trends in automation

The Festo customer magazine **2.2016**

FESTO

In focus

Spaces

Above, below, in between

Compass

3D Cocooner

New dimensions in individual product design

Impulse

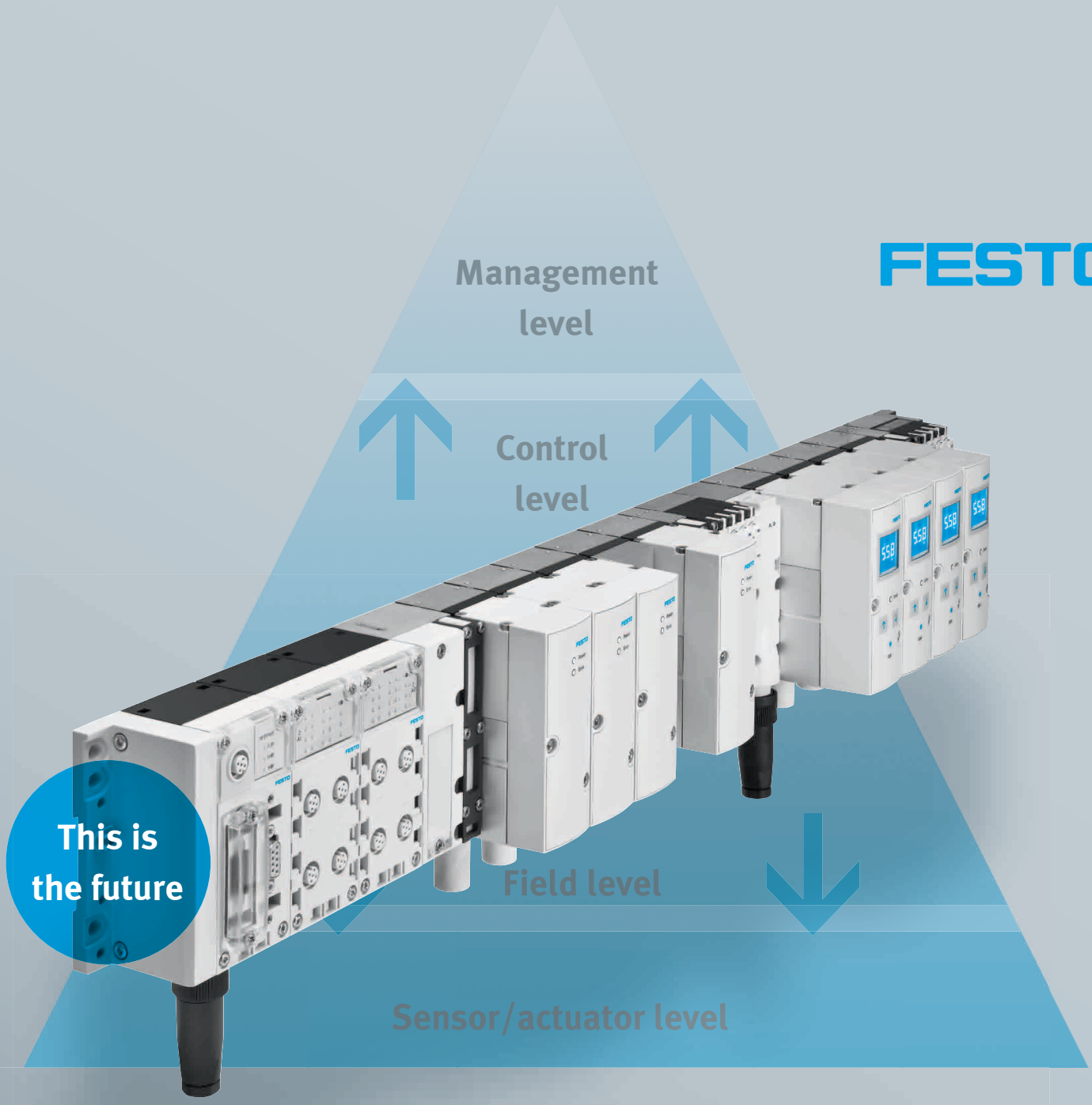
CERN

Air analysis in the world's largest research laboratory

Synergies

Stitch perfect

High-speed buttonhole production



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→ WE ARE THE ENGINEERS OF PRODUCTIVITY.

Expertise in process and factory automation

Festo CPX is the automation platform for any situation. Exactly what you need when you demand the best from your automation solution. CPX with MPA or VTSA is the expert solution for factory and process automation – and the standard for all process steps with fluid and motion control.

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Discovering spaces

Dr. Ansgar Kriwet,
Member of the Management Board, Sales

Dear reader,

Humankind has always been fascinated by space. Macrocosmic or microcosmic, above or below, open or closed – people love to explore spaces, to discover what they contain and where their boundaries lie, and to unlock the mysteries of the unknown. It is this spirit of discovery that spurs people on – and drives Festo employees to become leaders of innovation in automation.

As a learning company, Festo gives its employees the freedom they need for focused reflection, invention and visionary thinking. And the more they consider future potential, the more freedom they have to explore. Space is also an important requirement for our FreeMotionHandling, which combines bionically inspired flying and gripping in one technology platform (page 8). The 3D Cocooner from the Bionic Learning Network shows how by using a simulation a new, real space can be created with complex and highly individual structures (page 12).

The solenoid valve VUVG is the solution to a growing demand for space. Our experts have packed the high energy density of pneumatics into a compact valve. In the industrial sewing machines manufactured by Dürrkopp Adler, the VUVG once again demonstrates the huge benefits that pneumatics has to offer in the field of automation (page 30).

To increase your productivity, we have realigned our production plants in Europe, America and Asia. In doing so, we have reduced the distance between you and us. The learning spaces integrated in the new Scharnhausen Technology Plant have also been designed to increase your productivity. Here, our employees learn by combining theory and practice, and are literally exploring new spaces.

We hope that this issue of trends in automation will take you on an inspiring voyage of discovery.

Best regards,

Ansgar Kriwet

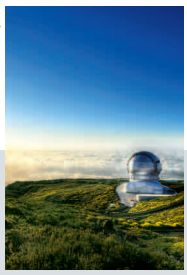


Photo: © Pablo Bonet, Instituto de Astrofísica de Canarias (Spain)

In Focus Spaces Whether we are indoors or outdoors, space is all around us. At the Gran Telescopio Canarias on the island of La Palma, scientists explore the biggest space of all: outer space. In this issue, we explore the concept of space from a variety of perspectives, including habitats, manoeuvrability, learning spaces, air and cleanrooms.

trends in automation 2.2016

8 **A good sense of space** is a feature of the autonomously flying gripping sphere FreeMotionHandling.

Compass

FreeMotionHandling
Flying and gripping. The free-moving helium sphere can grip an object and place it in many different positions. People can interact safely and trouble-free with it. ➔ **8**

Lightweight construction in 3D
Free-moving, fast and autonomous. For the 3D Cocooner, the developers equipped a parallel kinematic system from the Festo standard product range with a special nozzle. ➔ **12**

16 **Unique application location** for valve terminal VTSA.

30 **All sewn up** with solenoid valve VUVG.

Impulse

100 metres below ground
At CERN, the world's largest particle physics laboratory, the valve terminal VTSA controls the analysis processes of the air in the inner experimentation and cavern space of the CMS detector. ➔ 16

Integrated learning spaces
The training factory at the Scharnhausen Technology Plant bridges the gap between practical learning in the workplace and theoretical learning in the training centre. ➔ **20**

Creating flexibility
The eight phases of the Productivity Circle: Festo software tools deliver greater productivity. ➔ **24**

Synergies

Individualist among packagers
Transnova-Ruf stands out from competitors with its design-to-order concept. Proportional valves from Festo contribute to this individuality. ➔ **26**

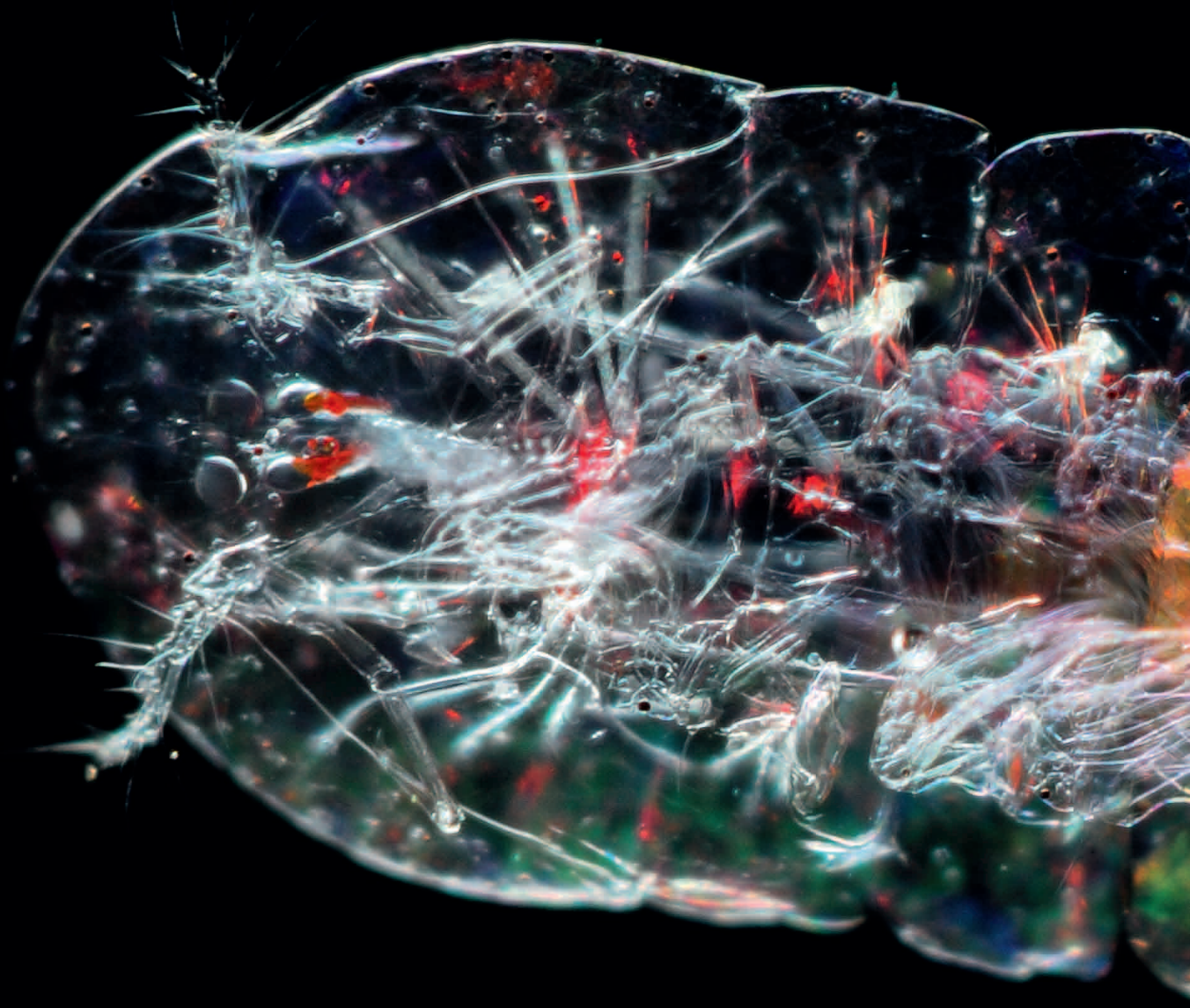
A stitch in time
Thanks to compact solenoid valves VUVG, the new automatic eyelet buttonholer from Dürkopp Adler can create a buttonhole in just under four seconds. ➔ **30**

The cleanroom
Cleanliness with a capital C: the valve terminal and stainless steel component solution used by ROTAN ensures operational reliability and a long service life. ➔ **34**

Photos: © Solvin Zankl

Entering the water: it takes up to three hours for the large deep sea plankton net to reach its predefined depth of 5,000 metres.

