

WORLD OF INDUSTRIES

www.world-of-industries.com

WORLDWIDE
OFFICIAL
PARTNER | 2020



PREDICTIVE MAINTENANCE

ALWAYS RETAINING AN
OVERVIEW OF THE BRAKE

in cooperation with



WORLD OF INDUSTRIES

COVERING THE 4TH INDUSTRIAL REVOLUTION



Discover the
EXCELLENCE OF TECHNOLOGY
with a click!

www.world-of-industries.com

The Adventure of Globalization

Dear readers,

A network that has been finely spun around the world for decades is now proving to be an uncertainty. The Corona pandemic has highlighted the limits of globalization and many are now wondering how things will continue. To date, we primarily focused on the advantages of a globalized world and economy, although the disadvantages are now starting to show. For example, we have production sites in countries where labor markets are more cost-effective and at the same time are brave enough to rely on these dependencies. This has been highlighted by the supply of systemically important products such as drugs and protective clothing.

The labor sharing model therefore has its limitations. Even sectors that are embedded around the world, such as the mechanical engineering and automotive industries, are feeling the radical changes. Export has practically come to a standstill and procuring

components from abroad has become virtually impossible. However, just like during every crisis we now also have the opportunity to review our actions, our decisions, and our global policies. Collaborating is important as this is the only way each country can leverage its strengths and work on its weaknesses.

The best way to achieve this is to ensure that every country remains independent from a geopolitical perspective while simultaneously working toward the common good.

We should critically evaluate globalization and improve it

In our latest edition we will report on globally operating companies that are doing precisely that. These companies have a level of expertise that they implement on a global scale – they are part of the bigger picture while also having national ties.

With best wishes,



Nicole Steinicke
Chief Editor



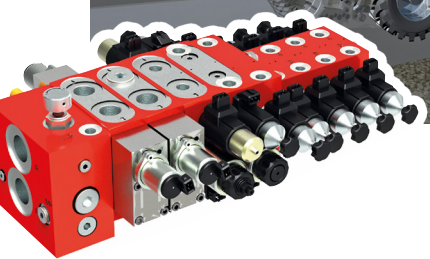
TABLE OF CONTENT



06



12



10



16



18

NEWS AND MARKETS



- 03 EDITORIAL
- 05 NEWS AND MARKETS

LOGISTICS



- 06 WITH GOOD PLANNING AND TEAMWORK FOR A SUCCESSFUL RETROFIT
- 09 "CLEAN" SOLUTION FOR CLEAN ROOM PARTITIONING

MOTION AND DRIVES



- 10 **COVER STORY** MAINTENANCE COSTS SAVINGS THROUGH INTEGRATED BRAKE MONITORING
- 12 OPTIMIZED WITHOUT COMPROMISE
- 15 PRODUCT NEWS

AUTOMATION



- 16 MOVEMENT ARTIST IN AIRCRAFT CONSTRUCTION
- 18 SMART LASER SENSORS INSPECT FINEST DETAILS

Advertising



COVER

Chr. Mayr
GmbH + Co. KG,
Mauerstetten,
Germany

Cross-industry and cross-application SPE System Alliance



The technology partnership between Phoenix Contact, Weidmüller, Reichle & De-Massari (R&M), Fluke Networks, and Telegärtner for the Single Pair Ethernet (SPE) has progressed to create the SPE System Alliance. In this group, leading technology companies from various industries and fields of application have come together to bundle their respective SPE expertise and ensure the target-oriented exchange of this knowledge. The partners in this group are pursuing the goal of driving the development of SPE further forward for the Industrial Internet of Things (IIoT) and may branch out to other areas as well. Ethernet in general and SPE in particular play a central role in the establishment of the Industrial Internet of Things. The SPE System Alliance is an open platform for companies that want to further advance SPE technology on the market. Import to know: on the website www.singlepairethernet.com you get more details and options for contacting the System Alliance.

