trends in automation

The Festo customer magazine **Issue 28**

FESTO

Inspiration
Magic
Masters of illusion: interview with the Ehrlich Brothers

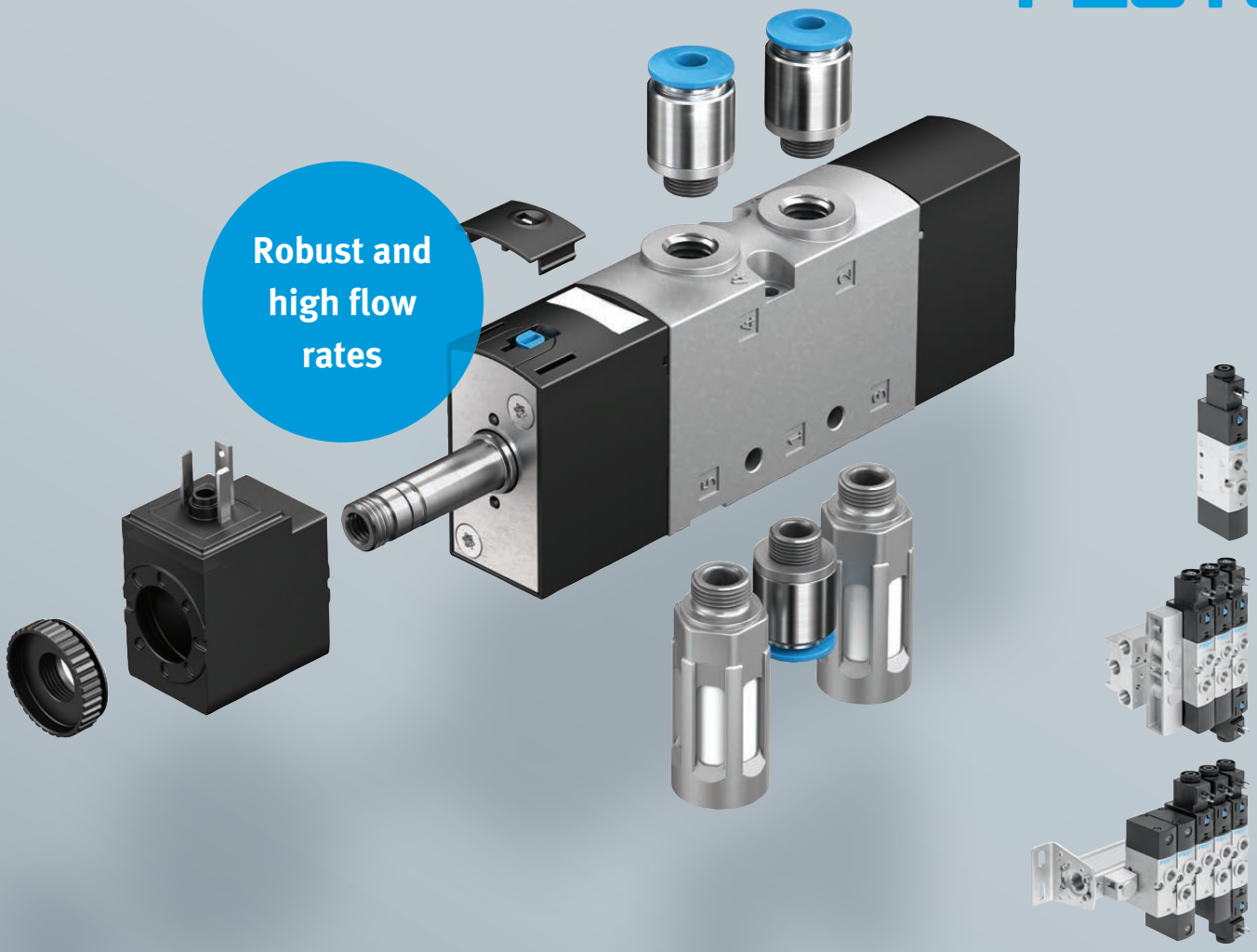
Impulse
SupraCycle
The latest developments in superconductor technology

Synergies
Compact
The mini planar surface gantry shows its real strength

In focus
Dimensions
Spatial wonders and amazing feats

Your outstanding everyday valve

FESTO



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Small world, big ideas

Gary Wyles,
Managing Director, Festo GB

“That’s one small step for man, one giant leap for mankind.” These were the words spoken by Neil Armstrong when he became the first man to step on the Moon on 21 July 1969. His wonderful play on words shows us how small and big are relative concepts.

In this issue you’ll find out how the big and the small interact with one another. Increasingly compact systems are achieving higher outputs than the huge machines of the past. Where vast production halls once stood, a few square metres of space is often all that is needed today for greater productivity.

At the same time, miniaturisation is paving the way for new solutions. A small, high precision test system for mobile devices – the first of its kind – is replacing laborious manual testing procedures. A key element of this test platform is the mini planar surface gantry EXCM (page 16). Laboratory automation is also benefiting from this trend, with increased throughput and more reliable results (page 33).

Our SupraMotion 3.0 exhibits can move large loads using small forces. The SupraCycle shows how this technology could revolutionise the way in which we work in the coming years. Quiet, compact and extremely efficient, these solutions are excellent proof of the strength of Festo as an innovative company.

Without wanting to detract from the historical significance of the Moon landing, we believe we share one thing in common with the heroes who completed this mission – a passion for new development, and for future topics such as Industry 4.0 or Internet of Things.

We hope you enjoy reading this issue.

Gary Wyles

Photo: © NASA, ESA, and the Hubble Heritage Team

In focus Dimensions Since 1990, the Hubble Telescope has been providing incredible images from the depths of outer space. What looks small in a colour photo takes on truly vast proportions in reality. In this issue of trends in automation you'll find out how the great and the small interact with one another. Ever more compact systems are delivering higher productivity. Extremely small components are creating space for new possibilities.

trends in automation

Issue 28

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Compact class
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Photo: © Coop Himmelb(l)au

Colossal knowledge store

It stands 190 metres long, 90 metres wide and a good 40 metres high. 14,000 m² of bead-blasted stainless steel, concrete and glass dominate the façade of the Musée des Confluences in the French city of Lyon. This futuristic building in the form of a crystal cloud was designed by the Vienna based firm of architects Coop Himmelb(l)au.

The museum, which is located at the confluence of the Rhône and Saône rivers, opened its doors on 21 December 2014. It is the first museum in France to bring together more than two million works from ethnological and natural science collections under one roof. Visitors who enter the 24,000 m² building can move between open and enclosed exhibition spaces as if following the course of a river and explore the vast world of knowledge among the many ramps, walkways and floors.

The art of illusion

Andreas and Chris Ehrlich belong to the international elite of illusionists. They have been named "Magicians of the Year" twice and delight young and old alike with their unique brand of magic during their tour. Shortly before the show in Stuttgart, the Ehrlich Brothers talked about how it all started, how they bring their ideas to life and the technical wizardry behind their spectacular shows.

▸ **trends in automation:** We're sitting here on the set of your show in Stuttgart. The sound check and lighting test are underway. Three 40-tonne Megaliners are parked in the courtyard. And tomorrow it's on to the next city. You've enjoyed a rapid rise to fame in recent years. Did you ever dream that you would one day fill venues of this size?

Chris Ehrlich: We started out with just a small magic set when we were children. Never in our wildest imagination – though with our illusions you need a pretty vivid imagination – would we have believed that this would one day lead to such huge success. One of the cornerstones of our success is our love of detail and the determination to always do better. After every show we analyse exactly how it went, eliminate potential for error and improve our illusions wherever possible. Even though something may look perfect, for us it is never one hundred per cent perfect. We always want to try and make our shows just that little bit better.

Andreas Ehrlich: For us it's just the same as working in industry. We also operate in a continuous improvement process, whether it's for small tricks or big illusions.

▸ Your show begins in just a few hours. You seem very relaxed – as does the entire crew. Yet everything here seems to involve a great deal of technical effort. Are you familiar with all of the technical details or are you 'merely' the artists who do all of the creative work and leave the implementation side to your co-workers?

Chris Ehrlich: We are the architects of our productions and work both in and on them – from the initial idea to the final technical implementation. It's always been that way. At home we used to ➔

spend hours on end working in our father’s workshop. That is where we laid the foundations for the success that we enjoy today.

Our goal was always to understand everything about the technical side of the overall production. We are constantly learning new topics and are often the last people to leave the workshop, long after midnight. We even write our own PLC programs and are heavily involved in the technical production process of our shows.

Andreas Ehrlich: I’ve always been fascinated by the idea of building something. It runs in the family. Our father was a skilled toolmaker, mechanical engineer and vocational teacher. He had a huge amount of expertise and taught us an awful lot. In the early days he supported us in constructing our tricks, but always insisted that we help so that we would learn how things work ourselves. Enthusiasm for technology and using technology to captivate people has been a recurrent theme throughout our lives.

▶ So technology is a key element of the illusions performed by the Ehrlich Brothers. How much time do you invest in technology and what are your expectations?

Andreas Ehrlich: Technology plays a big part in our lives. The art lies in ensuring that the audience is not aware of its presence. This means that we have to fit the technology into the smallest space possible, but at the same time make sure it is reliable.

Chris Ehrlich: Of course, magicians still use good old fashioned sleight of hand. But if you want to amaze thousands of people,

> “Automation gives us security, it relieves the pressure on us and gives us the freedom to focus on our performance on the stage.”
>
> Andreas Ehrlich

The interview with Andreas and Chris Ehrlich took place on 29 January 2015 at the Porsche Arena in Stuttgart, Germany.

it’s simply no longer enough. You really need to offer more. And that’s only possible by making extensive use of technology. Strictly speaking, what we do is highly specialised machine building. One of our latest illusions, teleportation, is a perfect example of this. When we were developing this illusion, we couldn’t just walk into an engineering firm and say that we needed a teleporter. This is a highly specialised, individual solution that had to be developed from scratch.

▶ Where do you use automation and how do you benefit from the high level of technical back-up?