Cool idea: photographer Solvin Zankl sets up his on-board studio in a refrigerated container with a constant temperature of 4 degrees Celsius. This is the only way of guaranteeing that the organisms would stay alive.



Deep-sea expedition

The dark, cold waters of the earth's largest habitat, the deep sea, seem like a hostile environment. The deep sea begins 200 metres below sea level, extends down to 11 kilometres and is never warmer than 4 degrees Celsius. An expedition by the German research vessel Polarstern off the coast of West Africa discovered that even at a depth of 5,000 metres the ocean is teeming with life. On board was trained biologist and full-time professional wildlife photographer Solvin Zankl. He returned from the expedition with fascinating photos of living organisms which have only ever been seen by a few people, and some of which have not been photographed before.

Take the one millimetre long male copepod of the genus Sapphirina, for example. These microorganisms have flabby bodies that hold a lot of water, and protect them from being crushed by the enormous water pressure. Their iridescent appearance is the result of their layered chitinous exoskeleton. Copepods account for at least 60% of the entire marine plankton biomass.

Very little deep sea research has been conducted up to now. Scientists believe that this realm of darkness is home to at least one million as yet undiscovered species.

Autonomously flying gripping sphere

Free Motion Handling

With the FreeMotionHandling, the developers of the Bionic Learning Network have combined bionically inspired flying and gripping in one technology platform for the first time. The indoor flying object, which was first exhibited at Hannover Messe, opens up new prospects for the workplace of the future.

Endless degree of freedom: the free-moving helium sphere enables the gripped object to be set down in a wide variety of positions.

The flying helium sphere is a further development of the eMotionSpheres. For the first time, Festo developed adaptive propellers for the drive concept. Flexible membranes provide the same thrust in both directions of rotation. The design of the propellers is based on the experience gained with the BionicOpter. The developers took the wing principle of the artificial dragonfly a step further and transferred it to the drives of the FreeMotionHandling. Festo had already used the flying motion of the eMotionSpheres to show how one or more flying objects can be coordinated to move in a defined space without colliding. The gripping mechanism on the FreeMotionHandling was modelled on the universally applicable FlexShapeGripper. Its working principle is based on the tongue of a chameleon. The elastic gripper wraps itself around the item to be gripped in a flexible and form-fitting manner.

Free and safe movement
Flying and gripping – and gripping while flying. The indoor flying object consists of an ultralight carbon ring with eight

Assistance systems for the workplace of the future

Self-learning subsystems and other intelligent components are taking on an increasingly important role in production. With Industry 4.0, people and technology will be working ever closer together. An important element for future production facilities are assistance systems for people that can adjust flexibly to a wide range of production scenarios. The assistance systems are able to react to variable conditions as well as to interventions by people. Machines are thus becoming harmless to people and help to take the strain during their work.

Sophisticated drive concept: the four horizontal propellers, together with the helium sphere, ensure the necessary uplift.

Autonomous object detection: thanks to the camera in the gripper, the FreeMotionHandling can identify objects and pick them up safely. (Picture below)

adaptive propellers. In its centre is a rotatable helium sphere with an integrated gripping element. Thanks to the intelligent onboard electronics and the indoor GPS, the FreeMotionHandling can move autonomously in all directions. It picks up objects independently and puts them down at designated places. People can interact safely and trouble-free with the flying assistance system. Unlike other indoor and outdoor flying objects, contact is not dangerous even in the event of a collision. This opens up new prospects for the workplace of the future.

The FreeMotionHandling freely positions its gripping component in all spatial directions by rotating the sphere by up to 180 degrees. This enables it to grip an object from various angles. The flying assistance system has a much greater degree of freedom than conventional multi-axis kinematic systems. In order for the FreeMotionHandling to pick up differently shaped objects, the developers also equipped the gripping element with an ultra-thin film, which is filled with helium. The gripper draws objects in using a rope winch inside the sphere. The pressure in the sleeve makes it extend back out on its own, while the holding process does not require any energy. The flying assistance system can also pick up several objects according to the last-in-first-out principle, transport them in its body and set them down again at several different positions one after the other.

Soloist and team player

Flying in three dimensions is a unique technological challenge. The onboard wireless sensor technology communicates constantly with the guidance and monitoring system installed in the space to ensure that the flying process is stable and reliable. An important part of the indoor GPS is a camera system that could also be used in the factory of the future. Several infrared cameras installed in the space record the FreeMotionHandling using eight infrared LEDs, which are attached to the carbon ring as active markers. The cameras transmit the position data to a central master computer, which acts like an air traffic controller and coordinates the sphere from the outside. Once the sphere gets closer to the object to be gripped, it controls its flight path on its own by using two integrated cameras.

The concept of FreeMotionHandling could be used wherever people require additional support from machinery – for instance, when doing ergonomically repetitive assembly tasks, during sorting or warehousing. Difficult tasks can therefore be made much easier. ■

Further information
and videos
can be found at
www.festo.com/freemotionhandling

Festo Bionic Learning Network: 3D Cocooner

Lightweight construction **in 3D**

The new 3D Cocooner brings ideas to life. Free-moving, fast and individual. Creating a tangible product directly from a design. Although still at the research stage, this bionic development is already showing enormous potential for the production of tomorrow.

Nature has a virtually limitless supply of intelligent solutions for challenging tasks. Bionics transforms these solutions into technical applications that are useful for people. One area that is set to define the future of production is the manufacture of customised products with batch sizes as small as one. 3D printers are already making major advances in this field. However, their one major disadvantage is the fact that they can only work one layer at a time. With the new 3D Cocooner, Festo goes a step further. Inspired by the impressive shapes created by butterfly caterpillars, it constructs complex structures freely in space. Just like a caterpillar, the 3D Cocooner spins delicate shapes and creates lightweight structures out of a strong glass-fibre thread. A delicate handling system accurately manoeuvres the spinneret and glues the glass fibres together while at the same time laminating them with UV-curing resin.

Soft thread, solid lattice

A three-armed, vertically mounted parallel kinematic system EXPT-45 is used as a specialised handling unit for the 3D Cocooner. It can be controlled precisely, quickly and with exceptional manoeuvrability. To convert the soft thread into a solid lattice structure, it is moved forward over a pair of rollers inside the spinneret and simultaneously covered with a viscous resin. As soon as it comes out, a UV light cures resin-soaked fibre with absolute accuracy and hardens it into a sturdy little rod. A small cutting disc cuts off the thread so that the spinneret can start again in a different place. By precisely regulating the amount of UV light, the resin can also be temporarily kept →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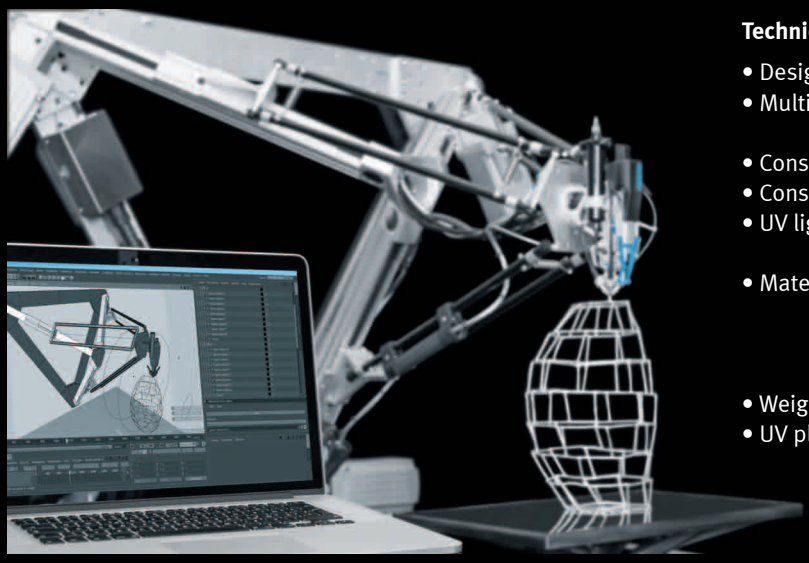
in a liquid state so that a new section can be glued to existing structures. The parallel kinematic system receives the necessary positioning data and control signals directly from an animation software program that is normally used to create virtual 3D models, computer graphics and simulations.

3D printing freely in space
Even if conventional injection moulding is still superior when it comes to tolerance and dimensional precision, additive manufacturing methods are already part of standard industrial production processes. Especially in model construction, 3D printing has become indispensable for making prototypes and end products in small quantities. The required shape is built up layer by layer according to the specifications from a CAD program. Depending on the process, powders, granulates or thermoplastic filaments are melted together line by line to make a solid body. However, materials that can be freely printed in space – such as the UV-cured glass fibres used in the 3D Cocooner – are still undergoing research and are not yet available on the market. With the 3D Cocooner, Festo has developed a bionic technology platform that combines the individual benefits of additive manufacturing with the precision control and agility of an industrial high-speed handling system. A new tool of this kind enables shapes and structures that cannot be made using conventional production means.