www.phoenixcontact.com

Jungheinrich Rental Fleet Management for hagebau Logistik

Hagebau Logistik will rely entirely on Jungheinrich material handling equipment in the future. At hagebau Logistik's five logistics sites in Westerkappeln, Neumünster, Herten, Schleinitz and Burgau, the material handling equipment by various brands used to date will be replaced by some 200 Jungheinrich trucks. As part of this process, the logistics division of the hagebau Group is decommissioning all its diesel-powered trucks and will in future only use electric vehicles. The company is thus focusing on sustainable intralogistics and significantly reducing the ecological footprint of its truck fleet, since the CO₂ emissions of a Jungheinrich electric truck are some 42 percent lower than those of an IC engine powered truck of the same payload class. All trucks are rented trucks. This enables hagebau Logistik to increase the flexibility of its intralogistics fleet.



www.jungheinrich.com

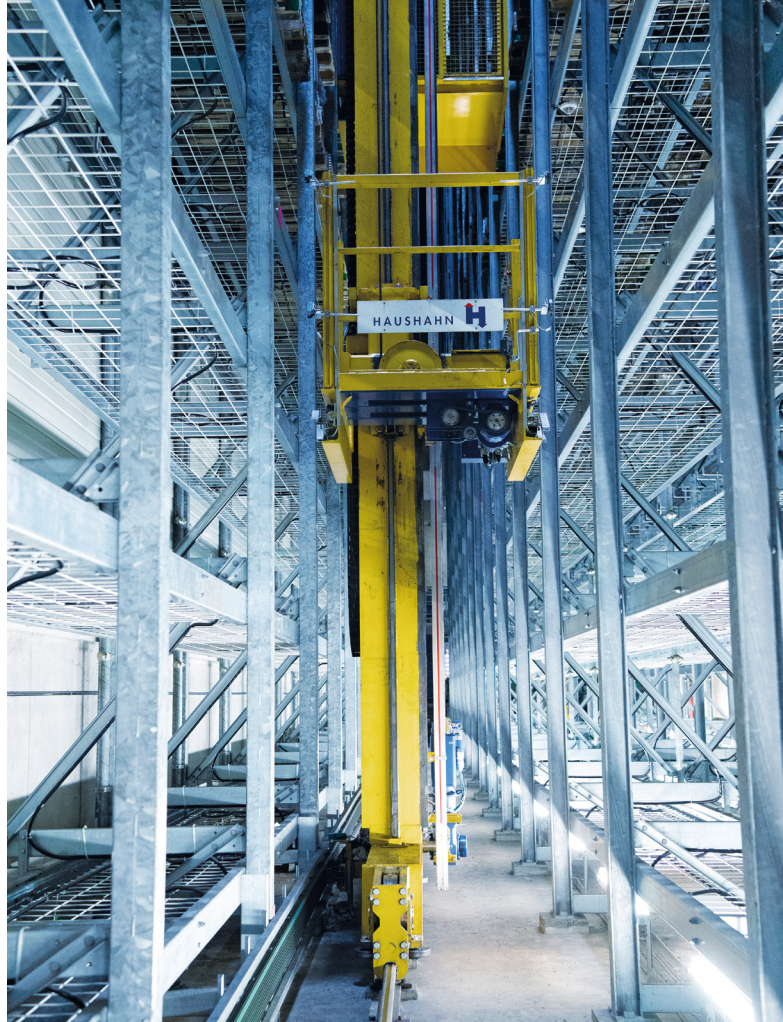
Weidmüller is well positioned for the challenges ahead

In a very difficult market environment, the electrical engineering company generated sales of 830 million euros in the 2019 financial year. That corresponds to sales growth of almost one percent. "In view of the deterioration in the economy in the second half of the year and the general economic conditions, we are nevertheless satisfied with the result," explains board spokesman and technology board member Volker Bibelhausen. "We are facing enormous challenges, but we are confident that we will not only master them, but also grow from them. The entry into future markets such as electromobility, but also the further automation and business with IIoT solutions will help us here in the future," Bibelhausen said. Despite all the unpredictability of the Corona crisis, Weidmüller is satisfied this year. They are setting the course for a successful start in 2021 and considers itself well-equipped for the future. The planning and investments in locations and technologies are long-term anyway.