Chris Ehrlich: Obviously we can’t give away the secrets behind our illusions. However, one technical innovation we can tell you about is the central roll-up projection screen that we have over the stage, which is driven using a Festo servo motor. The advantage of this is that it can be moved to any position. This means that we have maximum flexibility despite the infrastructure that changes from venue to venue. The roll-up projection screen is controlled by our own PLC structure, which operates the Festo controller.

Andreas Ehrlich: We used to use a turnkey standard solution, but it wasn’t reliable enough for our requirements. The screen didn’t move precisely enough to the required position and the projected image therefore didn’t always fit on the screen. With the new solution we no longer have this problem. It is taught before every show and once that’s done we can be sure that it will operate with one hundred per cent reliability. Automation gives us security, it relieves the pressure on us and gives us the freedom to focus on our performance on the stage. ➔

▶ Festo components are now a permanent part of the automation for your show. How did the cooperation with Festo come about?

Andreas Ehrlich: The first contact we had with Festo was in the sales office in Bielefeld. In 2005 we devised a system for a show in which we wanted to implement a special compressed air application, and we were looking for a partner who could provide us with both the pneumatic hardware and the necessary technical expertise. We got to know a Festo sales engineer. After we had given a brief performance, he came backstage and gave some suggestions as to how we could improve certain technical processes. And that's when we began working together. In the years that followed, the expert from Festo was instrumental in our success and development, providing us with Festo products and sharing his knowledge of pneumatics. Whenever there was a problem, he would time and again examine the technical details and present us with possible solutions. He is the one who introduced us to pneumatics.

Chris Ehrlich: We rely on perfect technology that can deliver maximum reliability during every performance. To illustrate just how much we trust Festo, you only have to look at the saw that I lie under every night. It's controlled by a valve terminal from Festo – a CPX/MPA, to be precise.

▶ The time flies by for the audience. People are fascinated by the smaller tricks and the interaction you have with them, but it is the big illusions that really get them going. When is an illusion perfect for the Ehrlich Brothers?

Chris Ehrlich: When it is one hundred per cent reliable and one hundred per cent emotional. The emotions of the audience are hugely important. We aren't just a show that presents technical special effects. Technology provides the foundations on which we can build a show that delivers maximum emotion for the audience. You could say that we transform technology into emotion.

Photo: © Ralph Larmann

Bending spoons is old hat: the Ehrlich Brothers bend entire railway tracks made from steel with apparent ease.

Photo: © Ralph Larmann

Snowflake magic: in the current show, the stage is transformed into a winter wonderland.

▶ You put on some of the biggest illusion shows in the world right now. Even David Copperfield wanted to use some of your tricks. What are your goals for the future?

Chris Ehrlich: To put on a magic show on the Moon. We'll make zero gravity disappear.

Andreas Ehrlich: We actually do think it would be really cool to perform magic in a space station. But that is probably still a few years away. Will it ever happen? Who knows. We all have to have dreams. And we've always tried to make our dreams come true so that others can dream of a new reality. ■

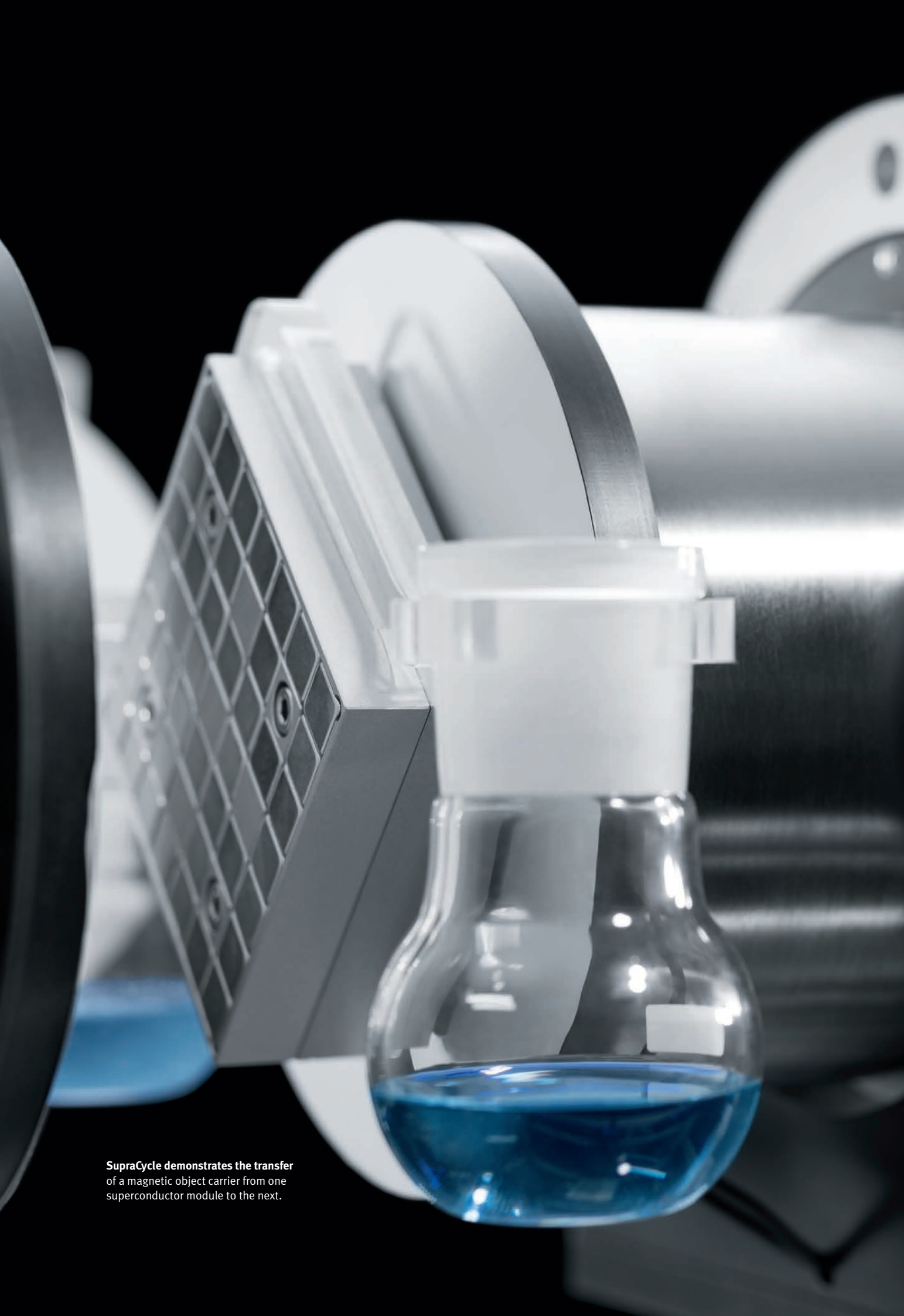
About the people

The Ehrlich Brothers

Andreas and Chris Ehrlich were born in 1978 and 1982 in Herford, Germany. As children, they loved experimenting with a magic set. Today, their spectacular illusion shows fill entire arenas, with audiences of up to 10,000 people. Before joining forces as the Ehrlich Brothers in 2000 they worked as solo performers, winning numerous awards for their magic shows. They have been members of the Magic Circle in Germany since they were seventeen and eighteen years old respectively. In 2004 and 2013, the Ehrlich Brothers were named 'Magicians of the Year', following in the footsteps of world famous magicians including David Copperfield and Siegfried & Roy.

The enormous illusion shows that the brothers put on transport the audience to an amazing universe with fascinating special effects. But it takes many years of conceptual and technical development before an illusion is ready to be performed on stage. Automation plays a key role here. Whether it's driving a motorbike off the screen of an iPad, a six bladed saw cutting Chris into pieces, effortlessly bending railway tracks or growing an entire orange tree from a single orange seed, technical perfection provides the foundations for illusion through emotion.

www.ehrlich-brothers.com



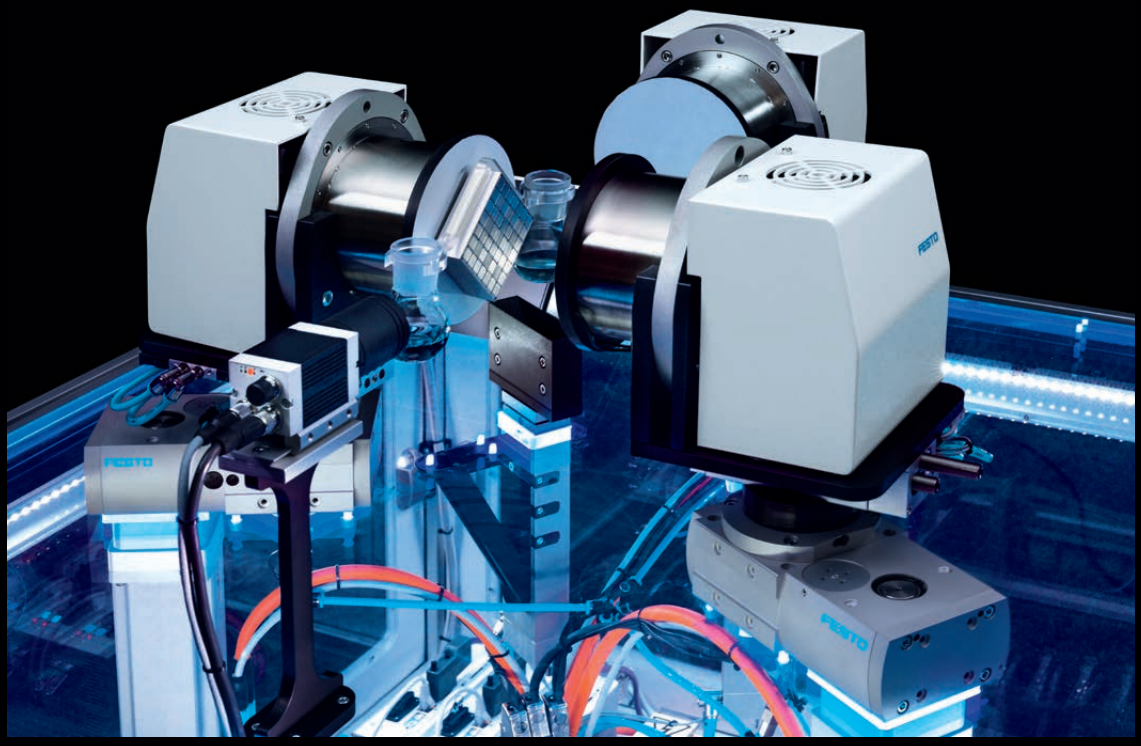
SupraCycle demonstrates the transfer of a magnetic object carrier from one superconductor module to the next.

