. As compared to conventional

progressing cavity pumps, this produces much greater pressure stability, less backflow, longer durability, better efficiency, less shearing of the product, and better suction behavior. Typically, the MX pump meets all hygiene standards; CIP and SIP cleaning are standard. The material selection, constructive arrangement of the O-rings and surface properties fulfill the guidelines according to EHEDG, QHD, GMP, and 3A.

▶▶ 55189 at www.pcne.eu

Hall 8.0, Booth D28

FLOW FIELD FLOW FRACTIONATION SYSTEM

With an additional Electrical FFF module



The EAF2000 Electrical and Asymmetrical Flow Field Flow Fractionation (EAF4) system from **Postnova Analytics** is designed to enhance separation and characterisation of biopharmaceutical, environmental and nanomaterials. EAF4 technology uniquely combines the principle of Electrical and

Asymmetrical Flow FFF in just one system. In an EAF2000 system - Electrical and Cross Flow Fields are applied simultaneously across the FFF channel enabling separations by particle size and particle charge based on electrophoretic mobility. Combining these two powerful separation techniques in a single platform opens the door to characterising complex proteins, antibodies and viruses.

▶▶ 55191 at www.pcne.eu

Hall 4.2, Booth F17

VALVE ENGINEERING EXPERTISE

For the pharmaceutical and biotech markets



Samson presents its entire valve engineering expertise on a joint booth at this year's ACHEMA. Samson will show its core competence in valves (globe, three way, rotary plug, axial, ball, butterfly, gate) as well as actuators and smart field units - for today's and tomorrow's markets. In addition, a pilot setup of an Ethernet

in the field solution will be on display to show how devices can be interconnected on the field level. Samson will also be exhibiting valves for the pharmaceutical and biotech markets together with its subsidiary SED. Samson's digital solutions designed to advance decentralized valve intelligence will be in the spotlight with the Sam Digital Hub.

▶▶ 55192 at www.pcne.eu

Hall 8.0, Booth C74

COLUMN INTERNALS

For projects with larger diameters



Sulzer has recently introduced the MellaCarbon column internals which has delivered considerable advantages for corrosive applications. Decades of experience in the design and construction of tailor-made components

ensure good column performance for the chemical manufacturing sector. Further developments have been made in tray performance with increased capacity and improved downcomer technology that enhances performance. For Sulzer, also the integration of the latest technology with existing infrastructure is very important. The company offers a service using skid-mounted solutions that minimize costs and disruption on site.

▶▶ 55195 at www.pcne.eu

Hall 4.0, Booth D48

FILLING VALVE PLATFORM

Used in the hygienic and aseptic sector



Gemü has recently introduced a new filling valve platform. The use of the Gemü PD design has made it possible to securely isolate the moving parts of the actuator hermetically from the product area while simultaneously achieving a high number of switching cycles. This means that what has become known as the lift effect, in which the remains of the product are transported through the

inserted spindle into areas in the actuator which are not to be cleaned, is excluded. In addition to the improved ease of cleaning of the media-wetted area, the valve stands out thanks to its extremely compact design and the ability to quickly and easily replace worn parts.

▶▶ 55196 at www.pcne.eu

Hall 8.0, Booth F4

OIL-FREE HIGH-PRESSURE COMPRESSOR

To ensure gas purity



Sauer Compressors products have been a staple of the processing industry for years. At this year's ACHEMA, the manufacturer will exhibit its extensive portfolio of oil-lubricated Sauer compressors and oil-free Haug Sauer solutions. Highlights include the world premiere of the Haug.Sirius HP 450.

The oil-free high-pressure compressor marks the first innovation that was collaboratively developed by J.P. Sauer & Sohn Maschinenbau GmbH and HAUG Sauer Kompressoren AG. Since the integration of Swiss HAUG Kompressoren AG last year, Sauer Compressors has exponentially increased its ability to meet the high demands of the processing industry.

▶▶ 55193 at www.pcne.eu

Hall 8.0, Booth D24

FLEXIBLE MACHINERY

With a minimum space requirement



Highly specialized products in small quantities and different drug delivery systems - the trend to flexibility - present a challenge for pharmaceutical companies. It makes a change in thinking necessary, since niche products require a completely

different production process than Blockbuster pharmaceuticals. Pharmaceutical companies that produce small quantities need flexible machines that can process small batch sizes and different container types. The MultiUse machines from **Optima Pharma** are proficient in processing different primary packaging materials - vials, syringes, cartridges - and only have a minimum space requirement, since the basic machine does not have to be exchanged.

▶▶ 55195 at www.pcne.eu

Hall 3.0, Booth A73

PUMP MONITORING SYSTEM

To detect the operating behaviour of the machine



KSB is presenting a new pump monitoring system called KSB Guard. Networked vibration and temperature sensors fitted directly to the pump make availability at plant level transparent for the first time.

The system ensures that changes in the operating behaviour of the machine are detected at an early stage, and maintenance work can be better planned, without having to be on site with the pump. Unlike previous systems, KSB Guard is ideally suited for retrofitting. The sensor unit is attached to the bearing bracket or the drive lantern of the pump using a magnet and adhesive, and can be mounted during operation, with no need for changes to the machine.