Photo: The Executive Board of the Weidmüller Group can look back on a mixed year 2019 and is confident for 2020 that the company and society will emerge stronger from the crisis.

www.weidmueller.com



With good planning and teamwork for a successful retrofit

Many components were discontinued. This was a challenge for the smooth operation of Metabo's 24-year-old production warehouse in Nürtingen (Southern Germany). With a detailed system analysis, the viastore retrofit experts identified all critical elements and created a binding roadmap for the measures required. Thus, with good advanced planning, Metabo was able to manage the three-week modernization phase without any supply bottlenecks and ensure long-term availability of the warehouse.

1995: The year in which Austria, Sweden and Finland joined the EU, leading electronics manufacturers agreed on a common standard for DVDs, and Christo wrapped the Reichstag in Berlin. And in which Metabo, a traditional manufacturer of power tools for professional users, is increasing its turnover to almost half a billion Deutschmarks. At that time, the company based in Nürtingen (near Stuttgart) had viastore Systems, the Stuttgart-based international supplier of intralogistics systems, build a new automated warehouse to provide supplies to production in order to create capacity for further growth.

After 24 years a risk for availability

With success: Today Metabo scratches the 500 million turnover mark – and the warehouse still supplies production safely with components and raw materials. However, after 24 years, reliability was no longer entirely adequate, as Dennis Bosch, Head of Logistics at the main plant, explains: “Although we had modernized the material flow computer back in 2005, the number of failures increased over the years, even if it was not proliferating.” Metabo wanted to avoid the risk of a shutdown, because the warehouse must always be available – production at the tool manufacturer is structured in such a way that replenishment must be available at the production site after a maximum of four hours. “viastore has regularly reminded us that obsolete components pose a risk to availability in our plant,” says Bosch.

System analysis as the basis

Finally, in 2018, the decision was made to increase the availability and reliability of the warehouse, and secure it for the next few years. “For this, viastore extensively analyzed the condition of the entire system”, says Dennis Bosch. Lars Breuer, Assistant Director Retrofit at viastore, explains: “Because logistics systems are becoming increasingly complex, an analysis is extremely important.” The retrofit experts examine the condition of each component and each module of the warehouse system. Such a system analysis can take up to three weeks – but the effort is well worth it. As a result, the operating

01 Many components had already been discontinued in the 24-year-old Metabo production warehouse

company receives a graphical overview, which evaluates each component in terms of its modernization needs and displays it in the form of a traffic light: If the traffic light is “green”, there is no need for action, “yellow” issues should be kept in mind, and “red” requires the fastest possible measures. “With this analysis, we work out the risks very clearly and can derive corresponding actions. In addition, we develop proposals for reorganization, as our customers’ processes often change over the years,” explains Breuer.

All traffic lights on red

“There was hardly a traffic light on green”, Dennis Bosch remembers. Lars Breuer goes into detail: “Many components were discontinued. Spare parts were no longer available for the old S5 controls in the conveyor system and the automated storage and retrieval systems.” Above all, the IT hardware was outdated. It relied on the old Sinec L2 FMS bus system for communication with the conveyor system, for which the interface cards were no longer available. “It was the cyber attack of 2017 that opened our eyes permanently,” recalls Dennis Bosch. At that time, the virus Petya infected more than 1,000 workstation computers and 350 servers at Metabo and caused an interruption of production and supply lasting several days. All affected systems had to be completely rebuilt – the discontinued interface cards could only be organized with difficulty somewhere else. “That made it clear once again what availability means,” says Bosch.



02 After a comprehensive analysis of the plant, Metabo decided for a holistic retrofit

Exact planning based on a detailed roadmap

Based on the system analysis, the company decided not only to modernize individual components, but to carry out a comprehensive retrofit. “The necessary preparatory work was quite extensive,” recalls Dennis Bosch. “We had to remove material from the warehouse that was needed in production during the period of modernization, and put them in other places in the factory – in a specially built tent and also directly in the various departments.” To allow Metabo to schedule all of this, viastore defined a time frame that the