SupraMotion 3.0

Motion without contact

Transporting without contact, transferring objects in suspension, working from behind walls without any connecting mechanical systems. Automation based on superconductor modules makes the previously unthinkable possible. The latest future concepts for superconductivity from Festo, such as the SupraCycle, show the possibilities of this fascinating technology.

In some automation processes there are advantages to separating the object to be transported from the transport device. Contactless handling is opening up new perspectives, particularly with regard to easier cleaning in hygienic environments and moving delicate objects. This can now be done thanks to superconductivity, a technology which Festo has been researching for a number of years. Experts believe that contactless motion will lead to major advances in automation in the future. With superconductor automation modules, products move through production halls quietly, cleanly and energy efficiently, as if guided by an invisible hand. It can be used to run processes without interruption, because enclosures, sluices, etc. are no longer obstacles. Handling systems based on superconductivity can even meet requirements for high purity or harsh environments. With the current SupraMotion 3.0 projects, Festo is showing how automation could find its way into areas in which it would previously have been scarcely conceivable. One of the latest projects is the SupraCycle exhibit. It shows for the first time ever how a suspended permanent magnet can be transferred from one superconductor element to another using superconductivity. ➔



Three cryostats with superconductors are mounted on a base plate and the two magnetic object carriers are transferred contactlessly in turn to the next cryostat.

Contactless transfer
The new SupraCycle from Festo transfers a magnetic object carrier between two superconductor elements without any contact. It shows how the stored, permanent connection can be actively released and restored. Three cryostats with superconductors are mounted on a base plate. Two magnetic object carriers are transferred in turn from one cryostat to the next. Two small, open bottles filled with liquid are attached to these object carriers. The magnetic object carriers are frozen in the cryostats at a distance of several millimetres from the superconductors. The cryostats can be rotated through 360 degrees using the rotary modules ERMB. When two of them are positioned exactly opposite one another, one hands over the magnetic object carrier to the other. A PCB on the cryostats provides the necessary built in intelligence. One of the many possible practical applications of the SupraCycle is the securing of a workpiece carrier to an object carrier. The carrier can be transferred between the two systems in order to transport objects, as the exhibit illustrates using the glass bottles as an example.

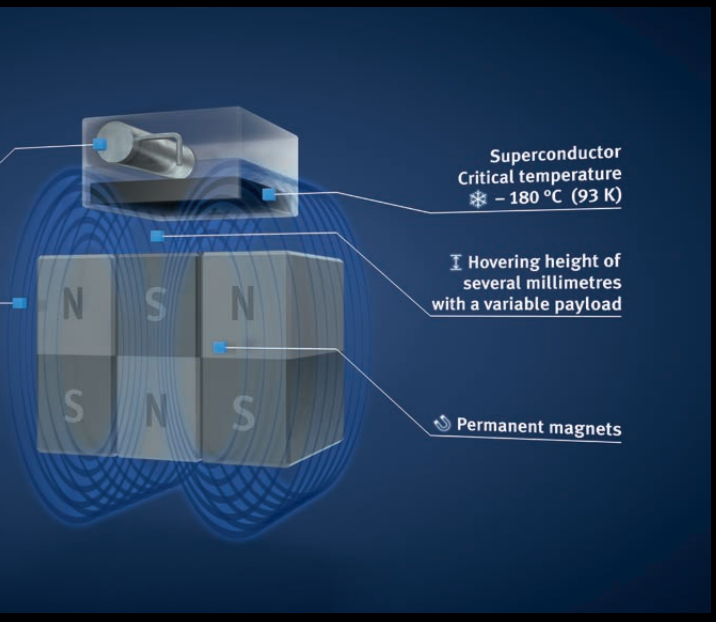
A host of new applications
Superconductor automation modules can be designed using numerous bearing variants and active drives. Any suspended kinematic sequence can thus be set up. The transfer of objects using a shuttle can be carried out completely contactlessly. This means that the systems meet the most stringent demands on sterility. The modules maintain their predefined positions by means of the system's intrinsic resetting forces, regardless of spatial alignment.

The vision for future Festo modules involves completely wear resistant bearings and cooling systems with a long service life of up to 10 years. Contactless

SupraMotion 3.0

Festo has developed the so called "SupraMotion 3.0" exhibits to illustrate future superconductor applications. The latest exhibits include SupraCarrier, SupraCycle and SupraHelix. Products can be supported and transported on suspended rollers with the SupraCarrier exhibit. SupraCycle from Festo shows the contactless transfer of a magnetic puck between two superconductor elements. The stored, permanent connection can be actively released and restored. SupraHelix, on the other hand, is a suspended screw shaft, which can be driven actively and contactlessly to transport ring shaped products or process them while in rotation.

www.festo.com/en/supramotion



Unique operating principle: suspension in the superconductive state at –180 °Celsius.

motion and holding avoids wear and dust, which means that the modules are suitable for use in environments with stringent hygiene requirements. A definable air gap also allows the modules to work from behind walls, allowing handling to take place in protected and enclosed areas that are susceptible to contamination and difficult to clean. Because the storage and holding functions of the systems are not affected by non magnetic materials entering the bearings, use in areas that contain large amounts of material particles is also possible. The cooling systems used are extremely efficient, with maximum energy consumption of 80 watts per cooling unit. ■

www.festo.com/en/supramotion

Dr. Susanne Krichel,
Portfolio Management,
Superconductor
Project Team, Festo

One more question

▶ **trends in automation:**
What fascinates you about the subject of SupraMotion?

Dr. Susanne Krichel: There are already various solutions for storing and moving objects without contact. But rotation through 360° in any spatial direction is only possible with superconductivity – without the need for intricate control technology and with minimal energy consumption. We are involved right now in order to investigate possible application areas for this fascinating technology. This is completely uncharted territory for us and it gives us a great deal of creative freedom for our ideas.

▶ SupraMotion has been at Hannover Messe for the past three years – what are the plans for the future?

Krichel: We have moved on from merely showing off the impressive levitation effects and possibilities of superconductor technology to actively discussing their potential with the automation industry. Based on numerous discussions with customers in recent years we have concluded that individual elements from our future concepts could already be used today. We are currently working on getting our first pilot projects off the ground.

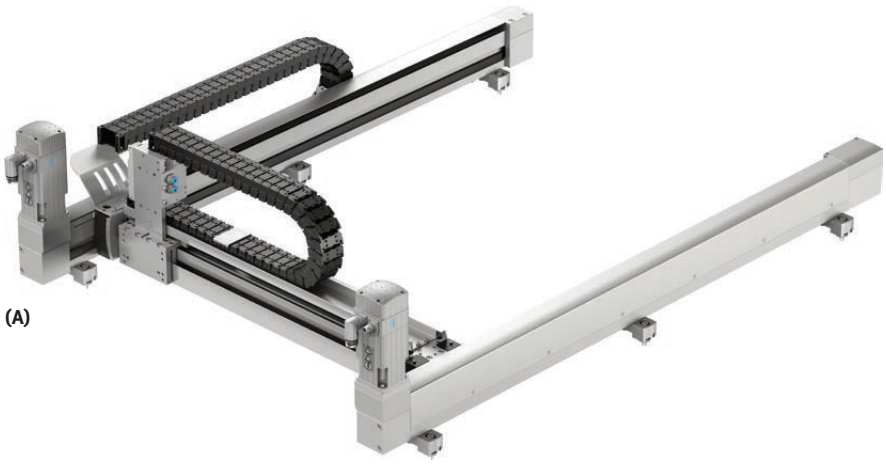
▶ What are the biggest challenges facing the Festo SupraMotion team over the coming year?

Krichel: Right now we are dealing with the question of how we can use the technology for problems for which there is currently no feasible solution or that could only be solved with complex workarounds. It's also important to create the right conditions to allow the technology to succeed on the market. We are discussing these issues with our customers, and our team is calling on the knowledge and experience of our Sales division as well as of experts and technology partners.

Test platform for mobile devices with the mini planar surface gantry EXCM

Compact precision

Mobile electronic devices are developed in highly automated processes. Yet their touchscreens and keys are generally still tested manually. PKC Electronics decided to go in a completely new direction with its Chameleon test platform. It offers automated, fast and reliable testing of mobile devices using different adapters. The mini planar surface gantry EXCM is completely in its element in this environment.



(A)

(B)

(A) Approaches any position within its working space: the mini planar surface gantry EXCM.

(B) Highly automated: the only task performed manually is positioning of the mobile devices.

The adaptive test platform from Finnish equipment manufacturer PKC Electronics heralds a new era in the testing of electronic devices, which until now was mostly still carried out manually. As mobile devices such as smartphones, tablet PCs or navigation devices with their touch displays and sophisticated audio or video functions become more and more complex, so too does the task of thoroughly testing them. The user interface performance tests, touchscreen swipe tests, operation of the keys and switches on the sides of the mobile devices and the speaker and microphone tests require extensive and quality assured test procedures. The rapid expansion of the smartphone and tablet PC market is also set to further heighten the demand for reliable test devices. In 2013 alone, 1.4 billion smartphones were in use worldwide. The number of tablet computers grew from 17 million in 2010 to 195 million last year.

Demand calls for automation

"Today, it is important for us to be able to offer turnkey test devices where all you have to do is quickly change the adapter for the different terminal formats and retrieve the right software for the test routine at more or less the touch of a button", explains Kimmo Hyrynkangas, Test Solution Business Area Manager at PKC Electronics in Finland. "Many end users need to change the adapters and associated programs twice a day on average", continues Hyrynkangas.