Further information and videos can be found at **www.festo.com/3dcocooner**

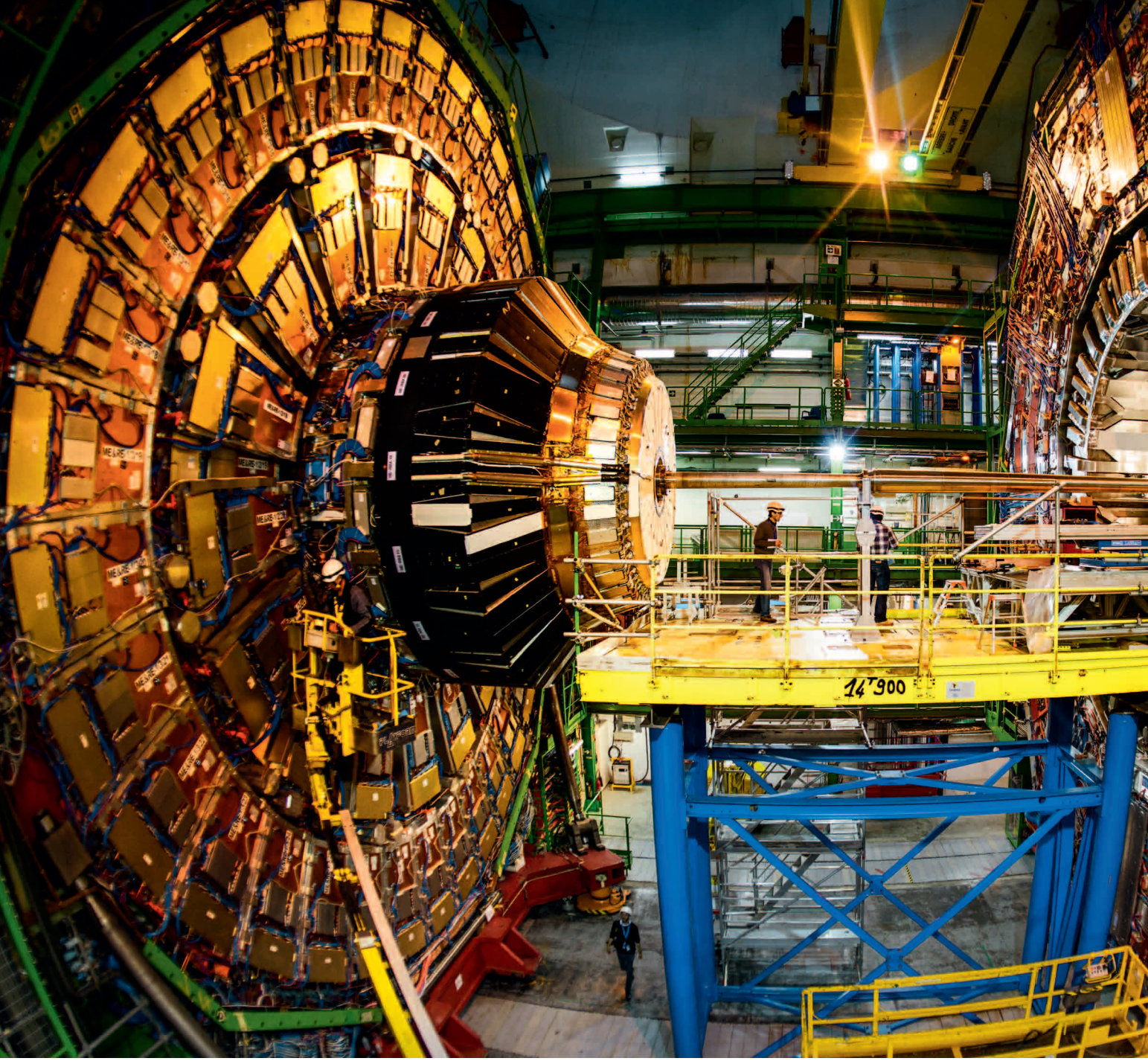
New dimensions in design
The delicate frameworks made of rods open up new dimensions for individual product design. Complex shapes, which up until now could only be depicted as a virtual model in a computer simulation, are now taking shape with the 3D Cocooner. The thread can be attached at any point of the lattice structure so that the shape can continue being built. This ultimately results in an almost endless variety of design options using minimal amounts of material. The UV-cured glass fibre itself has astonishing tensile and bending strength. If you were to connect several 3D Cocooners together via a network, extensive structures could be constructed within a very short time. Thanks to their stability, they could have tremendous potential in the most diverse areas. Particularly in sectors like the packaging industry or medical technology, this technology is opening up a whole host of new possibilities. ■



Digital production: the software transfers the geometry of the structure directly to the parallel kinematic system's motion paths.

Technical data

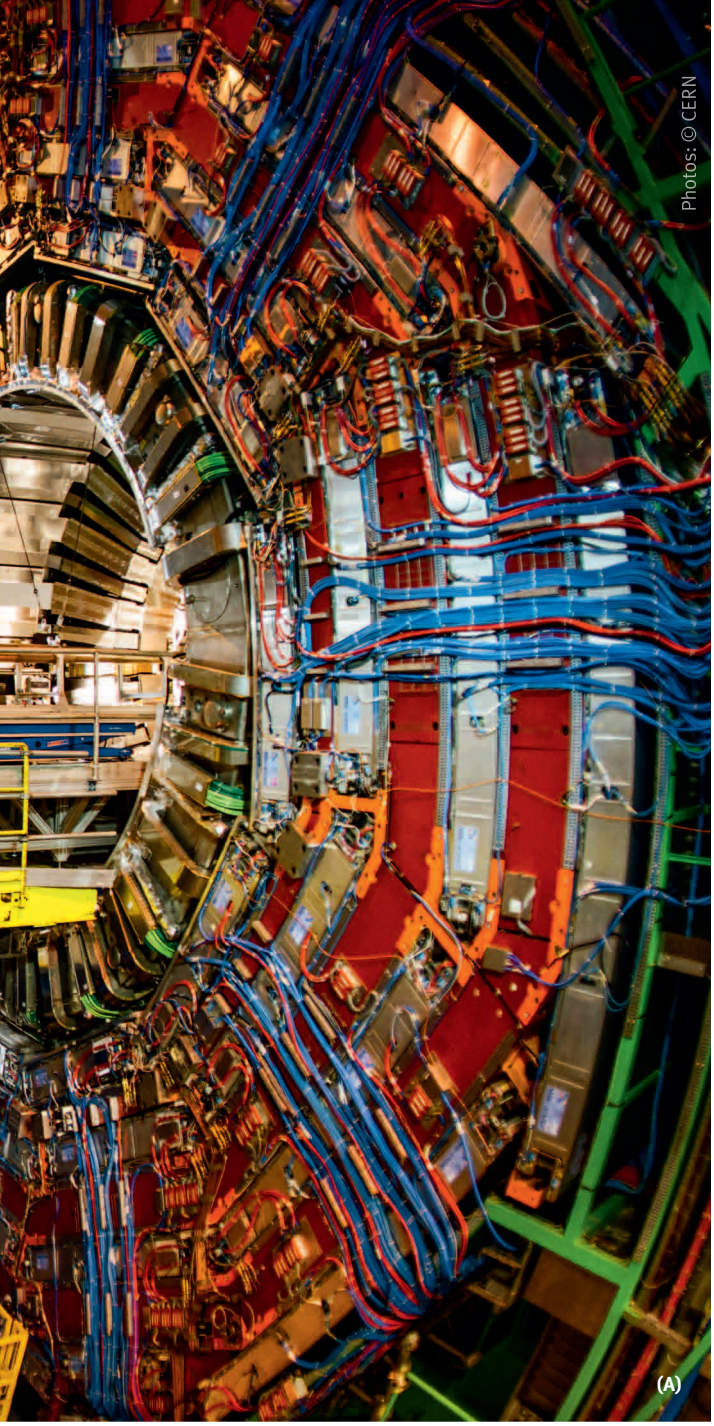
• Design software:	Cinema 4D
• Multi-axis kinematics:	Festo parallel kinematic system EXPT-45
• Construction space:	Approx. 450 × 300 × 600 mm
• Construction speed:	10 mm/s
• UV light:	Fibre-coupled LED; 365 nm; 9.3 mWW
• Material:	Glass-fibre roving with 2400 tex for producing glass-fibre rods with 2 mm diameter and 60% fibre-volume ratio
• Weight of glass-fibre rod:	5–7 g/m
• UV plastic:	1-Vinylhexahydro-2H-azepin-2-on, acrylate mixture

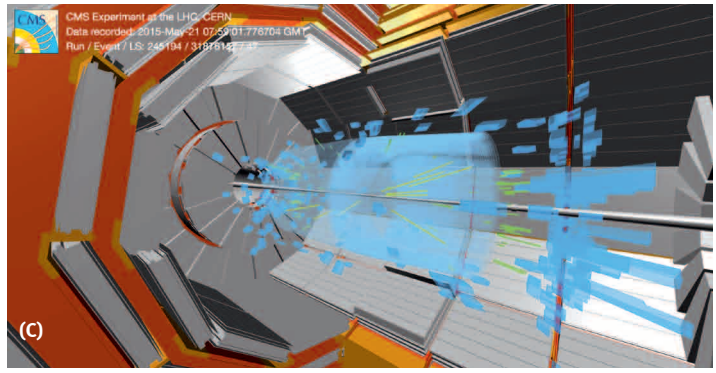


Automated air analysis at CERN with Festo valve terminal VTSA

100 metres below ground

At CERN, the world's largest particle physics laboratory, thousands of scientists are working hard to figure out the unsolved mysteries of physics. Their valuable scientific research is supported by the intelligent and flexible application of automation technology. The Festo valve terminal VTSA controls the analysis processes of the air in the experimentation cavern of the Compact Muon Solenoid detector (CMS).





(A) Impressive: 21 metres long, 15 metres in diameter and weighing 12,500 tonnes – the CMS detector takes up to 40 million measurements per second.

(B) Maximum performance: the world's biggest particle accelerator is installed in a circular tunnel with a circumference of 27 km. In the LHC accelerator ring, the protons nearly reach the speed of light.

(C) Proof: in 2012, the CERN particle accelerator provided experimental proof of the Higgs boson. The simulation shows the decay of a Higgs boson using the CMS detector.

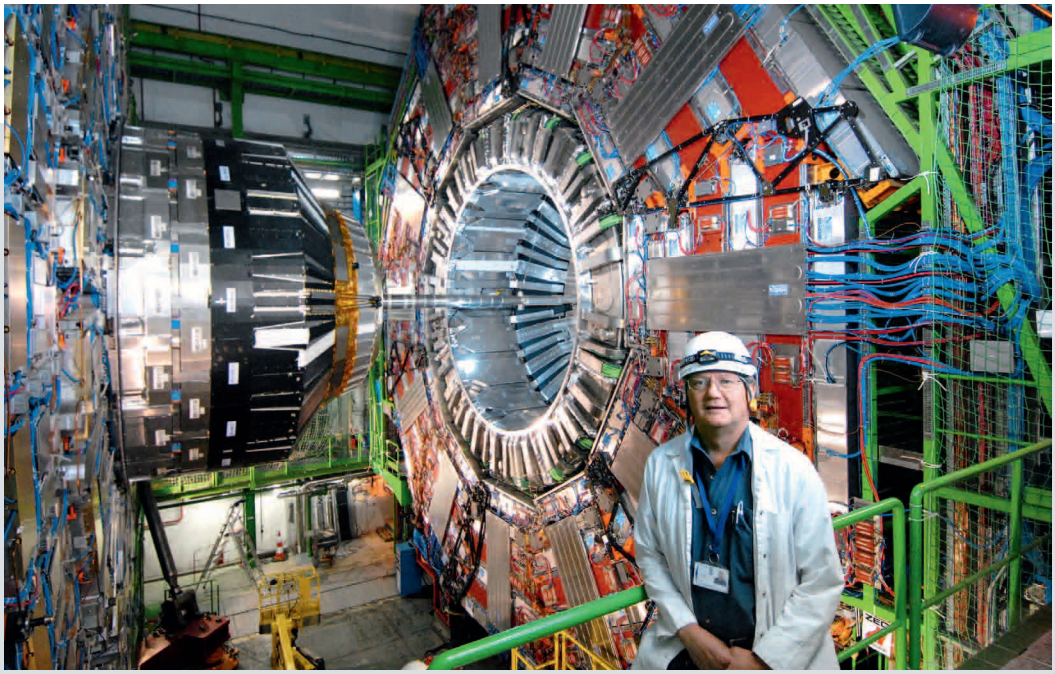
Deep underground, close to Lake Geneva, at the Large Hadron Collider (LHC) particle accelerator of CERN, the European Organization for Nuclear Research, huge detectors sift through a stream of subatomic particles and collect gigantic volumes of data, which are analysed using powerful algorithms. Modern technologies are making the tiny particles that hold the cosmos together visible on a larger scale.

The existence of matter

In 2012, a milestone in particle physics was achieved with the discovery of the Higgs boson particle. Scientists Robert Brout, François Englert and Peter Higgs had first predicted its existence back in the 1960s. According to the Standard Model of particle physics at the time, there should strictly speaking be no mass. Subatomic particles should move at the speed of light. Yet, as previously stated, they should be massless. The three researchers nevertheless developed the theory of the Higgs field. According to this theory, the Higgs field slows down the smallest particles – comparable with beads flying through honey – giving them inertia and therefore mass. 50 years later, the big breakthrough finally came. Protons were accelerated at virtually the speed of light in the LHC to allow them to collide. Higgs bosons broke free from the Higgs field and it was thus possible to measure them and prove that they actually exist. And so the existence of matter was proven. Higgs and Englert were awarded the Nobel Prize in Physics in 2013 for their theory. Brout had died in 2011.