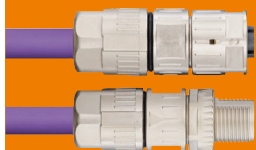
Ethernet cable

Tested for 15 million double strokes

Test 4888

CHAINFLEX® *SPINNING AROUND!*

Record torsion for cables with $\pm 360^\circ/\text{m}$



- Robot cables directly from stock
- From 1 m, with no cutting charge
- Tested in the largest laboratory in the industry

- Sold by the metre or harnessed and ready-to-connect
- Online service life calculation
- 36 month guarantee



motion plastics® ... for longer life
Tel. +49-2203-9649-800 info@igus.eu

[igus.eu/chainflex](https://www.igus.eu/chainflex)



03 Within three weeks, the production warehouse was fundamentally modernized



04 With energetic support from the company fire brigade, the old storage and retrieval machines were removed through hatches in the roof, and the new machines were installed

company would need for the retrofit. A roadmap detailed what work would be done, and when. "So we knew exactly when and how long the plant would stand still," explains Bosch. "In addition, we were able to say which and how many parts from the warehouse we had to accommodate externally and what we had to do at what time." This also helped with the coordination with all other involved parties in the company, for example those departments in which we had to make room for the temporary storage of the required parts. "It was impressive that viastore adhered to the roadmap almost 100 percent," emphasizes Dennis Bosch.

Completely modernized in three weeks

In the three weeks leading up to Easter 2019, the logistics system was completely modernized: The old S5 controls were replaced by modern S7, and the shuttle car – which connects the outbound aisles of the storage and retrieval machines with the pick stations – was given a new drive. The controls and drives of the three fire protection doors, which separate the rack area from the pre-zone and the rest of the hall in case of fire, were also modernized. "There was a separate control installed by the manufacturer, which had also been discontinued," explains Gregor Rentschler, the viastore project manager who was responsible for the retrofit on site. "With the new controls, we have implemented a gate clearance control including emergency power supply – this ensures that the conveyor line at the fire doors is cleared in the event of a fire and the doors can close safely." This is an aspect demanded by fire insurance companies today.

The material flow computer has also been redesigned: It is no longer running as hardware, but runs on a virtual server, which is located on a mainframe and is backed up accordingly. The visualization has also been updated. The storage and retrieval machines and the conveyor system were updated to a current bus system. And the S7 control of the conveyor system is connected to superordinate systems via Ethernet, so that remote maintenance for the system is possible right down to each individual component.

Replacing the AS/RS increased the performance by 30 percent

The most spectacular measure was the replacement of the old storage and retrieval machines. "We knew that our shuttle car still had power reserves," explains Dennis Bosch. "So we also wanted to increase the performance of the storage and retrieval machines." viastore then calculated what increase in performance would be achieved by the replacement of the AS/RS by current models in comparison to a mere modernization of the old machines – and what would be the extra costs. "With completely new, more dynamic AS/RS, we achieve a performance increase of 30 percent," says Lars Breuer. So the decision was easy. The two old machines and the floor crane rails were removed through two hatches in the roof, and the new ones were installed in the same way.

Good teamwork

The company fire brigade took care of securing the work on the roof and also helped with removing and installing the masts. "Handling the project together with the Metabo employees made the work particularly special," emphasizes Gregor Rentschler. A sign of this good cooperation was the home-baked cake that Dennis Bosch brought to the construction site. "The food was great," Gregor Rentschler admits with a smile and emphasizes once again: "It is important that in such a project, the interaction of our experts and the customer's employees works." Dennis Bosch confirms that "the team was key to successfully implementing the overall project." It is therefore important to him that his Metabo core team be mentioned by name: "I take my hat off to Uwe Hennig, Mike Kießig, Steffen Killer, Martin Lehr, Tobias Fuchs, Kevin Rebelo and the entire logistics team. They all have done a great job. And the other colleagues and departments involved in the preparation and follow-up also did a great job – a great team effort."