"With the Chameleon brand name, PKC Electronics has developed exactly the flexible test device we require", states Marko Anttila, Operation Manager at Elektrobit. Elektrobit is a Finnish manufacturer of mobile devices and infotainment systems for vehicles. "Equipped with the corresponding adapters, the solution allows even small and medium sized series consisting of 10,000 to 100,000 units to be tested quickly and reliably", he adds.

Highly flexible solution

The high level of flexibility and adaptability of the test device enables customers to respond to the wide variety and ever decreasing product life cycles of mobile

“We couldn’t have developed our test platform without the compact mini planar surface gantry EXCM.”

Kimmo Hyrynkangas, Test Solution Business Area Manager at PKC Electronics

devices. Development times are shortening all the time. Extensive tests now have to be carried out as early as the development phase. Ideally, the test systems should be able to be used in both the development phase and during series production. End customers also need to integrate multiple test functions in a single test phase in order to guarantee fast throughput in volume production. These include display/touch tests, performance tests, audio tests and radio frequency tests, as well as thorough evaluations such as the fully integrated analysis of the audio test results. The Chameleon system thus sets a new standard in integrated test instruments, allowing tests to be performed on a single compact platform.

Integrated in a single unit

Another industry trend is also on the horizon: as the test facilities are integrated in the production cells, the test devices need to be made smaller and smaller. It is also important to have enough test capacity, so that the test process does not lead to supply bottlenecks. “This is another way in which the test devices from the Chameleon series set themselves apart from others on the market – because they can analyse the tests within the device”, explains Hyrynkangas.

Perfect position

“The mini planar surface gantry EXCM from Festo appeared on the market at exactly the right time”, says Risto Mäkelä, Chief Engineer at PKC Electronics. “With this compact, ready-to-install planar surface gantry, precise and fast positioning in tight installation conditions is now extremely easy.”

Jukka Merisalo, Key Account Manager at Festo Finland, adds: “The planar surface gantry EXCM really shows off its strengths in situations where every millimetre counts.” The compact planar surface gantry can travel to any position within its working space. It just needs an area equivalent to a DIN A4 sheet. The recirculating toothed belt moves the slide within a two dimensional area (X- and Y-axes). The fixed motors are connected to the slide and thanks to the parallel kinematic drive principle, the moving masses remain low. This allows fast positioning at speeds of up to 500 mm/s and repetition accuracies of the order of ±0.05 mm.

Together with the electric slide EGSL, the Z-axis is responsible for the correct functioning of the touch and swipe tests. The pneumatic slide DGSL is equipped with a microphone and light cube, allowing audio, camera and display tests to be performed.

Ready-to-install system solution

The gantry is quick to commission and can be integrated quickly into machines. The pre-parameterised drive and controller package gives users the security of knowing that they can concentrate on their own core competencies without having to concern themselves with the details of automation technology. “The fact that Festo could offer us a complete package consisting of hardware, software and a consultancy service is what tipped the balance in their favour”, says Mäkelä.

www.festo.com/excm

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Area of business:
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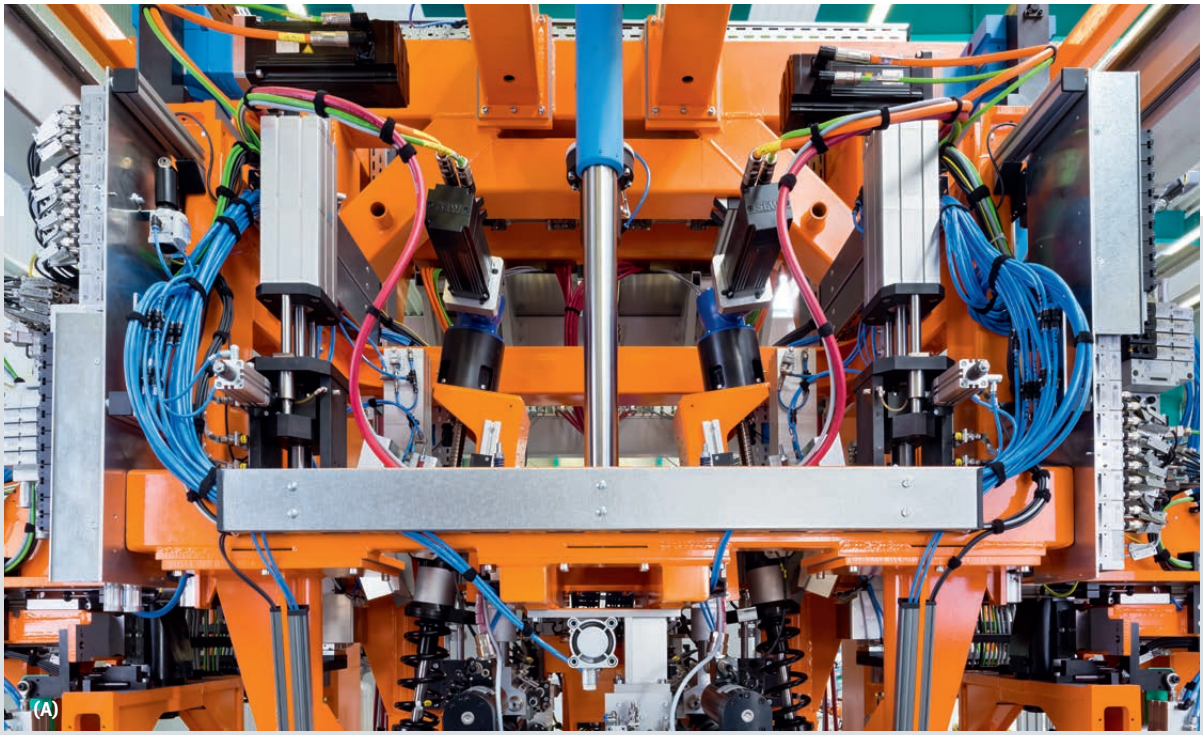
Automatic adjustment of vehicle axles

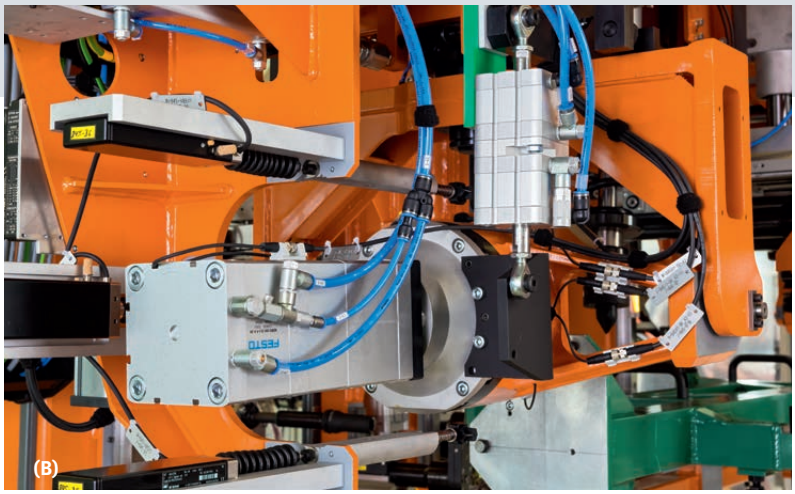
Staying on track

The track and camber of vehicle axles has a major influence on driving behaviour. In automotive production, track and camber adjustment used to be a time consuming, manual process. The current generation of machines from AuE Kassel GmbH fully automatically adjusts track and camber in less than 60 seconds. Festo components guarantee precision and speed in this process.

The latest generation of machines from AuE Kassel GmbH fully automatically adjusts track and camber in just 60 seconds.

In the early days of automotive production, the axles were clamped on steel work tables and adjusted roughly using probes and dial gauges. Final measurement of the chassis was not carried out until the “end of the line”. This last step took up to ten minutes to carry out and affected the output rate of the vehicle plant. Today, adjustment is automated and meets the output requirements of manufacturers of vehicles with multi-link rear axles. AuE Kassel GmbH implemented a new rear axle adjustment system for a well known German car manufacturer in just nine months. Once the axle has been adjusted, it can be installed straightaway in the vehicle. Based on a gantry design and equipped with drives and valve terminals from Festo, it adjusts track and camber in less than 60 seconds. ➔





(A) ADNH high force cylinders clamp the axle in the system as if it were screwed onto the vehicle.

(B) Powerful argument: the advantage of the high force cylinders lies in the sequence of up to four cylinders with the same piston diameter and stroke.

Securely clamped

Integrated directly in the production process of the car manufacturer, linear conveyor technology transports the axle on a workpiece carrier through the machine in either a longitudinal or a transverse direction. A lifting frame that can be lowered directly above the axle holds all of the Festo components and the tools for adjusting track and camber. After the axle is clamped, counterholders swivel under the subframe mounts of the axle, and later provide the attachment points for the car body. ADNH high force cylinders with a piston diameter of 100 mm clamp the axle at four positions as accurately as if it were screwed onto the vehicle. The advantage of the ADNH high force cylinders is in the series connection of two, three or four cylinders with the same piston diameter and stroke. This means that, compared to a conventional cylinder, the force can be doubled, tripled or even quadrupled during the advance stroke. A Festo SMAT sensor on a guide unit detects the level of the wheel hub. The height at which a slide unit must move to the axle can thus be determined.

Fast adjustment

In the next step, grippers driven by ADNH high force cylinders clamp themselves to the hubs. Spring replacement devices actuated by electric motors then drive against the axle and automatically locate the positions where the springs will later sit.

Next, the axle is pulsed under load to achieve the setting behaviour on the rubber mountings and joints. The axle is then moved to the K0 position. This is the ideal position of the axle and corresponds to the normal load, when the vehicle is loaded with a defined weight. The track and camber are measured in this position, with a pneumatic cylinder moving directly to the brake disc. The adjusting screws are located independently using track and camber screwdrivers that are also supplied

"Thanks to the Festo valve terminals we have been able to reduce the installation and tubing effort in the system to a minimum."