The biggest of its kind

The research conducted at CERN involves scientific work with breathtaking dimensions. Established in 1954, the research organisation receives almost 1 billion euros in funding every year from 22 member states and currently employs more than 2,500 scientists. Over 12,000 guest scientists from all over the world work on CERN experiments. The world's largest laboratory for particle physics operates a network of several accelerators which ➔



“The tailored solution from Festo has improved safety and efficiency in the CMS experiment.”

Gerd Fetchenhauer, CMS Gas Safety Officer, CERN

prepare various particles for a wide range of experiments. These include muons for researching the structure of the proton, heavy ions for creating states of matter and radioactive ion beams for observing exotic nuclei.

The LHC is the world’s largest and most powerful particle accelerator. It is located around 100 metres underground in a circular tunnel with a circumference of 27 kilometres. The LHC uses strong electric fields in order to transmit energy to particle beams and guides the beams through the system using magnetic fields. The particles acquire more and more acceleration energy until they travel around the LHC at close to the speed of light – 11,245 times per second. When they collide, four huge detectors – CMS, ATLAS, ALICE and LHCb – record what happens.

Safety always takes priority

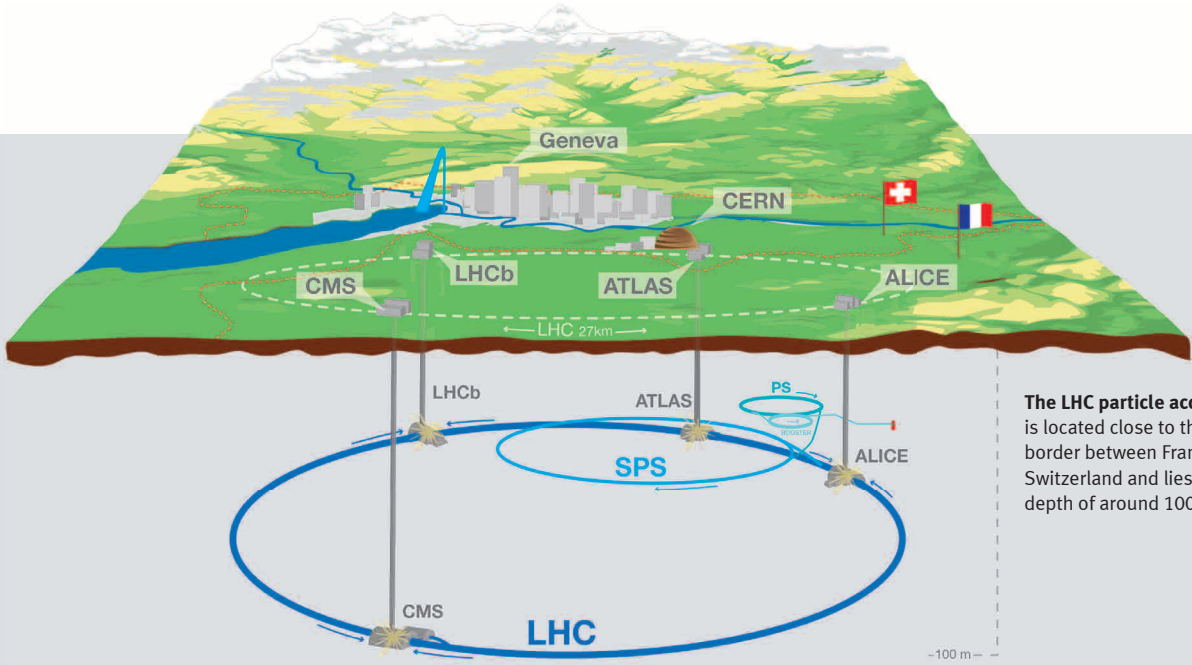
The CMS detector is a technologically advanced detection device measuring 21 metres in length, 15 metres in diameter and weighing 12,500 tonnes. Composed of 100 million individual measuring elements, it takes up to 40 million measurements per second and is one of the most complex and precise scientific instruments ever built. To prevent measurement errors, all influencing factors must remain within defined tolerances.

These influencing factors also include the composition of the ambient and venting air in the underground caverns. To ensure consistently correct operation, air is continuously extracted and analysed at more than 100 measuring points inside and outside of the detector. This is all the more important given that the word ‘Compact’ in the name also means that it is not possible to intervene quickly anywhere at any time. In a critical situation, such as a gas leak or a fire in the detector, it would take up to two weeks to reach the emergency openings to access the inner areas.

Intelligently automated

In the past, each individual air pick-off point had a separate analytical device, which led to high costs. Furthermore, the maintenance costs and probable failure rate were too high for CERN standards. Since the beginning of 2016, valve terminals type VTSA have been ensuring that the air flows are guided to the analytical devices by the fastest route possible. The new solution reduces the number of analytical devices required by a factor of 10. The air flows are now combined centrally and assigned to downstream analytical devices. The main valves of the VTSA are piloted with compressed air and have the advantage of being insensitive to the magnetism of the CMS detector. The valve terminal was configured to the specific requirements of CERN. The most important technical adaptation was reversible operation.

In normal operation, the air from a measuring line is routed through the valve terminal to the downstream analysis station. At the same time, all the other measuring lines are permanently primed in low pressure operation. The ambient air is therefore available at the valve when changing over to the next measuring line. This flexible application shows that the



The LHC particle accelerator is located close to the border between France and Switzerland and lies at a depth of around 100 metres.

"The specific requirements of CERN highlight the versatility of Festo components – and as a ready-to-install system solution in a unique environment."

Dipl.-Ing. Johannes Lang, Project Manager System Solutions, Festo

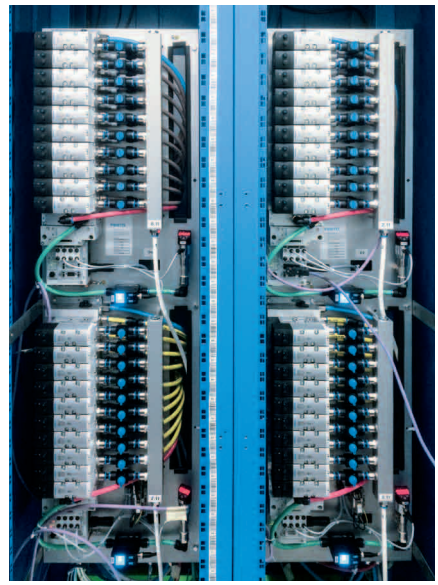
high-quality standard components of the VTSA can provide an intelligent technical solution that delivers a long-term efficiency gain for the CMS both in terms of performance and cost.

Small step, big future

The joint project for automated air analysis began in August 2015, and the units were delivered at the end of October. The new system was commissioned at the beginning of 2016. "Festo was an obvious choice to supply this technology given that we have been using Festo products in CERN and CMS for many years and are very happy with them," explains Gerd Fetchenhauer, CMS Gas Safety Officer at CERN.

Whereas in the past it was primarily individual components that were purchased, the ready-to-install system solution is the first of its kind in the many years that Festo and CERN have been working together. It lays the foundation for similar applications in other detectors of the Large Hadron Collider so that small steps can continue to lead to major new scientific discoveries. ■

www.festo.com/vtsa
www.cern.ch



Reversible installation: the valve terminal VTSA routes the air flows from around 100 measuring stations to the analytical devices by means of a vacuum.

Festo training factory Scharnhausen

Integrated learning spaces

Education, knowledge and individual learning are an integral part of the Festo corporate culture. The training factory at the Scharnhausen Technology Plant is incorporated directly in production and thus bridges the gap between practical learning in the workplace and theoretical learning in the training centre. Think tanks also provide a platform for cooperative technology and product development.

Juliane Körner casts another appraising glance over all the workstations. The training course on energy efficiency is due to begin in ten minutes. The commercial trainee, who is in her second year of training, has been working at the training factory in Scharnhausen for the past two months. Along with a technical trainee, she manages the training course registrations and is responsible for the upkeep and maintenance of the training facilities. "I think it's great that as apprentices we are given the responsibility of preparing for the training courses." Being right in the thick of things is what the new training factory is all about. Whether you're a trainee, a new hire or an experienced employee, knowledge transfer doesn't happen in an isolated seminar room, but directly alongside the practical application. "Because the training courses are aimed specifically at employees in the Scharnhausen plant, we deal a lot with technical subjects. As commercial trainees, this is a fantastic opportunity for us to gain an insight into production, as our office is located right in the middle of assembly for customer-specific solutions," explains Juliane Körner enthusiastically.

Short routes

The 220 m² training factory integrates the modern learning culture of Festo directly into the processes of the Technology Plant. The training factory currently offers 33 training courses, as well as product and process training, which can be integrated into the normal working day. The courses support new employees who want to understand the function of products and become familiar with their new tasks as well as long-serving employees who want to learn about innovative processes and technologies. Training-on-the-job and training-near-the-job are combined in a single learning unit. A broad range of specific training courses, business games, advanced seminars as well as the exchange of knowledge between managers and colleagues ensure that learning is tailored to the requirements of the individual employee. To enhance the learning effect, the training rooms →

Places of inspiration and communication

Comfortable seating areas, conference tables, individual workstations tucked away in corners, and a big media wall as an interactive gateway to the data world. The four atmospheric working spaces – each with its own unique colour scheme – at the Scharnhausen Technology Plant provide ample room for the development of products and cooperative technology, as well as for interdisciplinary exchange. The interactive media walls can be used by several employees at the same time and allow videoconferencing with other locations worldwide. The sophisticated space concept provides the ideal platform for close cooperation, effective working and easy interaction.

Photo: © Werner Huthmacher

CP Factory: this comprehensive, modular and extendable factory model for Industry 4.0 represents many areas of the value chain.

at the training factory have various training stands equipped with original components and software as used in production. With managers and technical experts as trainers and target group-specific learning scenarios, training sessions can be held close to the workplace at short intervals.

For Manfred Zahn, Head of Qualification at Festo, one of the reasons for the development of the training factory is the short route between work and learning: “This makes it easy to build the lessons into the normal working day,” he explains, adding: “Another important reason is that the training factory allows us to test technical innovations in interdisciplinary groups made up of engineering experts and production staff such as operators and plant managers – right across all hierarchies.” New employees all receive an hour and a half introductory training in the training factory, which is held fortnightly. This provides them with an overview of general

“I’m impressed to see how Festo employees are offered learning opportunities, and not just vocational training, throughout their working lives.”

Dr. Angela Merkel, Chancellor of the Federal Republic of Germany,
during her visit to the Scharnhausen Technology Plant on 10 March 2016

issues such as quality, energy, safety, sensitivity of components, work standards and break-out zones.

Individual learning profiles
The training factory is designed to complement the Technology Plant, and enable managers to identify potential training topics. The training aims, number of people, trainer, duration, and the required training method are described in individual training profiles. The objective is a standardised training process.

The course catalogue includes machining, assembly, electronics manufacturing and automation as well as the associated topics of energy and environment, Festo products, Festo production systems and location-related training at the Scharnhausen plant.

Training in the CP Factory
A central element of the training factory in Scharnhausen is CP Factory, the cyber-physical learning and research platform of Festo Didactic. With the Cyber-Physical Factory, technical knowledge about increased digitalisation of production and the future interaction between people and machines can be communicated at a practical level. The CP Factory reflects the new developments in networked production for Industry 4.0 and offers a modular Smart Factory system for teaching and research purposes. It is part of a continuous, modular learning system for transferring knowledge about Industry 4.0.