A performance boost for the warehouse

Although the modernized plant has only been in operation for a few months, there is already some success: "It is still too early to give specific figures," reports Dennis Bosch. "But I assume that the increase in performance will result in the promised double-digit range. The colleagues in the warehouse have already noticed that the system is running faster. Not only is the material outside faster, but the data records are also available fast as lightning." Remote maintenance allows events to be resolved online very quickly. In addition, the energy consumption will decrease because in the new AS/RS, a DC link coupling ensures the internal energy compensation of motoric and regenerative loads. "The entire retrofit project went very well," says Dennis Bosch happily. He recommends that companies that intend to modernize their plant "have enough time for pre-planning – that should not be underestimated. The system analysis and the detailed roadmap from viastore are a reliable basis."

Photos: viastore

www.viastore.com

“Clean” solution for clean room partitioning

The Bayer Weimar GmbH und Co KG plant, opened in 1994, and is both the company Head Office as well as the location for production, quality control and packaging. At this site, around 500 employees manufacture hormone-containing solid dosage tablets, coated and film-coated tablets. The processing of hormone-containing drugs requires special demands on the production areas in the plant. Efaflex SRT CR high-speed roller doors from Efaflex were therefore installed to separate the clean rooms from the corridors.



Nino Baracskaï, Head of Technical Office, explains the importance of the high-speed doors in front of the clean rooms and airlocks as follows: “Absolutely no hormones may enter the environment from our pharmaceutical production. We therefore operate our production areas with -15 Pascal vacuum to protect our employees and the environment. This means that when the doors are opened, the air flow is in the direction of the clean rooms.”

The corridors in front of the airlocks to the clean rooms must therefore always be spotlessly clean. The fast action of the high-speed doors (opening at up to 2 meters per second and closing at up to 0.75 meters per second) help ensure that the air exchange from the corridor into the airlock and from the airlock into the production area only takes the shortest time so that particles do not enter the production rooms despite the negative pressure. This keeps the filter load low and reduces air loss. The doors’ curtain is also adapted to the clean room environment. “Our requirement profile included doors with stainless steel frames and plastic curtain that are washable and resistant to detergents,” explains Nino Baracskaï. The Efaflex CR-series clean room doors are perfectly adjusted to the requirements in controlled production zones. The high-performance high-speed doors have a smooth surface structure and no protruding edges. They can be easily cleaned, and a depositing of particles is largely excluded.

Predestined for cleanrooms

Like all Efaflex high-speed doors, the clean room doors are enormously heavy-duty and low maintenance thanks to their excellent quality. However, the most important case for Efaflex clean room doors are their high level of air tightness, which contributes consid-

erably to cost savings in clean rooms, and the modular design in clinical look. The narrow frames allow for a space-saving and visually appealing installation, even in confined spaces.

Despite the complicated installation conditions under airlock conditions, the assembly of the doors ran completely smoothly. Nino Baracskaï also has more than good things to say about the responsive field service engineer: “I can always call him if there’s a problem. He thinks about the issue and then offers very good solutions.”

Bayer Weimar GmbH und Co. KG. company information

Bayer Weimar GmbH und Co KG is a legally independent pharmaceutical site located in Weimar on the grounds of the former Jenapharm and is a fully owned subsidiary of the Bayer Group. Weimar is also home to the logistics center with purchasing, delivery of all materials, storage in a fully automated high-bay warehouse with around 8000 pallet spaces, distribution, shipping of products and production planning. All processes in the company, from planning to dispatch, are optimally controlled thanks to consistent investment in a modern computer-aided, integrated system for factory master planning and production management. The company therefore achieves a high degree of flexibility and responsiveness to customer needs while maintaining competitive costs and the outstanding quality that is essential for pharmaceutical products.