Valerio Loi, Project Management, AuE

via pneumatic cylinders. The machine detects the relative future position of the wheels automatically using the probes. The adjusting tools adjust the track and camber values in real time and counter with the final screwing torque. The tools then move away and the axle is placed back on the workpiece carrier. The system references itself compared with a master gauge in specified cycles.

To avoid having to interrupt the production process during machine maintenance, the machine can be moved from the conveyor technology area to a specially created maintenance area via racks and guide rails.

Intelligent supply
A special feature of the new machine are the valve terminals installed directly on lifting frames and vertical slides; this reduces the effort required for tubing and wiring to a minimum. The lifting frame that picks up the axle has two VTSA valve terminals with CPX input modules, separated into the left and right side. In the vertical slide, which carries the hub gripper, there are two smaller VTSA valve terminals with four valves each, which control all the actuators beneath the energy chain of the slide. Thanks to this solution, a supply tube, a power supply and a bus system are all that are needed. ■

- www.festo.com/catalog/adnh
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AuE Kassel GmbH

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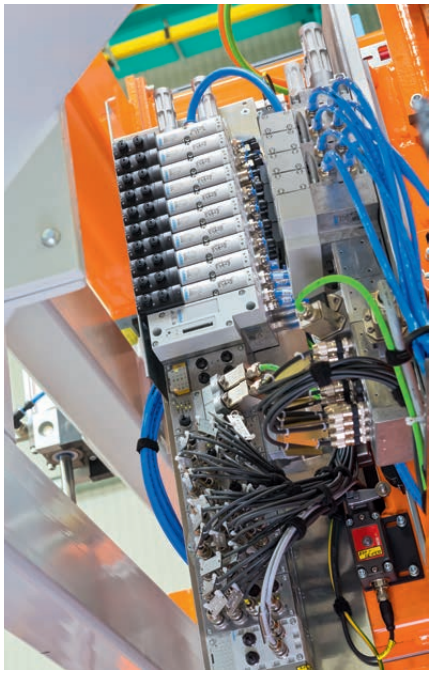
Area of business:
Automation specialist for all production work relating to axles, chassis and similar tasks

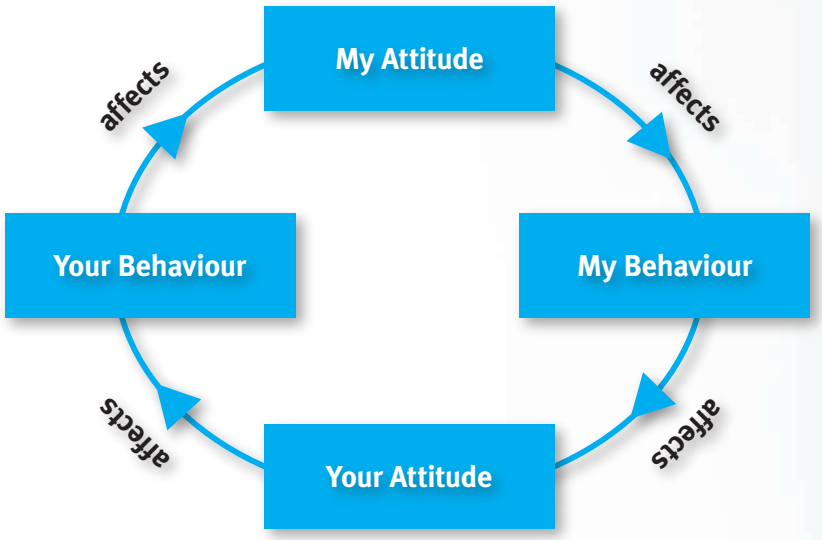


To keep tubing and wiring effort to a minimum, the CPX-VTSA valve terminals are attached directly to the lifting frame of the system.

Gary Wyles, Managing Director of Festo Didactic Training & Consulting, discusses management issues.

Dealing with difficult people

We've all had this – the sinking feeling in the pit of our stomach knowing that we have to confront poor behaviour by difficult employees. And it's even worse for HR and training departments. Many managers think that issues such as these should be 'outsourced' to those responsible for people development.



Betari Box model demonstrates how an individual's attitude affects their behaviour.

This is mainly down to a manager's lack of skills and experience in handling difficult people and tricky situations. But it is exactly the manager that needs to assume responsibility. Of course, there are situations which are frankly untenable and a more rigorous organisational decision might have to be made, but this is only when the issue has escalated and other interventions have proved fruitless.

In the first instance, it is the manager's responsibility. For training departments, it is about guiding managers and supporting them to develop their own people management skills.

Take a step back
The first step forward is actually taking a step back. The manager will need to be able to dispassionately analyse the situation. Coming from an engineering background, we like formulas and this one is particularly effective: Behaviour = f (Personality; Environment)

Personalities
Differences in personalities can be a source of friction and tension. A useful personality assessment tool such as DiSC® helps to identify the underlying personality traits that influence behaviour. For example, a manager who exhibits strong Influential characteristics might find someone in the Conscientious segment highly frustrating, as they cannot grasp a concept and continuously require data and information to analyse decisions. Simply being aware of someone's personality characteristics can remove, or at least soften, tension and enable a manager to have a more pragmatic approach to working harmoniously together.

While people's personality is relatively fixed, a change in environment can be a critical factor in the change of behaviour.

Environment
Assessing the current situation through the lens of environment is particularly effective. Of course, there might be personal circumstances at play that affect behaviour at work. Often, there is a change in the workplace environment that has led to deterioration in attitude and performance.

For example, there might be a change management project in progress that the employee doesn't agree with or understand. It could be that a new team hasn't yet gelled making the individual feel insecure. They could be feeling insufficient in coping with new tasks and responsibilities.

Look inwards
What is sometimes most difficult for managers to understand is that it is usually their behaviour and attitude that needs to adapt and change first. The Betari Box model (see diagram above), demonstrates how an individual's attitude affects their behaviour and that this is transmitted through the team. A manager needs to have a high degree of self awareness to understand his or her own personality and reactions that might trigger poor behaviour in others. Going back to the previous point, understanding how personality influences attitude and behaviour, as well as a change in environment, can be enough to break this cycle.

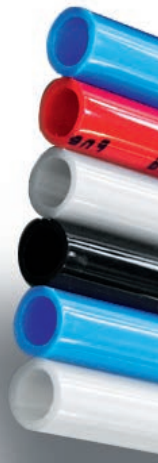
Courageous conversations
This analysis needs to be conducted quickly as poor behaviour can fester and infect other people. However, most of us will tend to avoid having difficult conversations. This is partly an avoidance strategy, as we would rather just wish the problem went away and things got back to normal.

Approaching the situation with this attitude will not engender trust or loyalty. A manager needs to be firmly committed to helping their employee. If you firmly have your people's best interests at heart, you've already got one aligned goal.

Coaching culture
There is skill required to handle and change the behaviour and attitudes of employees. Having a coaching culture in place can greatly enhance a manager's ability to have courageous conversations with their team.

Not only will a manager have the time to reflect on his or her own behaviour, coaching establishes a one-to-one relationship that is built on trust and →

> “If a manager demonstrates that they are willing to work together with an employee, trust and respect will follow”.
>
> Gary Wyles, Managing Director, Festo Didactic Training & Consulting



respect. If employees feel respected, supported and valued they are more prepared to change their own behaviour.

It is often the case that individuals are aware of their own attitudes and behaviours; they might just need a safe and secure place to vent their anger and frustration without the fear of recrimination. Knowing that coaching conversations are private and confidential enables the manager and their team member to reach a decision that is right for the company and of benefit to the individual.

Speak to the problem

Courage is certainly needed in these conversations. Often managers will have to confront an individual with the stark reality of the situation. They will need to be fully aware of the relevant policies and procedures as well as being skilled in these discussions. If handled badly, it can result in a poor outcome, greater cost and, worst of all, an adverse affect on others.

If they have managed to take a step back and to analyse the situation dispassionately they will be more able to skilfully navigate this conversation. They can focus on addressing the problem, rather than criticising the individual.

The importance of follow-up

It is unlikely, if not impossible, that a single conversation will have a miraculous affect on behaviour in the long term.

A manager will need to establish a mutually agreed course of action. What are we going to do about this? What do I need to do to help make the changes required? What do you need to do? When will these be done by? When shall we reconvene to discuss progress? They will need to ensure that they do their part and that their employee delivers on their promises.

If a manager demonstrates that they are willing to work together with an employee, trust and respect will follow. These are fundamental aspects for changing behaviour and establishing a new and better way of working together.

There’s an old saying, “To change the world you have to change yourself.” Never has this been more true than when dealing with difficult people. ■

www.festo-didactic.co.uk

Personality profiling with DiSC®

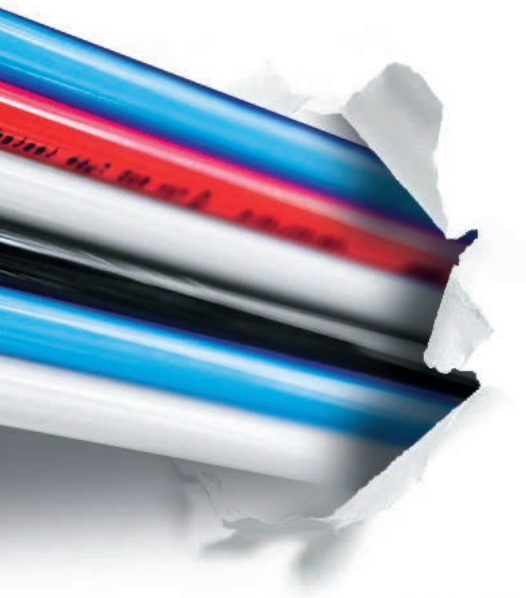
Used all over the world to improve work productivity, teamwork and communication, DiSC® is a non-judgmental tool that helps people discuss their behavioral differences following the principal of first looking to understand yourself, then looking to understand others.

The DiSC® model provides a common language and helps individuals adapt their behaviors with others.