As a platform, it replicates the stations of a real production system, integrates relevant mechatronic and automation technologies and supports learning about system programming, networking and data management, for example. The CP Factory is also used for developing and testing flexible software solutions, which are then used in production. “The CP Factory represents an important step towards Industry 4.0 for the Festo training factory in Scharnhausen,” says Klaus Zimmermann, Head of Training and Consulting at Festo Didactic Germany. “In addition to further technological development, interdisciplinary training for employees is crucial.” And for Juliane Körner, Industry 4.0 is no longer an abstract term thanks to her work in the training factory. When she looks over the shoulders of her technical colleagues, she can see with her own eyes how production is going to change in the future. ■

- www.festo.com/technologyplant
- www.festo-didactic.com

The eight phases
of the Productivity Circle

Software tools for greater productivity

Creating flexibility

Companies are using software tools at many different points of the value chain to increase reserve capacity and achieve productivity gains. It is therefore crucial to have access to support tools throughout all project workflows. The new eight-phase ‘Productivity Circle’ provides the basis for Festo to be even better at meeting customer requirements in every phase of a project in the future.

More information on the software tools can be found on **www.festo.com/support**

Make contact
Global presence. With the 'Festo addresses worldwide' online search function, you will find every Festo address in the world. Country-specific information on authorised sales partners can also be retrieved quickly.

Conceptualise
Tools with built-in competency. The Festo Product Finders enable you to search for specific features and thus help you to quickly find the right product. The search process is 2.5 times faster than a conventional product search – and the Festo Engineering Tools make it at least 10 times faster. This saves you a lot of time.

Design
Systematic savings. The design phase represents around 25 to 30 per cent of the overall service life costs in machine and plant construction and is thus one of the greatest cost pools. CAD data, CAD tools/plugins, programs like FluidDraw® and EPLAN circuit diagram macros for generating circuit diagrams, as well as ready-to-use program libraries for CODESYS provided by Festo significantly reduce process costs.

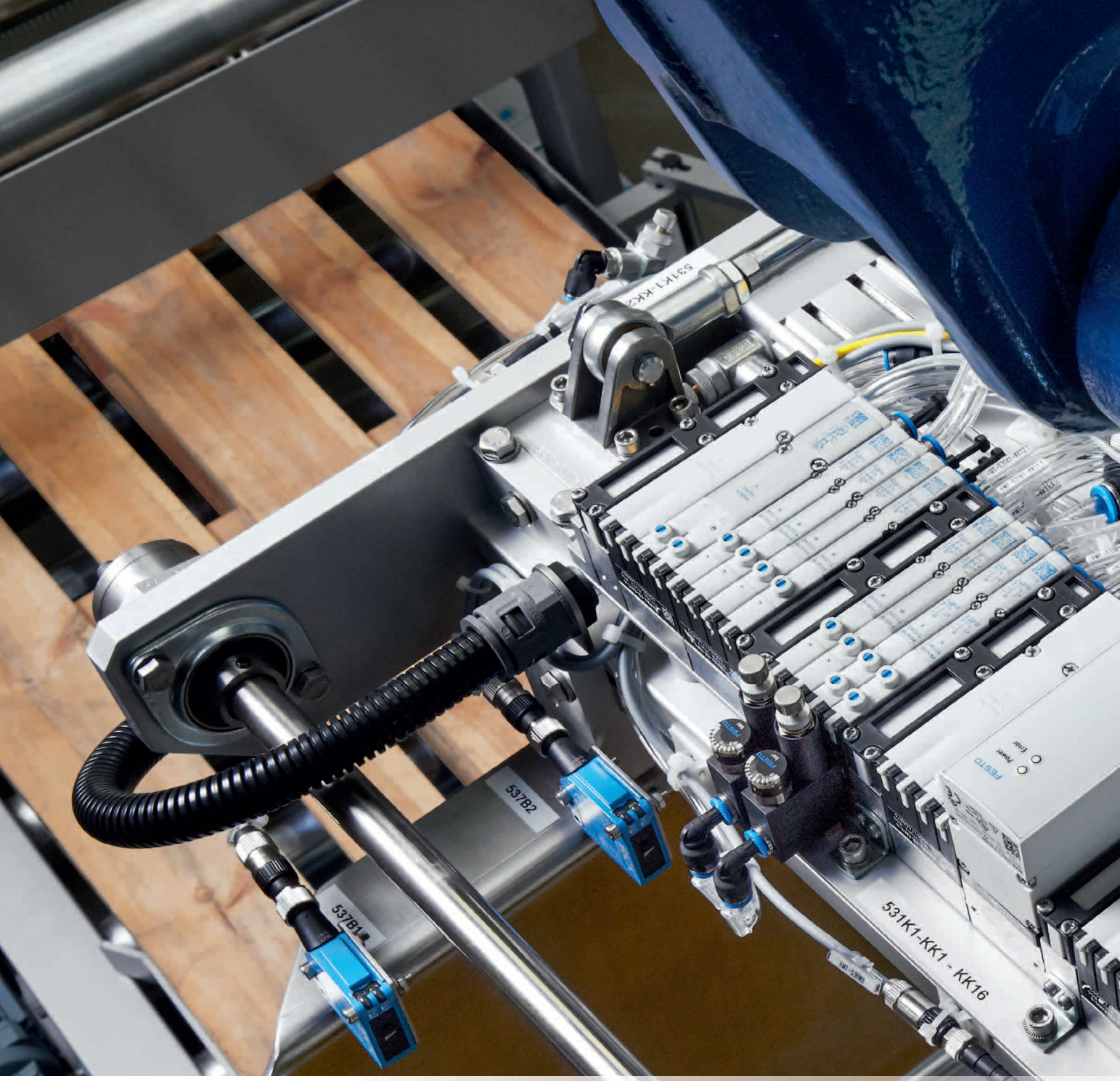
Procure
Quick and convenient inventory management with the Festo Online Shop and its extensive range of functions such as order tracking, downloading order documents and the Label Designer.

Assemble
Everything in its place. Festo simplifies the assembly of machines and systems, for instance with templates for inscription label holders for valve terminals, drilling templates for the correct control cabinet cutout and assembly instructions in multiple languages. All important information can be retrieved quickly and easily on the Support Portal.

Commission
The Festo Configuration Tool FCT is the ideal solution for parameterising axis systems, proportional valves and cameras, etc. It offers convenient configuration and maximum reliability. Should you have any questions, the Expert knowledge and Training tabs in the Support Portal, the technical hotline and the Support Community can quickly provide the right answer.

Operate
A high level of overall equipment effectiveness (OEE) and short downtimes – the Festo Product Key in DataMatrix-format makes product identification fast, easy and reliable. Simply scan the DataMatrix code using your mobile and forward the information by e-mail.

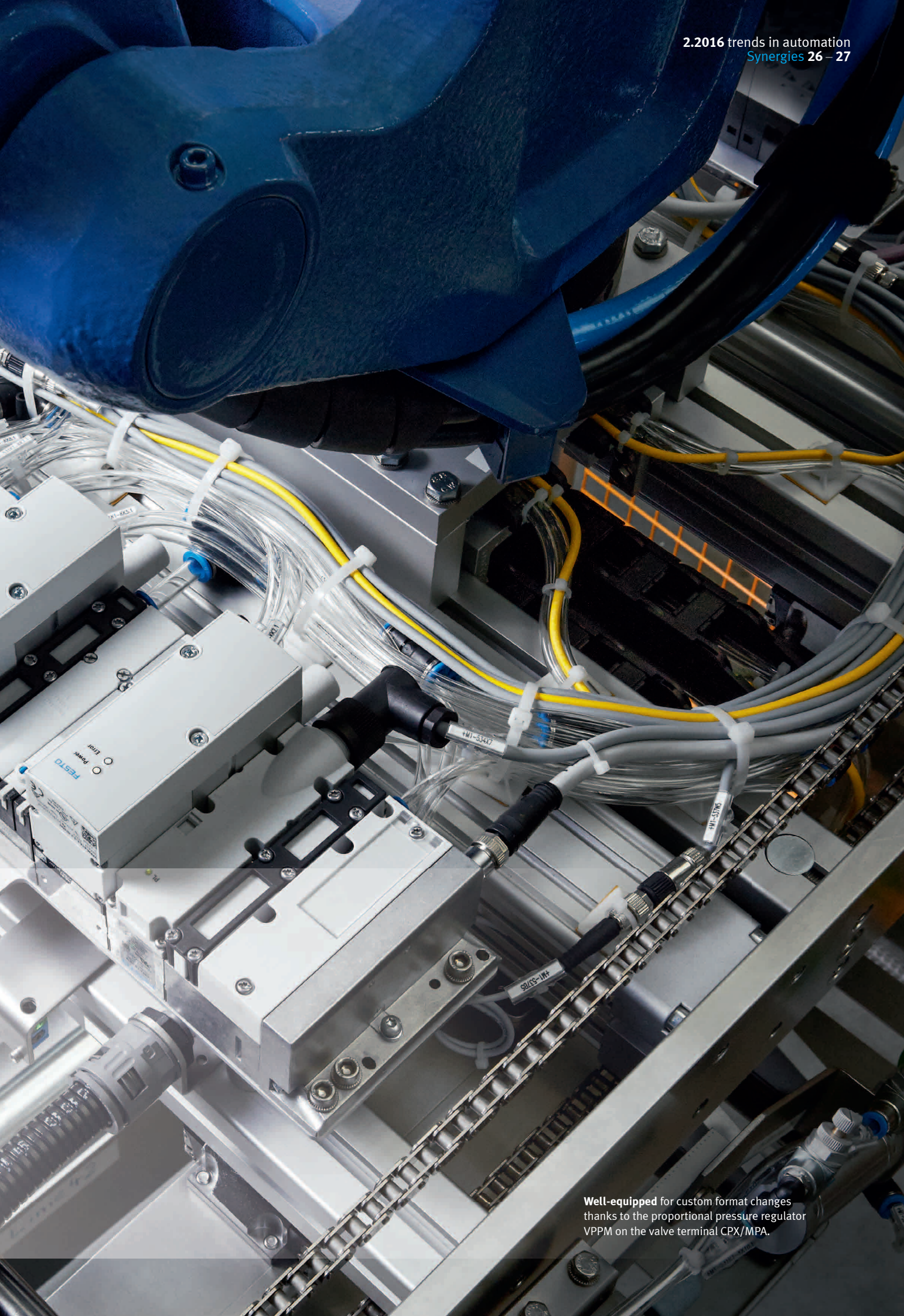
Modernise
Always up-to-date. When it comes to modernisations, our Online Shop immediately shows you all possible replacement products which you can easily use instead of the existing components. The compressed air cost calculator makes the savings potential of an application transparent in an instant. This gives you greater financial freedom.