Photo: Efaflex

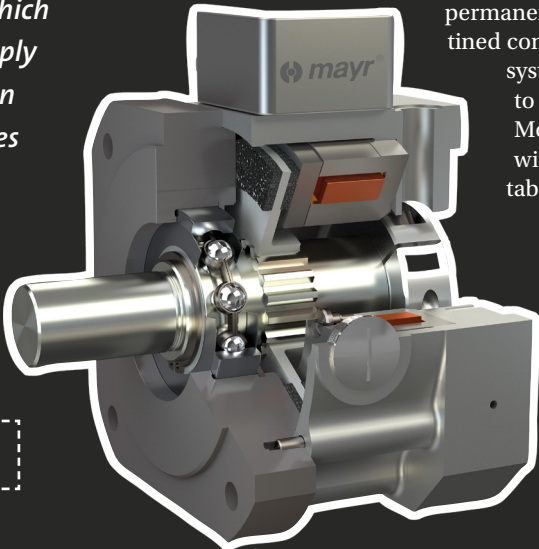
www.efaflex.com



Maintenance costs savings through integrated brake monitoring

Based on the concept of permanent inspection, mayr power transmission offers solution concepts for the predictive maintenance of electromagnetic safety brakes. Here, the focus is placed on the Roba-brake-checker module, which is not only able to monitor and supply brakes without the use of sensors. In an advanced version, it also provides data, thus enabling scheduled and cost-effective maintenance.

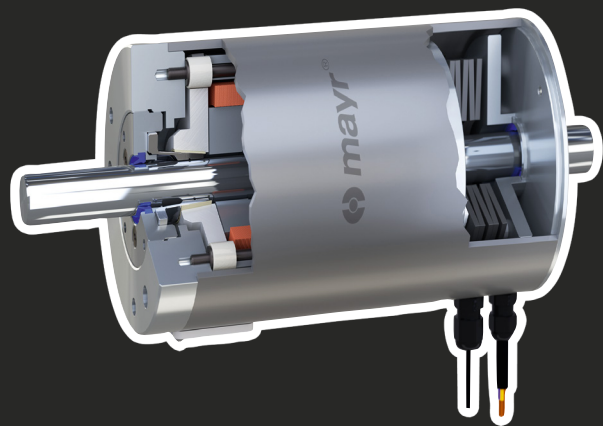
Permanent inspection, demand-related maintenance, plannable and suited to the actual utilization, automated remote maintenance or cross-machine/cross-plant error analyses – these are the key aspects of tomorrow’s machine maintenance. mayr power transmission offers solution concepts for the predictive maintenance of electromagnetic safety brakes based on permanent inspection, as these brakes are predestined components for the maintenance, safety and system availability, and permit conclusions to be drawn regarding the system operation. Monitoring of the safety brakes takes place without the use of sensors with the retrofittable Roba-brake-checker module.



01 Solution concept for the proactive maintenance of electromagnetic safety brakes based on permanent inspection: here you see the Roba-topstop, the modular safety brake system for A-bearing side servomotor attachment

Author: Andreas Merz, Product Manager at mayr power transmission, Mauerstetten, Germany

02 The Roba-brake-checker: Sensorless, networked brake monitoring for efficient and proactive machine maintenance



03 The electromagnetic design of the proven Roba-linearstop linear brake series has been approved for monitoring with the Roba-brake-checker module – it is the only electromagnetic rack and pinion brake on the market

Safety becomes visible

Through the extended analysis of current and voltage, the module detects the movement of the armature disk and knows what condition the brake is in. In addition to the switching condition, temperature and wear, the Roba-brake-checker also monitors the pull-in distance or tensile force reserve, i.e. whether the magnet is still able to release the brake. With the module, substantially more parameters are thus depicted during monitoring than with a conventional switching condition control.

In the advanced version, the module is equipped with an additional circuit board with a customer-specific interface (e.g. optical, WiFi, IO Link, OPC UA etc.). Via this interface, data regarding the switching time, current, voltage, resistance, performance and relative attraction current can be generated. This means that processes can now also be evaluated, anomalies in processing procedures can be detected quickly and conclusions can be drawn from complex interrelationships. Safety and reliability become visible, so to speak. Maintenance becomes plannable and cost-effective due to permanent inspection. The system operator or manufacturer is able to undertake maintenance in a targeted manner, aligned to their working processes. Furthermore, integration into remote maintenance systems is also possible.

Integration of the monitoring function into the control system

For direct integration of the monitoring function of the Roba-brake-checker into the machine control system, a licensing model with mayr power transmission is possible. The company supplies

the validation for specified brakes and supports integration and data evaluation. Additional components are not required. "In collaboration with the customer, the issued data are integrated into the customer-side evaluation system on a project-specific basis taking the requirements of the respective application into account", explains Bernd Kees, Product Manager at mayr power transmission in Mauerstetten.