▶▶ 55198 at www.pcne.eu

Hall 8.0, Booth H147



SMART SAFETY PLATFORM

With uniformly tailored hardware and software



Hima introduced a Smart Safety Platform under the motto "Discover Security". This is an integrated solution that combines safety and security by

uniformly tailoring hardware and software to each other. That enables operators to significantly reduce the complexity of their systems and buy only what they actually need. The platform also supports integration of existing systems, enabling lower operating costs and very high security of investment. The platform concept works this way: HIMA and the user jointly select the appropriate hardware and software components and install them in the plants. Existing HIMA solutions can continue to be used or be upgraded to the latest generation.

▶▶ 55199 at www.pcne.eu

Hall 11.1, Booth C15

HOT MELT COATING DEVICE

For pharmaceutical applications



Romaco Innojet has just come up with the first GMP compliant hot melt coating device specifically for use in the pharmaceutical industry. The IHD series for processing hot melt coatings can be supplied as a laboratory or pilot scale machine. The IHD series from Romaco Innojet was specially designed for coating and granulating pharmaceutical products with hot greases and waxes. GMP compliance was a key development priority

for these CIP capable devices, particularly regarding the validation of the cleaning processes. All sealing points, gaps and enclosed spaces were eliminated for this reason and flange connections reduced to a minimum. The hot melt coating flows through straight tubes to prevent any build-up of product residues.

▶▶ 55201 at www.pcne.eu

Hall 3.0, Booth B49

ROTARY PRESSURE FILTERS

Help increase efficiency and productivity



BHS-Sonothofen offers its customers a comprehensive product range that varies from rotary pressure filters, to indexing belt and rubber belt filters, to candle and pressure plate filters. A great number of process steps occur during a single rotation of the rotary pressure filter drum, such as separating the suspension into filtrate and filter cake, single- or

multi-stage cake washing, reslurrying, solvent exchange, steaming, extraction as well as mechanical and thermal cake dewatering. All of these process steps take place in separate, pressure-tight segment zones inside the filter. In the pharmaceutical industry, the rotary pressure filter is currently being used in the production of antibiotics and medical contrast agents to great success.

▶▶ 55203 at www.pcne.eu

Hall 5.0, Booth C43

PIPING BALL VALVES

Provide a double isolation function



The Taurus Series Double Block & Bleed Valves from **Armaturenfabrik Franz Schneider** provide a double isolation function with a Twin Ball Design and a bleed function by different bleed/vent valve designs. The Block Valves are available from 1" to 6" Full Bore (8" Reduced Bore). The Standard Flanged Connections are offered by default acc. to ASME B16.5. The Ball

Valves have an Anti-Blowout Stem Design and an Anti-Static Design and are Fire Safe tested and certified according to API 607 and ISO 10497. The Double Block & Bleed Piping Ball Valves are designed specifically for applications in the oil and gas industry.

▶▶ 55200 at www.pcne.eu

Hall 8.0, Booth A85

GASKETED PLATE HEAT EXCHANGERS

With an increased thermal efficiency



Alfa Laval presents new solutions for chemicals, biopharma and industrial wastewater treatment. Alfa Laval is bringing modern gasketed plate heat exchangers for industrial applications to the market. Here are the latest addition to this high performing gasketed plate heat exchanger range: the Alfa Laval

T25. Packed full of innovations and features, the design is truly challenging the status quo of gasketed plate heat exchangers. With a development process entirely driven by the needs and feedback of customers, Alfa Laval can meet the demands for a reliable, efficient heat exchanger that is also easy to maintain.

▶▶ 55202 at www.pcne.eu

Hall 4.0, Booth D4

ALL-CERAMIC CHEMICAL PUMP

Designed for difficult applications



The centrifugal pump of type MPCV from **Bungartz** has some interesting properties. Due to the dry-running, self-regulating and hermetically sealed design, the tried-and-tested vertical pump does not require a minimum volume flow or a large static head. The 3-phase compatible and intrinsically safe special pump is

now also available as an all-ceramic version (K-MPCV-AN). The chemical pump MPCV was designed for difficult applications. It has proven useful with pumping extreme media which are at the same time hot, corrosive and abrasive, such as ammonium nitrate with dolomite, iron oxide, gypsum and dust slurries, and much more.