Gaining a pneumatic advantage with proportional valves

The individualist among packagers

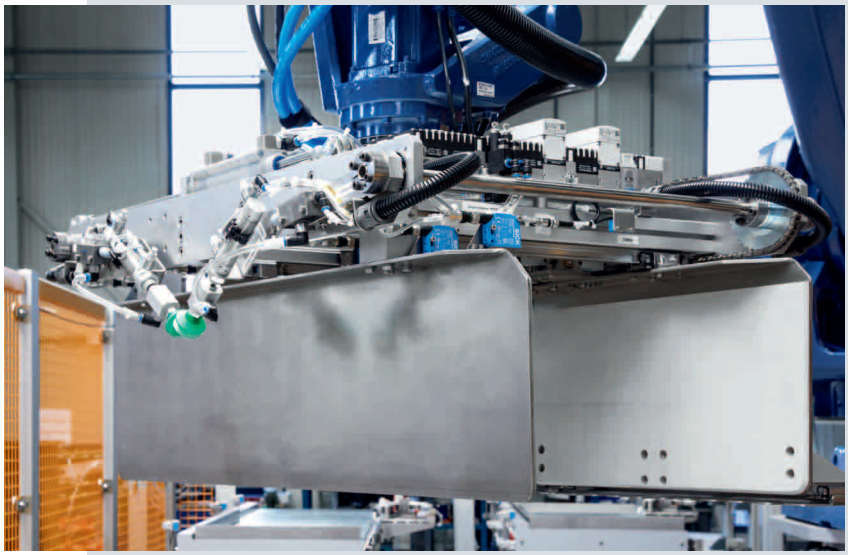
“Our design-to-order concept sets us apart from the majority of packaging machine manufacturers,” says Michael Ruf, Deputy General Manager of Transnova-Ruf. In addition to cutting-edge robotic and control technology, the company is using pneumatic automation technology from Festo, and especially proportional technology on valve terminals.



Well-equipped for custom format changes thanks to the proportional pressure regulator VPPM on the valve terminal CPX/MPA.

“Thanks to proportional valves from Festo, we have the right product for our tailored modular packaging and palletising systems.”

Michael Ruf, Deputy General Manager of Transnova-Ruf



Adjustable gripper jaws: sometimes they have to handle different box sizes, sometimes they have to handle whole Euro pallets – only proportional technology enables fast and cost-effective format changes.

Whereas many packaging machine manufacturers rely on standard machines with sliding, stacking and sorting chains, Transnova-Ruf is using tailored, robot-based packaging, palletising and handling solutions. This creates space-saving, energy-efficient compact systems with high power density and fast format changeovers. The innovators can now deliver well over 100 turnkey packaging lines per year for picking, packing and palletising. These solutions are precisely tailored to their customers’ requirements and cover the entire process chain for final packaging. As a result, the company is now recording double-digit annual growth.

Micro-modular systems

“We’ve given up our rigid machine program approach and are now living in the world of micro-modularity. Just like with a Lego set, previously unimagined solutions can be produced thanks to this concept, which is unprecedented in packaging machine engineering,” says Michael Ruf. “Micro modules are functional elements that we use to configure the system specifically to the customer’s requirements. For each module, a CAD template is stored with the corresponding hardware and software. The modules are combined according to individual customer specifications. The result is a tailored packaging solution, a design-to-order solution in the truest sense of the word,” adds the industry expert. “And we’ve also gained a competitive edge,” says Ruf confidently.
Each year, the company integrates about 200 robots that offer a number of key advantages: greater flexibility, in particular for special purpose machines, better handling and faster format changeovers. The focus is on the specific needs of the customer. “And those needs are different every time,” Ruf explains. Transnova-Ruf machines are used to package everything from button batteries and salami to IV bags and refrigerators and even control cabinets; from products in the food, cosmetics, non-food and chemical industries to medical and pharmaceutical products.

Pneumatic proportional technology

The market requires cost-effective production systems that can easily handle frequent product and format changeovers. And that is where pneumatic automation technology has a role to play. The gripping module of a packaging and palletising cell is equipped with vacuum technology, pneumatic drives, grippers and valve terminals. The key piece of technology here is the proportional pressure regulator, which is integrated into the valve terminal CPX/MPA on site. “It’s positioned exactly where the pressure is needed,” explains Festo Product Manager Ulrich Sixt.

The proportional pressure regulators VPPM regulate the contact pressure of the parallel gripper. The packaging must be gripped securely without deforming or damaging it. Gripping pressure is governed by various factors such as fullness, packing density or weight. Control precision and repetition accuracy are also very important. Thanks to the proportional technology, adjustments can be made at any time. This is necessary because systems sometimes have to handle over

Optimal use of space: this palletising system forms the end of a highly automated packaging line.

100 different formats. These formats are managed as recipe parameters in the SIMPLO software application developed by Transnova-Ruf. The software allows machine operators with no programming skills to create new palletising patterns and import them into the robot control system during live production.

Diagnostics and remote maintenance
The proportional pressure regulators VPPM are embedded in the valve terminal CPX/MPA. Its electrical component has analogue and digital inputs and outputs that can be used to control and monitor individual sections of the process. The CPX can be accessed and diagnostic data can be retrieved via the Internet. This means that, whenever maintenance is required, remote diagnostics can be used to quickly determine whether the problem is easy to rectify or, in extremely rare cases, whether the entire valve or valve terminal must be replaced. “As a medium-sized company, we can now provide our global network of customers with the best possible service,” says Michael Ruf with a smile. ■

www.festo.com/vppm

Transnova-Ruf Verpackungs- und Palettiertechnik GmbH

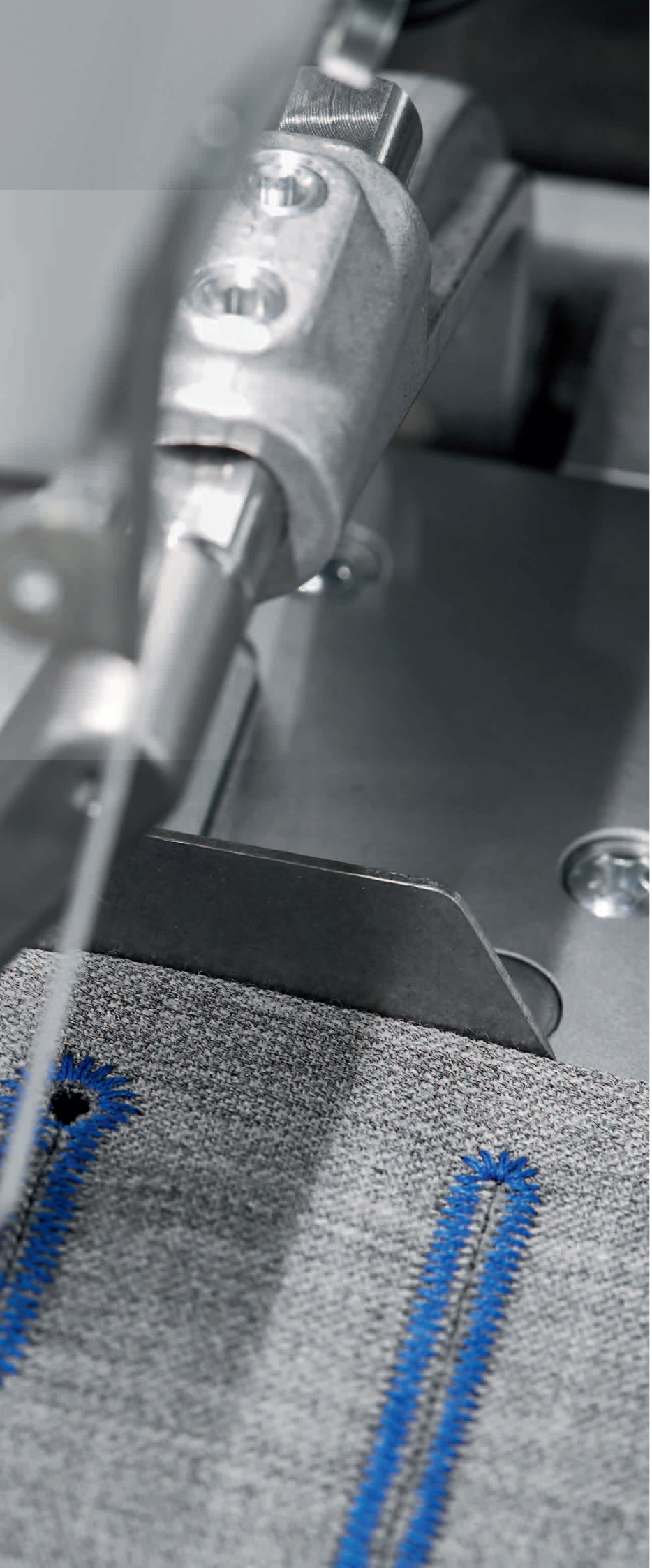
Rudolf-Diesel-Straße 12
91522 Ansbach
Germany
www.transnova-ruf.de

Area of business:
Development and assembly of modular robot-based solutions for end line packaging and palletising processes

Production of eyelet buttonholes with solenoid valves VUVG

A stitch in time

Buttonholes are not only functional but also have a visual aspect. However, in textile manufacturing there is generally very little time to produce them. The new automatic eyelet buttonholer 581 from Dürkopp Adler delivers the necessary speed. Thanks to the compact Festo solenoid valves VUVG, it takes just under four seconds to create a buttonhole.



Innovation meets tradition at Dürkopp Adler. Dürkopp designed his first sewing machine in 1861. Over the next 20 years, the city of Bielefeld became one of the most important centres of the sewing machine industry in Germany. By 1880, there were 19 sector-related companies operating in the area, among them Dürkopp Adler. Today, the company has a worldwide service and sales organisation and is a global leader in the sewing machine and automatic sewing machine market.

Dürkopp Adler's automatic sewing machines are much more than just sewing machines. The high-tech automatic machines feature state-of-the-art control technology, multiple thread feeds and automatic cutting systems which cut through the fabric at lightning speed after the buttonhole shape is stitched. The shape and length of the buttonholes are set on the operating panel of the machine. The premium automatic double-chainstitch eyelet buttonholer 581 is equipped with a multiflex cutting system, which allows different buttonholes to be cut without changing knives. Festo solenoid valves VUVG are an important component of these ultra-modern sewing machines. They enable the fabric to be handled and processed extremely quickly and precisely, with the fastest variant for making jeans having a cycle time of just under four seconds.

Based on partnership

Festo has been a key pneumatic partner of Dürkopp Adler for many years. The high quality and performance of the solenoid valves VUVG prompted the sewing machine manufacturer to intensify cooperation with Festo during the redesign of the automatic double-chainstitch eyelet buttonholer 581 around two years ago. Among the features of the solenoid valve series VUVG that impressed Dürkopp Adler was its wide range of variants. →

“Our automatic double-chainstitch eyelet buttonholer 581 is the fastest of its kind in the world thanks to Festo technology.”

Markus Richter, Head of Development at Dürkopp Adler

Compact, fast and flexible: the solenoid valve VUVG has reduced cycle times by around a second.

Solenoid valve VUVG

Powerhouse in a small space

Compact, high flow rate and low cost. The solenoid valve VUVG is ideal for small parts assembly and electronics and for the food and packaging industry. Electrically and pneumatically actuated, the solenoid valve VUVG can be used as both an individual valve and a valve terminal. One of the unique characteristics of this valve is its optimised footprint with an excellent size/performance ratio. Compact and made from lightweight aluminium, the VUVG saves space in the system and reduces weight. Its 10 bar technology ensures accelerated cycle times, smaller cylinder sizes and a higher energy density. The patented cartridge principle makes the solenoid valve VUVG extremely durable and very reliable.

Meeting of automation experts: Dürkopp Adler Head of Development Markus Richter (centre) and Development Engineer Artur Hinkelmann (left) together with Viktor Peters, Sales Engineer Automation Technology at Festo.

With a modular design that makes them suitable for use as both a valve terminal and individual valves, solenoid valves VUVG combine high performance with short switching times and minimum space requirements. Another important argument in favour of choosing Festo as a technology partner was the global availability of spare parts.