DiSC® profiles help you and your team:

- Improve how you resolve conflicts
- Increase teamwork and minimise team conflict
- Manage individuals more effectively by understanding their behavior styles
- Become self aware, well rounded and more effective leaders

Contact Festo Training & Consulting on 01604 667000 (Option 0) or email business_centre@festo.com to begin your DiSC® journey.



Production of tubing for industrial automation

From granule to long distance runner

Festo produces around 90 per cent of its tubing at its plant in the northern Czech city of Česká Lípa. Here, small granules are transformed into 50 metre long tubes in advanced production processes. The plant operates exclusively on the basis of just-in-time production.

Although the finished product may look simple, the automated production of tubing demands extensive expertise and maximum precision. Because not all tubing is the same. For optimum reliability in different applications you need exactly the right material.

Around 100 km north of Prague, Festo Production Česká Lípa produces tubing made from polyurethane, polyethylene and polyamide. Beginning with polyurethane, the plant processes three basic materials: semi-crystalline polyurethane, amorphous polyurethane, and a special highly flame retardant variant. In the case of polyethylene, there are two types: cross linked and non cross linked. Each material used needs a different type of production line that must be precisely defined by the requirements of that particular material. There are also major differences in terms of dimensions. In Česká Lípa, the smallest tube they produce has a diameter of 3 mm while the largest standard is currently 20 mm. On a smaller scale, Festo Production Česká Lípa also produces customised solutions such as tubing with special conductivity.

In addition to high quality series production, one of the local specialities of Festo Production Česká Lípa is welding two or more tubes. Although it seems simple, it is not simple at all. When the welded strands are later separated, their surfaces must not show any damage and their ends must easily fit into fittings.

The finished tubing is delivered to Festo in Germany. At the Customer Service Centre in St. Ingbert-Rohrbach (see report in trends in automation 2.2014), orders are processed and tubing is delivered to end customers. ■

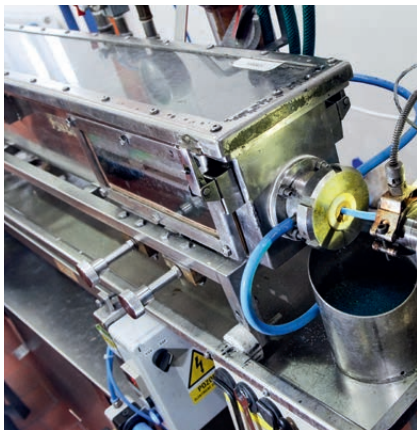
1 **Material:** Festo Production Česká Lípa produces tubing made from polyurethane, polyethylene and polyamide. The basic raw material is delivered to the plant as granules.

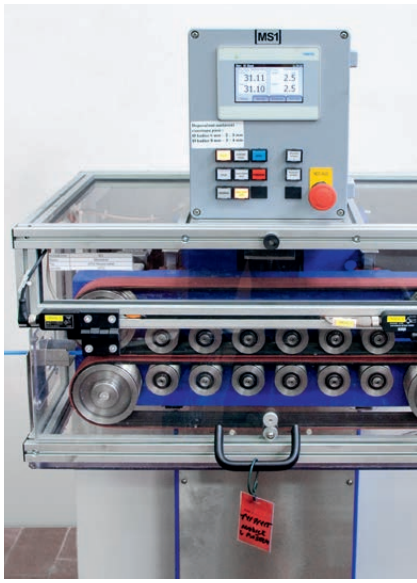
2 **Coloured granules** provide the colour of the tube. Transparent coloured tubing is the most popular.

3 **Drying:** 90 per cent of the materials must be dried to the required level before use. Depending on the dryer volume and type of material, the amount to be produced is determined very accurately so that it can be continuously collected for processing.

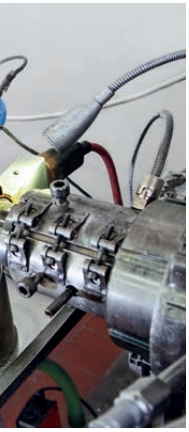
4 **Extrusion:** the dispenser mixes the dried material with the pigment in a predefined ratio, or with a cross linking agent in the case of polyethylene. The mixture is melted in the extruder at 200-220 °C and homogenised.

5 **Forming:** the extruder head forms the tube. It is formed to the required dimensions in the vacuum chamber. As the tube cannot solidify in one piece, it is cooled gradually.





6 **Pulling:** the tube travels along the line at 30 m/min, according to the size of the product. To retain the correct structure of the tube, the acceleration must be carefully monitored. The drawing speed is controlled using Festo components.



7 **Cooling:** final cooling of the tubing ensures that it can be handled safely by the plant employees. The cooling process itself does not affect the shape of the tube.

8 **Winding:** the finished tubes are printed and wound onto reels of 50 metres.

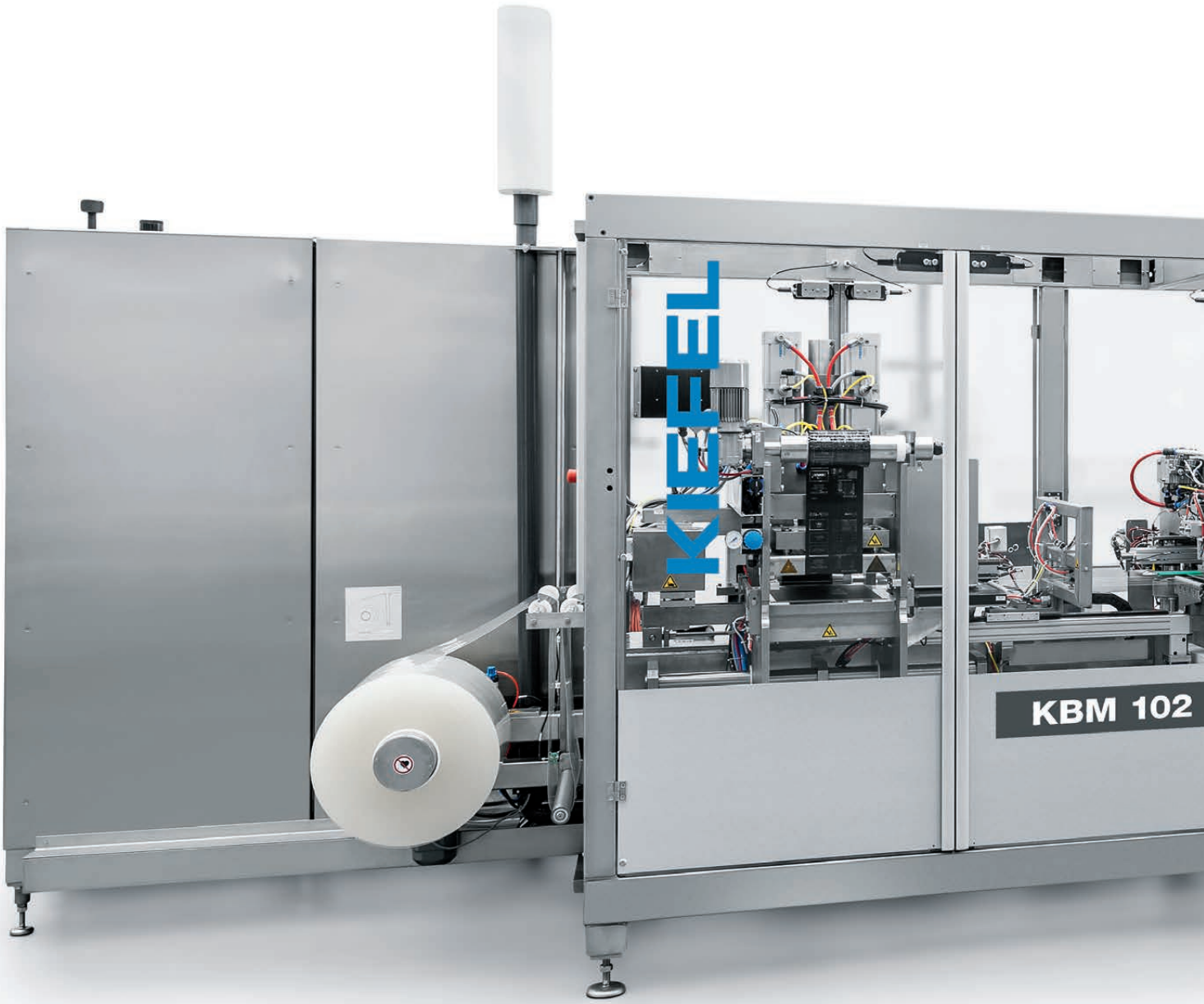
9 **Packing:** once packed in cardboard boxes, 90 per cent of the tubing goes to Festo in Germany. The remaining 10 per cent are customised solutions, which are shipped separately.

10 **Spiral tubing:** one of the most important specialities of Festo Production Česká Lípa is the manufacture of extremely flexible spiral tubing consisting of both a black and a blue tube.

Production of infusion and blood bags

Compact class

The trend in automation technology is towards smaller, multifunctional components. Compact one-way flow control valves type VFOF-LE-BAH are one of the latest developments in the field of pneumatics. In machines and systems for the production of infusion and blood bags at Kiefel GmbH, they shorten assembly time and reduce the installation space required by over 50 per cent.