▶▶ 55204 at www.pcne.eu

Hall 8.0, Booth C1



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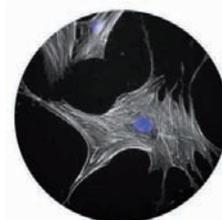
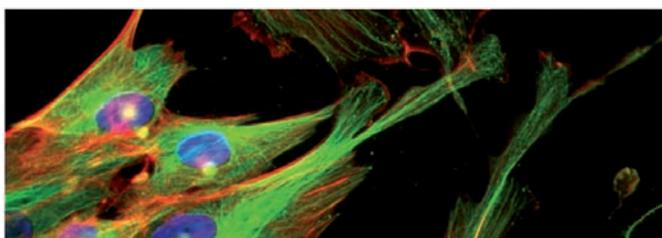
The "Nanokicking" Technique

This advanced technology developed by the Universities of Glasgow, Strathclyde, the West of Scotland and Galway enables breakthrough in the culture of 3D mineralised bone tissue

Three-dimensional samples of mineralised bone from human mesenchymal stem cells has been developed for the first time without typical osteoinductive media by researchers from the Universities of Glasgow, Strathclyde, the West of Scotland and Galway. The research, published in Nature Biomedical Engineering, is the latest advance in a technique known as 'Nanokicking', and is an essential first step in the potential culture of cellularised bone grafts.

HOW THE 'NANOKICKING' WORKS

The technique - developed by a team including Matthew Dalby, Professor of Cell Engineering at the University of Glasgow, and Stuart Reid, Professor of Biomedical Engineering at the University of Strathclyde - uses a Nanokick bioreactor to stimulate the differentiation of mesenchymal stem cells by subjecting them to ultra-precise, nanoscale vibrations. The researchers used Nanokicking on mesen-



chymal stem cells suspended inside collagen gels to produce a 'bone putty' which has the potential to be used to heal bone fractures and fill bone where there is a gap.

Bone is the second most grafted tissue after blood and is used in reconstructive, maxillofacial and orthopaedic surgeries. Currently, only limited amounts of a patient's own bone tissue can be harvested for use in grafting, and bone from other donors is likely to be rejected by the body. By using a patient's mesenchymal stem cells to grow bone tissue grafts, surgeons will be able to prevent the problem of rejection, and can bridge larger gaps in bone.

begin human trials in around three years from now."

Mesenchymal stem cells have the potential to differentiate into numerous other cell types in addition to osteoblasts and Nanokick bioreactors are currently being further tested in a network of laboratories across the UK. The researchers expect that other clinically-relevant applications of nanokicking will be discovered in these partner labs in the future. The team's paper, titled 'Stimulation of 3D osteogenesis by mesenchymal stem cells using a nanovibrational bioreactor', is published in Nature Biomedical Engineering and available to view at <http://rdcu.be/vMwt>.



AN EXCITING STEP FORWARD

Professor Dalby said: "This is an exciting step forward for our Nanokicking technology and we believe that combining this bone putty with mechanically strong scaffolds will allow us to address large bone deficits in patients in the future. Our hope is to be able to

PAPER INSIGHT

The creation of tissue-engineered bone grafts could help to fulfil clinical demand and provide a crucial resource for drug screening. In their paper, researchers show that vibrations of nanoscale amplitude provided by a newly developed bioreactor can differentiate a potential autologous cell source, mesenchymal stem cells (MSCs), into mineralized tissue in 3D.





TURBINE FLOWMETER

For industrial and medical lasers



The **Titan Enterprises 800 Series** turbine flowmeter is a monitoring device used in thousands of industrial and medical laser installations. It ensures accurate and repeatable long-term operation. There are many applications of

industrial and medical lasers. Whether used for cutting, welding, micro-machining, cosmetic or eye surgery - lasers generate a significant amount of heat. To ensure stable long-term laser performance, this heat needs to be quickly and effectively dissipated. Water circulated through a chiller or heat transfer system is a popular cooling method for lasers. To ensure consistent laser cooling accurate and repeatable water flow measurement is required. Titan Enterprises has supplied variants of its 800 Series turbine flowmeter to several leading industrial and medical laser system integrators for this application. Titan Enterprises 800 Series flowmeter offers a good balance of measurement accuracy, long term resistance to coolant fluids, high reliability and ease of maintenance. Operating over 6 flow ranges from 0.05 to 15 litres per minute, the 800 Series turbine flowmeter features high performance. Using totally non-metallic wetted components makes the 800 Series turbine flowmeter is an ideal choice for the metering of laser coolant flow.

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CUSTOM-MADE SEALS

Featuring a high performance material



The special material in the **COG HygienicSeal** series has been granted the most important approvals for application in highly demanding industries. As well as the harmlessness test according to FDA 21. CFR 177.2600, AP 306

is approved according to USP class VI in chapter 88 up to +121 °C and chapter 87. The EPDM compound also successfully passed the cytotoxicity test (according to ISO 10993-5:2009). This EPDM compound has extremely low migration values, which are in particular demand in applications in which there is a risk of contamination with the media to be sealed, e.g. in cell cultivation or insulin production. The high-performance material furthermore has excellent resistance to contact with CIP and SIP media and, in addition, is suitable for applications with WFI water. Owing to the operating temperature range from -40°C to +150°C, AP 306 is adaptable to the particular requirements of the production process. Properties of AP 306: Special-EPDM compound for the medical technology, pharmaceutical industry and biotechnology; Excellent resistance to CIP and SIP procedures; Suitable for use with WFI water; Good resistance to aqueous media; Excellent resistance to hot water and water vapour; Certified according to USP Class VI chapter 88 to +121 °C and chapter 87.

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