As innovative technology partners and suppliers of high-quality products, Festo and Dürkopp Adler both benefited from stepping up their cooperation. For example, as the relative humidity in textile production facilities in the Far East requires greater protection for machines, the IP class of the solenoid valves VUVG was increased to IP65.

Speed and force
The high energy density of pneumatic components comes into its own when operating different industrial sewing machines. In addition to greater speed, the high pneumatic forces ensure clean cutting. Cutting blades, punching tools and cutting blocks cut through even the strongest of fabrics in a matter of seconds. Compact and with high flow rates, solenoid valves VUVG can be integrated not only into new product developments, but also into existing automatic sewing machines. In the automatic double-chainstitch eyelet buttonholer 581, the solenoid valves type VUVG control all pneumatically driven functions. These include cutting and punching to separate the fabric as well as the pneumatic adjustment of the cutting/punching device itself depending on the size and type of buttonhole. The spreading and clamping of the fabric before stitching the buttonhole are also pneumatically controlled. A further pneumatic clamping mechanism stops the fabric after the buttonhole is produced and pulls it forward slightly so that the thread can be cut off. The thread tensioning is then switched off by a pneumatic cylinder.

Good prospects
The new automatic double-chainstitch eyelet buttonholer 581 is, according to Dürkopp Adler, the world's fastest machine of its kind. The faster the system, the greater the customer benefits and therefore the company's competitive edge. The increasing degree of automation in the garment industry also means opportunities for textile firms in European countries to move production back closer to home. A good 90 per cent of the technology used in the textile market in the Far East is high-tech made in Germany.

Dürkopp Adler believes there is potential for further cooperation with Festo, and hopes to build on the relationship in the future. The newly developed basic solenoid valve VUVG-...-S has a crucial role to play. It features a selection of core functions and significantly reduces cost pressure, particularly in the production of automatic sewing machines with a minimal range of functions. ■

www.festo.com/vuvg

Dürkopp Adler AG

Potsdamer Straße 190
33719 Bielefeld
Germany
www.duerkopp-adler.com

Area of business:
Development and production of modern sewing technology

Reliable cleaning: safety cabin for opening the vessels using rubber gloves.

Cleaning mobile production equipment

The cleanroom

In the chemical and pharmaceutical industries, cleanliness is of the utmost importance. Production equipment can only be reused if it is cleaned. A new system from ROTAN GmbH shows how this can be done reliably. The Festo solution comprising valve terminals and stainless steel components ensures operational reliability and a long service life.

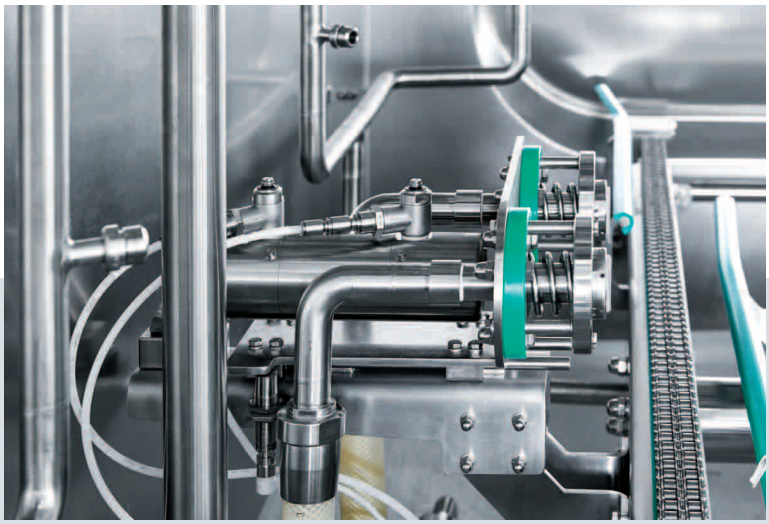
ROTAN develops complete solutions for pipeline and plant construction, tank cleaning, instrumentation and control engineering and cleaning technology. The cleaning specialist's systems are used worldwide in a wide range of industry segments, including the chemical and pharmaceutical industries and the paints and coatings industries. The new system from ROTAN cleans mobile production equipment made from stainless steel, such as barrels and containers with capacities ranging from 300 to 1,200 litres. It was designed and constructed in close cooperation with a well-known pharmaceutical company.

Reliable cleaning

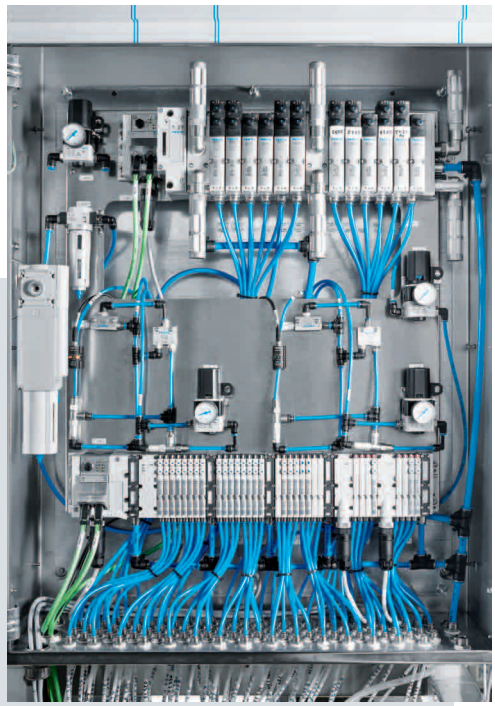
The cleaning process comprises four process steps or modules: the inward transfer of the barrels and containers, the safety cabin for opening the vessel lids, the cleaning of the vessels on the inside and outside, and a buffer station for the outward transfer of the vessels. The closed contaminated vessels are first transported into the safety cabin via a chain conveyor. Here, the lids of the vessels are opened manually. Because the barrels have openings at the top and bottom, cleaning gloves accessible from the outside are attached in the upper and lower sections of the safety cabin. The vessels can only be opened using the integrated glove when both doors are closed. When the vessels are transported towards the cleaning chamber, the lower gloves are raised slightly by compressed air to ensure that they can fold back. Other small parts that need to be cleaned separately are transferred in special bags. After each cleaning operation, the gloves are tested for leaks with the doors closed and a pressurisation of 0.5 to 0.6 bar. The pressure is controlled by valve terminals MPA, and the pressure sensor is an SDE5 from Festo.

Flexible attachment

The system rinses the chamber after each cleaning operation to remove the contamination from the barrels and containers. Different cleaning agents are used depending on the type of contamination. For water-soluble substances, rinsing with cold water is sufficient. Non-water-soluble substances require cleaning with solutions which meet customers' requirements. The vessels to be cleaned are moved from the safety cabin to the cleaning chamber. Here they are locked using a special device consisting of a coupling with spring package. This enables the system to respond flexibly to possible tolerances of the vessels. The locking process is carried out by the stainless steel cylinder CRHD, while the speed ➔



The vessels are locked using a special device consisting of a coupling with spring package, stainless steel cylinder CRHD and one-way flow control valve CRGRLA.



Reliable control of the pneumatics is provided by VTSA and MPA with fieldbus.

“Corrosion-resistant components made from high-quality stainless steel increase the operational reliability and availability of our cleaning systems.”

Dr. Ing. Klaus Roos, Head of Cleaning Technology, ROTAN GmbH

is adjusted via the corrosion-resistant one-way flow control valve CRGRLA. The process ends when the cleaned vessels are transferred to the buffer station.

Simultaneous movement
Inflatable seals keep the doors of the inner chamber sealed during cleaning. The doors are opened and closed by two linear pneumatic cylinders. Both cylinders must open and close simultaneously to avoid potential misalignment of the doors. To achieve this, it was essential to ensure that the pneumatic tubing above the valves are exactly the same length. The closing and opening speed of the doors is regulated by one-way flow control valves which are actuated using individual valves.

Long service life
When equipping the ROTAN cleaning system with Festo components, corrosion resistance was of central importance. Among the components used were the stainless steel standard cylinder CRHD, the stainless steel piston-rod attachment CRSG and the stainless steel Quick Star connector CRQS. The combination of easy-to-clean design and total operational reliability increases system availability and reduces downtimes. ■

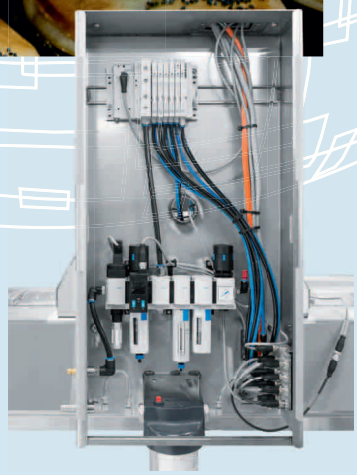
www.festo.com/pharma

ROTAN GmbH

Riedstraße 3
67125 Dannstadt
Germany
www.rotan-gmbh.de

Area of business:
Development of complete solutions for pipeline and plant construction, tank cleaning, instrumentation and control engineering and cleaning technology

Australia



Australian pie

Shaping, cutting and pressing in a single machine

Filled with minced or diced meat, the pie is Australia's most popular dish. To meet the huge demand for pies, Lindsay Pie Making Equipment (LPME), based in New South Wales, developed a pie production system more than 30 years ago. Today, the Simple Simon range of machines from LMPE is used to produce pies all over the world – in the USA, Canada, the Middle East, Africa and Asia.

A major leap forward in perfecting the system was achieved thanks to the use of the operator unit CDPX from Festo. This solution enabled LPME to make the switch from analogue to digital system control. In addition to introducing a much smaller control cabinet and optimising system operation, the machine design was also improved. A range of other Festo components, such as the Clean Design guided drive DGRF for shaping, cutting and pressing, and the safety valve MS6-SV contribute to the system's high level of productivity.

Supplied ready to install: control cabinet with valve terminal MPA and service unit MS4.

www.simplesimon.com.au

Thanks to the operator unit CDPX, the systems can be serviced via remote control from the plant in Australia.

Germany

An ergonomic model of success

Clip fix tool makes automotive assembly easier

Photo: © Volkswagen

Easier automotive assembly: the clip fix tool AGTC reduces ergonomic strain on finger and hand joints.

Clip and plug connectors are increasingly replacing conventional screw connections in assembly tasks as they reduce production times. These clips, normally in the form of expanding nuts and rivets, are used in vehicle construction to secure covers and hold cables in place. They are inserted either by hand or using a manual press-in tool – a process that exerts significant strain on the hands of employees. The thumbs and the heels of the hand can be exposed to press-in forces of around 100 newtons, several hundred times per shift.

This led Festo together with Volkswagen AG to develop the clip fix tool AGTC: to relieve the strain on employees during assembly, and to create a tool that would be easy to operate. The clip fix tool can also be used with a wide variety of clips. Inside the clip fix tool is a pneumatic drive based on the round cylinder DSNU, which generates a pulse when the tool is activated. The pulse is effortlessly transferred via the AGTC's head piece and the clip is pressed into the opening. The tool is then available again very quickly for the next clip. This significantly reduces the amount of force that is exerted on the body. In addition, the work can be done with greater precision and repetition accuracy than with manual operation.

www.festo.com/automobil

Germany/International

Twice in a row

Bosch distinguishes Festo as a preferred supplier

Quality and reliability pay off. Once again, the Bosch Group has honoured Festo with Preferred Supplier status for pneumatics for 2016. During a visit to the Festo stand by a delegation of 16 international lead buyers, Malte Ihlenfeld, Director Corporate Sector Purchasing and Logistics at Bosch, handed the certificate over to Festo's former Chairman of the Management Board, Dr. Claus Jessen, and Member of the Management Board, Sales, Dr. Ansgar Kriwet. "Our suppliers are an important success factor. In particular the global focus and capacity for innovation of a supplier are of great importance to the Bosch Group," said Ihlenfeld. "We've been especially impressed with the way that Festo is dealing with major automation technology issues such as Industry 4.0 and SupraMotion. The software tools and configuration solutions which help reduce the workload for our purchasing, logistics and engineering processes are also extremely promising."