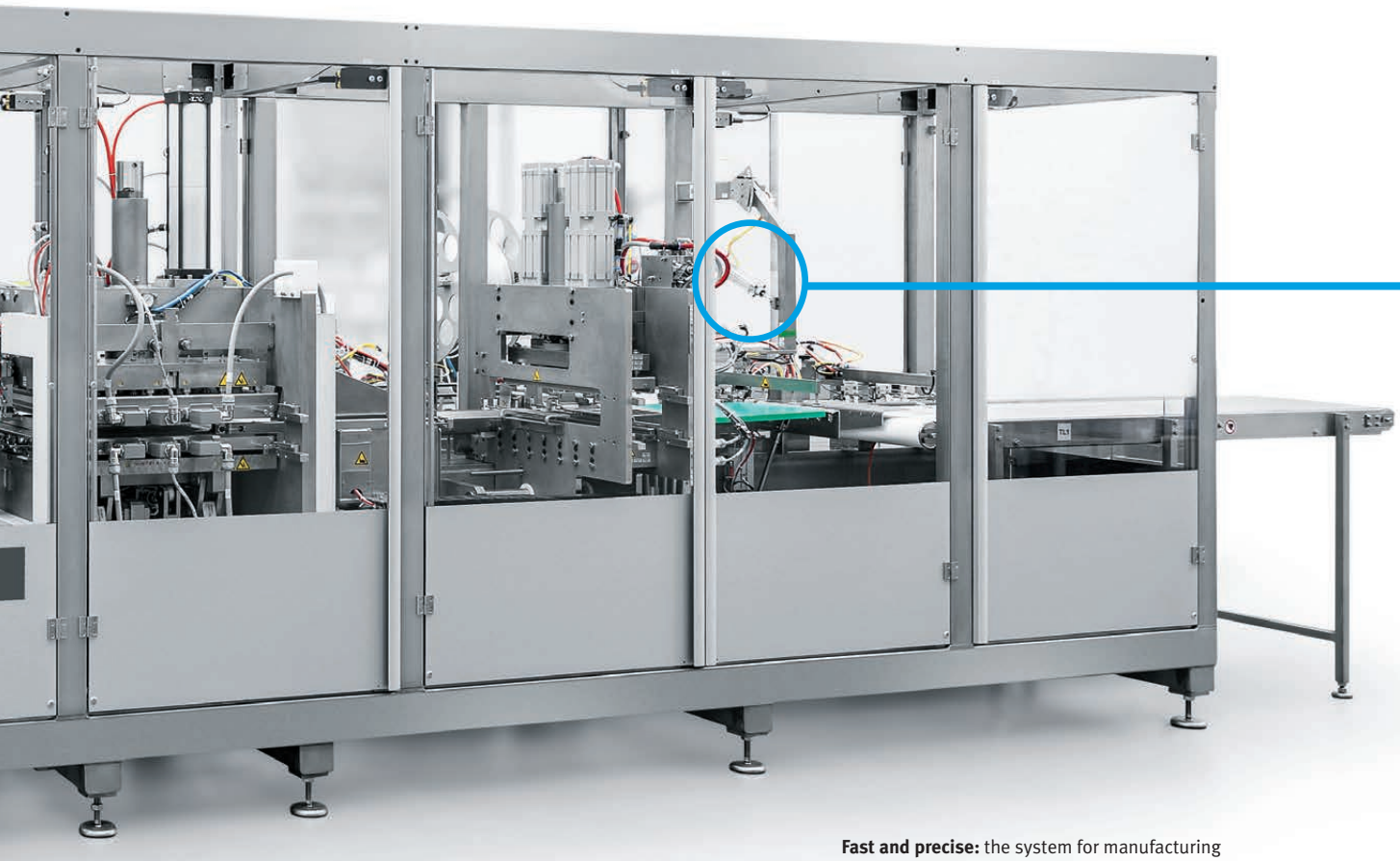


When manufacturing bags for medical fluids, extreme precision and high production speeds are of the utmost importance. The systems produced by Kiefel GmbH meet both requirements. The company specialises in developing and building systems for thermoforming and joining polymer films and is a global technology leader. Its machines for manufacturing infusion bags based on the contact welding method produce up to 6,500 bags per hour, while systems for making blood bags based on the high frequency welding method produce up to 2,500 units. Innovative pneumatic components from Festo can be found in all Kiefel machines. The extremely compact one-way flow control valves VFOF-LE-BAH with their three-in-one function not only save on assembly time, but also reduce installation space requirements and make maintenance easier.

Festo right down the line

The new one-way flow control valves not only control the piston speed of cylinders, but also allow an intermediate stop in a predefined position. Parts can be held and processed in this position and lowering in the event of the compressed air being disconnected briefly can be prevented. To reduce potential risks as per the Machinery Directive 2006/42/EC, a manual exhaust function is used which switches the drive to the energy-free state if the compressed air supply has been disconnected. Along with VFOF-LE-BAH, a number of other Festo components ensure efficient pneumatic processes in Kiefel systems. These include service units for compressed air preparation, valve terminals, individual valves and cylinders. The latter are used, for example, to move the grippers for feeding the film and to operate punching, embossing, printing and welding equipment. ➔

Saves installation space: one-way flow control valve VFOF-LE-BAH.



Fast and precise: the system for manufacturing infusion bags produces up to 6,500 units per hour.

“With the VFOF we have reduced assembly time and installation space. Instead of three parts, we now need to install only one.”

Peter Kronawitter, Pneumatics Design Engineer, Kiefel GmbH

From film to bag

Although the individual systems from Kiefel are all used to produce different products, the fundamental automation principle behind the medical technology machines is the same. The process is best illustrated by a new system for manufacturing infusion bags. In the first step, the film is unrolled. Dancer rollers perform a buffer function to cushion the synchronised motion sequences. They isolate the power from the machine, which is needed to set the parent roller in motion. This is followed by contactless electrostatic cleaning of the film and application of the product specific information in the printing station. The system laterally feeds a film with the print medium. The inlet and outlet tubes for fluids such as blood or infusion solutions are then welded on. In the next processing step the entire bag is welded and the cooling systems then reduce the temperature of the welded sections. Finally, the bags are separated by punching or cutting, placed on a conveyor and transported onwards.

Three functions, one valve

Until a year ago, two pneumatic control elements – the one-way flow control valve GRLA and the shut-off valve HGL – were still required on many cylinders. The GRLA was used to adjust the flow rate, while the HGL blocked the flow in one direction. The blocked connection could be opened again by a control signal. Both valves are still installed in systems where called for by the design specifications. In other areas, however, the compact, multifunctional valves VFOF-LE-BAH are used. The new components integrate three functions: variable piston speed, short intermediate stop and individual manual exhaust. The efficient control element therefore saves time and money and reduces the installation space by over 50 per cent. It is easy to operate and assemble and can be used everywhere. The pneumatic control elements offer versatile functionality, are energy efficient and non-polluting, and reduce compressed air losses.

Two-thirds less assembly time

For Peter Kronawitter, Pneumatics Design Engineer at Kiefel, use of the valves VFOF-LE-BAH has paid off right down the line. “Previously, our installation technicians had to install up to three different parts. Now they install just one pneumatic component. Assembly now only takes a third of the time that it used to”, explains Kronawitter. He also sees benefits for his company in the extensive portfolio of Festo pneumatic products and in the fast, worldwide spare parts delivery service. “This has permanently reduced our warehousing requirements”, he says. With the one-way flow control valve VFOF-LE-BAH, Festo has opened up new possibilities in terms of time and space savings for Kiefel. ■

www.festo.com/vfof

Easy to adjust: simple adjustment of the cylinder speed.

Kiefel GmbH

Sudetenstraße 3
83395 Freilassing
Germany
www.kiefel.com

Area of business:
Developing and building systems for thermoforming and joining polymer films.

Automation in an analytical laboratory

Put to the test

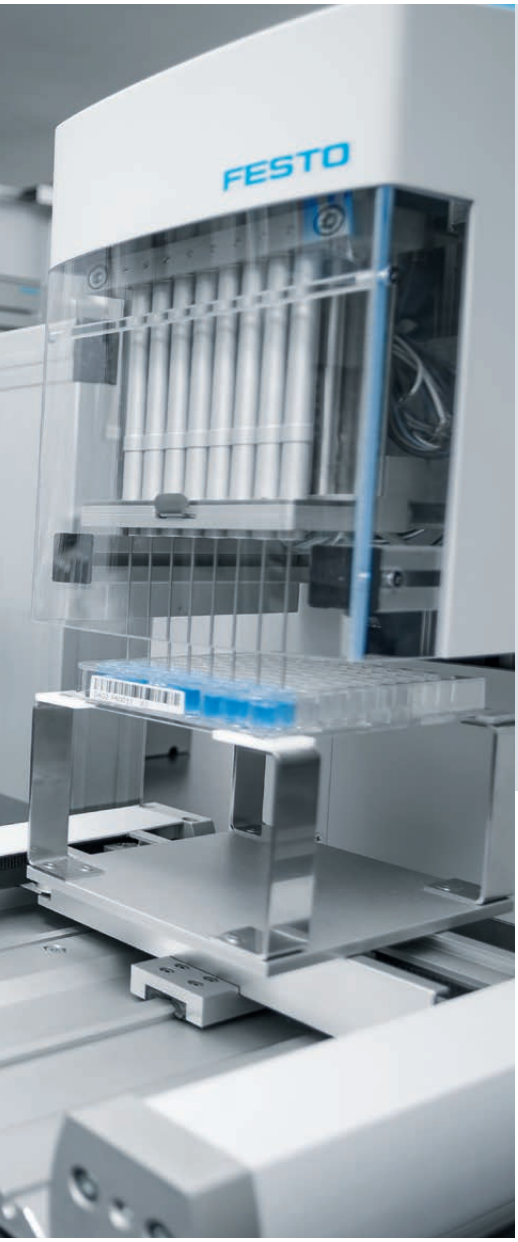
Analytical laboratories have to provide sound results in a short time. Speed and reproducibility play a significant role here. Modern automation technology saves time, increases quality and reduces costs for the transport and distribution of samples. Ready-to-install subsystems from Festo are opening up new possibilities for efficient processes in laboratory automation.

It takes very little time to give a blood sample at a doctor's surgery. However, the many different steps required in a laboratory in order to reach an accurate diagnosis demand a great deal of time and concentration on the part of the laboratory employees. When blood is taken, for example, the first thing to be done is capture the individual data, such as the patient's name or the analyses to be carried out, which are then encoded in a barcode on the sample vial. Once the samples reach the laboratory performing the analysis and the data have been retrieved, the next step is centrifugation, where high speed rotation is used to separate the blood into solid and liquid components. Only then can the laboratory check the sample for specific antibodies or viruses.