The Preferred Supplier status is part of Bosch's supplier management programme and is awarded each year. The preferred supplier status is valid worldwide for all Bosch plants and all business divisions of this high-tech company and the world's largest supplier to the automotive industry.

Hannover Messe 2016: Malte Ihlenfeld, Director Corporate Sector Purchasing and Logistics at the Bosch Group (centre) hands over the certificate for preferred supplier status in 2016 to Festo's former Chairman of the Management Board, Dr. Claus Jessen (right). Left in photo Dr. Ansgar Kriwet, Member of the Management Board, Sales, at Festo.

FESTO
ELEMENTI PNEUMATICI PER L'AUTOMAZIONE
MACCHINE PER LA LAVORAZIONE DEL LEGNO

Happy birthday, Festo Italy!

Festo has been a strong industry partner in Italy for 60 years. A number of long-standing as well as former employees of Festo Italy took a trip into the past this year to prepare themselves for the anniversary celebrations. After all, there are 60 years of company history to review and collate into a book to mark the occasion. The first Festo national company was opened by the Stoll founding family on 21 January 1956 in Milan. Numerous visits to Italy, as well as an innovative spirit and great vision were the major factors in this important decision. In addition, Italy was the second-biggest sales market after Germany for Festo. It all started with just over 20 employees in the Via Ettore Ponte. The company moved to Assago, just outside Milan, in 1984. Today, Festo Italy has 225 people, 105 of whom work in sales. In its 60th year, Festo Italy is a national market leader and has an optimistic outlook on the future, despite the ongoing economic crisis.

FESTO Italiana s.r.l. - 20143 MILANO - Via Ettore Ponti, 16-18
Tel. (02) 47.90.25 - 47.72.70. - 47.44.18 - Telex: 332317

Japan

Mobile air

Piezo valves in use

Around 600 million people worldwide suffer from chronic obstructive pulmonary disease (COPD). Portable oxygen therapy devices improve the mental and physical ability of patients as well as their quality of life. Japanese company Musashi Medical Laboratory supplies easy-to-operate regulators for oxygen therapy devices. Their size and weight are comparable to those of a smartphone, and they can be comfortably carried directly on the patient's body in a shirt or trouser pocket. The regulator is compact and light, not least of all due to the proportional valve VEMR which regulates the supply of oxygen via the tubing.

With piezo technology oxygen can be administered to patients gently instead of jerkily. The device is matched to the patient's respiratory rate. A sensor ensures that the regulator detects inhalation. The right amount of oxygen is then mixed with the respiratory air. During inhalation, the sensor detects a pressure drop and transmits a signal to the regulator which in turn opens the proportional valve VEMR. At the end of each inhalation, the piezo valve shuts off the supply of oxygen. Oxygen consumption is thus much more efficient. The oxygen bottle doesn't have to be refilled as often, and the patient's range of action is increased. Thanks to the energy-efficient piezo valve, the device's battery life is considerably extended. A further advantage of the piezo valve is the quiet supply of oxygen and its silent switching operations.

As compact as a smartphone: Musashi Medical Laboratory's IVY flow regulator for portable oxygen therapy devices can be held conveniently in the hand for operation and fits in any shirt or trouser pocket. (Photos: Musashi)

Germany

In the thick of things

Federal German Chancellor visits the Festo Scharnhausen Technology Plant

Demonstration of direct human-machine cooperation.

Federal German Chancellor Angela Merkel addresses the employees at the Scharnhausen Technology Plant.

In March of this year, Federal German Chancellor Dr. Angela Merkel visited the Festo Scharnhausen Technology Plant. The visit focused on direct human-machine cooperation, future-oriented production technologies and training employees for the production tasks of the future. Dr. Wilfried Stoll, Managing Director of the Festo Group holding company, former Chairman of the Management Board Dr. Claus Jessen, plant manager Stefan Schwerdtle and the owner family welcomed Chancellor Merkel and her delegation. She was given a presentation about the company and a tour of the plant. The tour took in the VUVG system, human-robot cooperation, the think tanks and the training factory.

Chancellor Merkel met many of the plant's employees during the tour and took the time to exchange a few words with them. The visit ended with a statement by Chancellor Merkel to over 400 plant employees. As a special gift, Chancellor Merkel was presented with a personalised VUVG valve directly from the assembly system.

Germany/Norway

The delegation at the VUVG assembly line: Monica Mæland, Norwegian Minister of Trade and Industry, and Stefan Schwerdtle, Head of GPC Scharnhausen (right)

Industry 4.0

Norwegian Minister visits Festo

Norwegian Minister of Trade and Industry, Monica Mæland, along with a delegation of representatives from politics, research and industry, visited Festo in Scharnhausen, where she learned about technological innovation and training for Industry 4.0. The Minister and her delegation spent an hour talking with Festo experts about the unique challenges of digitised production and the training programmes at Festo, in particular the requirements with respect to flexibility, availability and short training courses in production.

Italy

Getting to the point

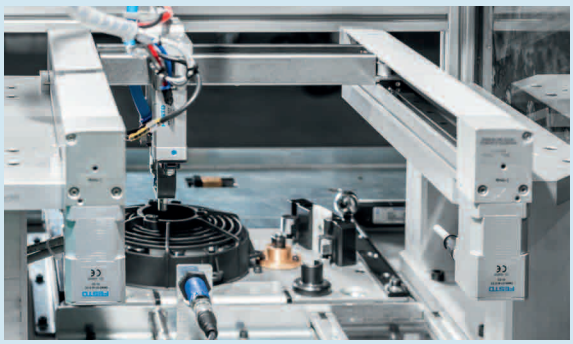
Dispensing with the planar surface gantry EXCM

To prevent overdispensing in lubrication processes, Stecam s.r.l. is using the planar surface gantry EXCM in its new lubrication range for locking systems. The centrepiece of the new system is a manual transport system with semi-automatic return. The assembly line comprises a series of automatic workstations with the first three dispensing assembly grease onto the components with the help of the EXCM. The planar surface gantry from Festo was chosen for this sophisticated application thanks to its ease of assembly and the absolute positioning accuracy of grease-dispensing guns on the slides.

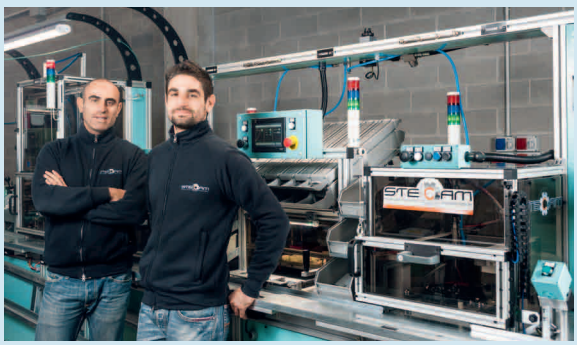
The compact planar surface gantry EXCM enables the individual lubrication points to be freely selected. And the modules no longer need to be exchanged mechanically. The coordinates of the chosen lubrication point can be easily and remotely set on a control panel. The entire system has been designed for high performance, aesthetic functionality and absolute cleanliness, while keeping maintenance costs to a minimum.

"As a result, we have developed a new assembly line concept that makes the critical lubrication and dispensing processes considerably more efficient, thanks to Festo," explains Stefano Segri, Product Manager at Stecam. Over the last two decades, the company, based in Livorno, Italy, has grown from an engineering consultancy into a design engineering and manufacturing firm of ready-to-use special machines.

www.stecam.it



The planar surface gantry EXCM with rectangular working space offers extensive functionality with a highly compact design.



Stefano Segri, Product Manager at Stecam (left): "The new system using the planar surface gantry EXCM makes the critical lubrication and dispensing processes considerably more efficient."

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Publisher
Festo AG & Co. KG
Ruiter Straße 82
73734 Esslingen, Germany
Phone ++49 (0) 711 347 0
Fax ++49 (0) 711 347 2628
service_international@festo.com

Project management
Silke Gartenmeier,
Market Media Creation
silke.gartenmeier@festo.com
Phone ++49 (0) 711 347 3902

Responsible for content
Dr. Guido Purper,
Head of Market Communication
guido.purper@festo.com
Ralf Sohn, Head of Direct Marketing
ralf.sohn@festo.com

Please note
All terms such as customer, user, specialist or sales engineer refer to both men and women.

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Are you always ready for action, Mr. Epple?

As a member of the local voluntary fire brigade, I am always on call. 24 hours a day, seven days a week. Sometimes I am in the middle of a meeting when a call comes in. I've been an active member of the fire brigade for more than 20 years. When we are sent on rescue missions to deal with fires, storm damage or accidents, I always take responsibility, whether I am a member of the team or team leader.

Helping people in need is our top priority. To ensure that everything runs smoothly during a mission, the tasks must be clearly divided. At the same time, we need to be able to respond quickly and flexibly to different situations. To do this, good teamwork is crucial. But technical expertise and physical fitness are also important. And regular exercise and training are also a must. One of the things I really like about the fire brigade is the camaraderie.

Teamwork, technical understanding and always being up-to-date are just as important in my job as Head of Sales Documentation. Every year, my team and I publish up to 14 different product catalogues. The biggest of these is the 1,300-page annual catalogue which has a print run of 40,000 copies worldwide. In addition to special product overviews and individual customer catalogues, we produce catalogues for our distributors in nine languages. The large number of different formats demands a concerted coordination effort throughout the year – from preparing all the data and dealing with the commercial aspects to approval for printing. My colleagues and I are in constant contact with the various departments at Festo, both nationally and internationally, so that the data is always as up-to-date as possible. The going can get tough during busy times.

Every two years we enter the INKA competition, in which B2B communication media for technical products are evaluated and commended. In 2014, we were given valuable suggestions for providing our customers with even clearer information. And in 2016, having been awarded second prize for our catalogue in the Print category proved that we are on the right track. This is an achievement we as a team are very proud of.

FESTO

Flexible in use!

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An unobstructed view

On top of Roque de los Muchachos on the island of La Palma in the Canary Islands, at a height of 2,400 metres, you feel slightly closer to the universe. The Gran Telescopio Canarias (GTC) gives astronomers insights into distant galaxies, black holes and exoplanets.

La Palma provides near perfect conditions for looking into the depths of space: clear air, dark-blue skies and minimal altitude wind thanks to the trade winds and high mountains. The high altitude means that the air contains fewer dirt particles that could impair the quality of the sensitive optics of the large telescope, which has a reflector diameter of 10.4 metres. Scientists also benefit from the band of cloud at around 500 metres above sea level, which is another of the island's natural phenomena. Its filter effect reduces light pollution at night to a minimum, thus ensuring an unobstructed view of the magnificent starlit sky and uncharted space, whose secrets have yet to be discovered.

Festo Inc.

5300 Explorer Drive
Mississauga ON L4W 5G4
Tel: 1 877 GO FESTO
Fax: 1 877 FX FESTO
festo.canada@ca.festo.com
www.festo.ca