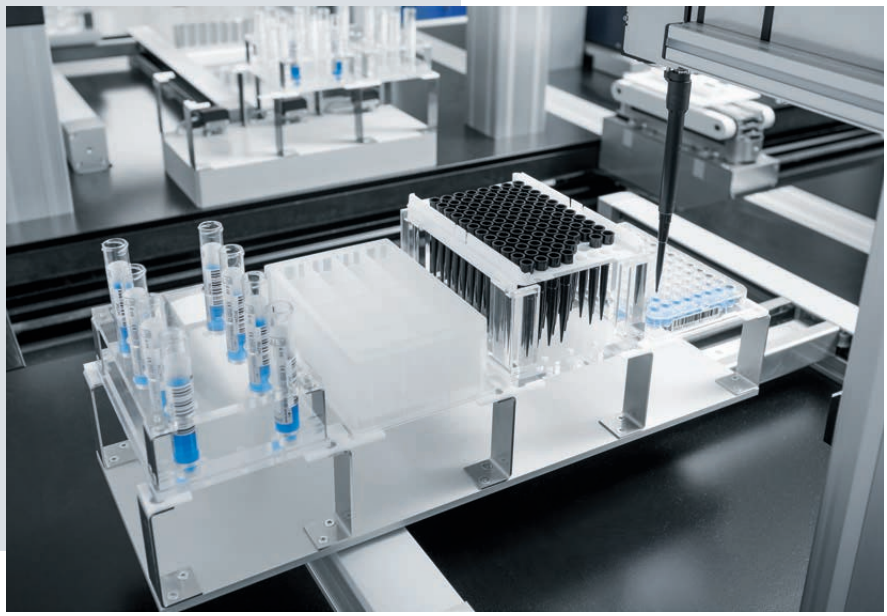
To obtain dependable results, precisely defined laboratory processes must be carried out in a reproducible, efficient and reliable manner. Automation technology is pivotal when it comes to achieving high speed and precision for transport between the individual processing stations. It therefore plays an increasingly important role in the medical and diagnostics sector.

Platform for individual solutions

The overall analytical process involves ➔



Fast and precise: modern handling systems ensure the efficient handling and reliable transport of highly sensitive samples and fluids.



many steps that have to be repeated over and over again every day, such as opening sample vials. Because even the tiniest quantities of sample material are sufficient for analysis purposes, sample vials are becoming smaller, making them more difficult to open by hand. The errors that can occur when handling samples manually are minimised by using automation processes. The same applies to the risk of sample contamination.

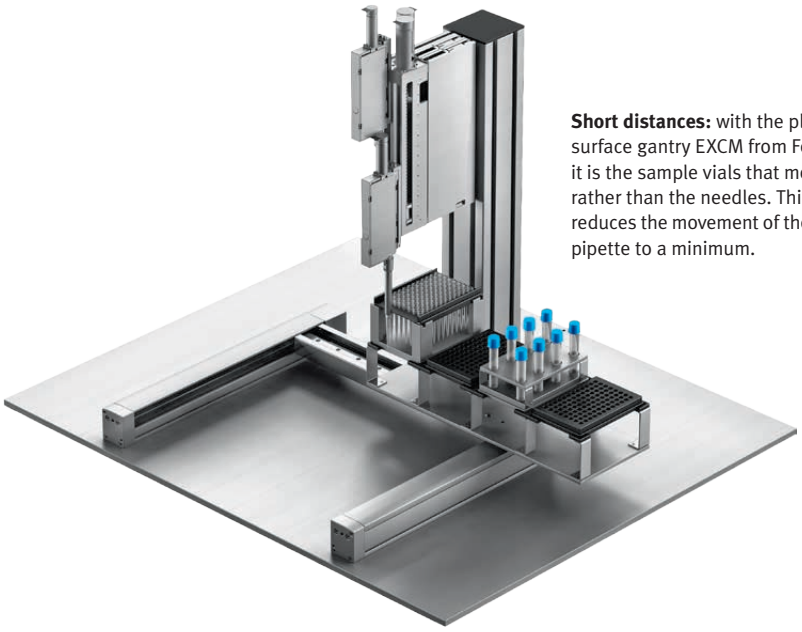
An innovative laboratory platform from Festo shows what the future of laboratory automation might look like. Nine modules demonstrate the entire process sequence, from the pre-analysis to the analytical process and then the post-analysis. This includes the automated handling of individual sample vials that are removed from or added to the sample carrier, the opening and closing of sample vials and the removal and addition of liquids in the millilitre, microlitre and sub-microlitre range.

Dosing precision as well as the modularity, flexibility and expandability of the system are the main focus throughout the process sequences. Products from other manufacturers can also be integrated on the platform alongside Festo components. This enables custom solutions to be designed for every application.

Fully automated pipetting process
Blood sample processing is fully automated on the laboratory platform, as shown by the pipetting process. First, a central transport system brings the blood sample to the pipetting module on a sample carrier. There, a highly precise pipette adds a specific amount of liquid blood components from the collection tube to each vial. The delivery system then transports the vials to the next module in the process.

Loads of up to several hundred grams can be precisely and safely moved using a classic 3D handling system. The handling system consists of an electric planar surface gantry EXCM that covers a maximum working space of 360 x 700 mm for motion in the XY direction as well as an electric axis EGSK for vertical Z motion with strokes of up to 100 mm. The system is completed by stepper motors, motor controllers as well as a multi-axis controller.

Step-by-step optimisation
Automation does not necessarily mean converting all previously manual processes to become fully automated. The transition often takes place in steps, from



Short distances: with the planar surface gantry EXCM from Festo, it is the sample vials that move rather than the needles. This reduces the movement of the pipette to a minimum.

automating individual modules and automated linking of modules to fully automating entire processes, based on the needs and requirements of the laboratory. These remain flexible and can be adapted to a change in requirements at any time. Faster, more accurate and more cost effective analysis results will thus contribute to the successful treatment of patients in the future.

Festo in medical technology
The trend in the field of medical devices, too, is towards ever smaller and lighter equipment. At the same time, they have to be more cost effective than previous models and withstand the stress of being used on a daily basis for long periods of time. The market demands faster and more precise analytical devices as well as state-of-the-art medical equipment. Festo is already working closely with customers to develop customised solutions that meet the stringent requirements for gas and liquid handling.

Piezo valves and miniature valves MH are the ideal solution for small flows in medical technology. Their great technical features make them particularly well suited to valve functions in the field of medical technology as well as for mobile oxygen system devices, for example. They work silently, consume very little energy, do not produce heat and can operate proportionally. Small valves can be used in a wide variety of applications, including dialysis machines, surgical instruments, training torsos and medical mattresses. ■

www.festo.com/medtech
www.festo.com/labor

Festo in medical technology

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www.festo.com/medtech

The valve terminal concept of the CPX/MPA reduces installation time and the required installation space by approximately a third.

Make some room!

Smaller packaging machines thanks to CPX/MPA

With the “Breakthrough Generation of Machines” from Italian packaging machine manufacturer Cama, brand and pharmaceutical manufacturers are experiencing a completely new feeling of space in their factories. The new machines from Cama take up one third less space thanks to the valve terminal concept CPX/MPA.

One characteristic feature of conventional machines is the large control cabinet outside the machine. The controllers within this cabinet are connected to the drives, sensors and valves by a multiplicity of cables and lengths of tubing several metres long. With the “Breakthrough Generation”, Cama completely redesigned its machines. This has made it possible to reduce the amount of space required by the machines. The control cabinets containing the electrical and pneumatic components are integrated in the machine pedestal angles. The compact machine footprint helps to minimise cabling and makes it easier to place the modules and components used right where they are needed and thus more accessible. The core product of this solution is the Festo valve terminal CPX/MPA with protection class IP65.

CPX links the pneumatic and electrical control chains and connects these simply, quickly, flexibly and seamlessly to any automation concept and in accordance with any company specific standards. Attention has also been paid to the topic of machine safety. The soft-start/quick exhaust valve MS6-SV is used to exhaust the system. It provides reliable protection against unexpected start-up and has an exhaust capacity 1.5 times its pressurisation capacity.

The side loading unit consists of a handling unit with an electric axis EGC for precise travel to intermediate positions and a pneumatic mini slide DGSL. The EGC helps to reduce assembly times by 30 per cent compared to previous self made and assembled electric axes. The deliberate use of both pneumatic and electric drive technology allows high precision to be obtained together with a high load capacity. ■

www.camagroup.com

Germany

Small cut, big gain

Pneumatic neck foil remover optimises recycling

Screw caps for wine bottles are becoming increasingly popular. Ease of use, no risk of the wine tasting corked and the ability to reseal the bottle are advantages that speak for themselves. However, these bottles still present problems, for example for dishwashing systems, as the bottom part of the cap remains on the neck of the bottle after it is opened.

Rink has now developed a machine with a patented method for the easy and efficient removal of the neck foil. It is controlled by a Festo valve terminal VTSA, which minimises installation effort and therefore reduces costs.

The machine makes a cut in the neck foil from below using a spring loaded knife and pushes it over the bottle shoulder. The foils are ripped and removed reliably, while the bottle thread and neck remain intact. The machine operates at a cycle rate of up to 5,000 bottles per hour and supports fast changeover to different bottle sizes.

www.rink.de

Compact design: the pneumatic neck foil remover with valve terminal VTSA.

Photo: © NASA, ESA, and the Hubble Heritage Team

The final frontier

Since its launch in April 1990, the Hubble Space Telescope has been providing us with a fascinating look into the mysterious depths of the cosmos. Its infrared portrait of the Monkey Head Nebula on the cover of this issue of trends in automation is a mosaic composed of many individual images. It was created to mark the 24th anniversary of Hubble's launch into orbit.

The image shows the birth of stars, when dark dust clouds are catapulted into outer space. The great Monkey Head Nebula – or NGC 2174 and Sharpless Sh2-252 to give it its scientific names – is formed from red hot gas. Enormous quantities of energy are produced over 6,400 light years away. Ultraviolet light from the bright stars helps carve the dust into giant pillars and bizarre shapes. The radiation ionises the main constituent of the cloud, hydrogen gas. The hydrogen gas heats up and its interstellar dust particles begin to glow at infrared wavelengths.

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