Intelligent safety for machine tools

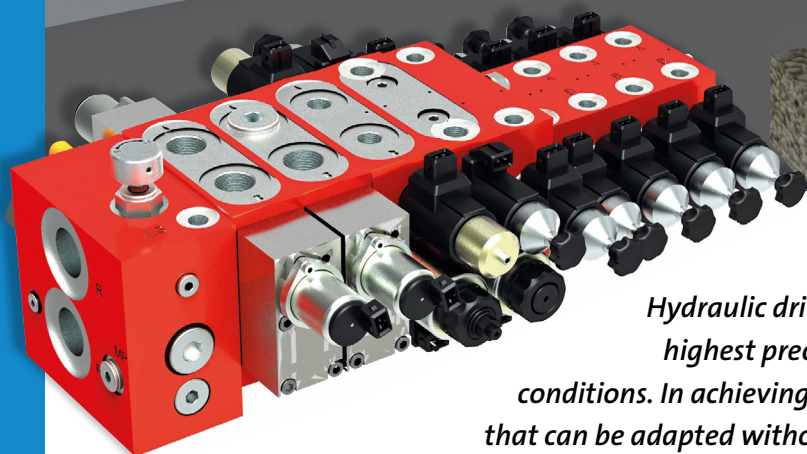
"Machine tools benefit from the permanent inspection of the safety brakes by the Roba-brake-checker module", explains Kees. "If, for example, the limit temperature is reached, this is an indication of damage to the brake, of brake failure or even incorrect dimensioning. The Roba-brake-checker also shows when critical wear values have been reached. This permits preventive maintenance, which in turn ensures higher system availability." Temperature progressions and changes in parameter across a product's lifetime are also made visible. In the case of previous solutions, such as contactless release monitoring, users are only able to see the failure or destruction pattern, but do not know how the error occurred. Using the Roba-brake-checker, on the other hand, progressions are made visible and error analyses can be used and even transferred onto other user systems. All this data from malfunctions and normal operation thus supply valuable input for future improvements and optimizations, for example for more system safety or an extended performance limit.

Photos: mayr power transmission

www.mayr.com



Optimized without compromise



Hydraulic drives in agricultural machinery need to demonstrate the highest precision, reliability and flexibility under the most adverse conditions. In achieving this high system performance, a vital feature is valves that can be adapted without compromise and exactly as required for the specific requirements. With the extensive range of valve functions that Bucher Hydraulics offers with its LVS series, every manufacturer of agricultural machinery has future-proof solutions at its disposal. The new expansion sections are aimed at delivering higher energy efficiency, reduced installation costs and significantly lower pressure losses in towed and self-propelled machines.

To meet existing and future requirements of manufacturers of agricultural machinery, the valve specialists from Bucher Hydraulics have developed numerous new functions for the LVS series of proportional directional control valves. Working in close cooperation with manufacturers of towed and self-propelled machines, further applications for these fast-switching valves are now emerging. Utilizing their precision, responsiveness and dynamic characteristics, they are designed to permanently reduce operating costs. These extremely compact valves, with a nominal flow rate up to 180 l/min and pressure ranges up to 350 bar, have been proving themselves in the market for years. The comprehensive system expansion, featuring two-stage valves with electrohydraulic operation, direct-operated solenoid valves and seat-valve combinations, facilitates application-oriented solutions that meet increasing demands and growing functional segmentation.

In the agricultural engineering sector, users now have access to new system solutions that are coordinated with one another for configuration within a valve block and thus work in harmony. Particular functionalities are selected for the respective application without any need for compromise and can be expanded at a later date, so at any time machine manufacturers can install the exact configuration required at that time.

Special functions for towed machines

For more than 40 years, Bucher Hydraulics has been contributing solutions for optimized harvesting performance by supplying valve blocks for a very wide range of towed machines. An example of such application experience at work is in self-loading feed wagons: a single block with just one valve section is sufficient to control the scraper

floor. For very fast unloading, the integrated boost function makes it possible to deliver the whole oil flow at one actuator outlet on demand.

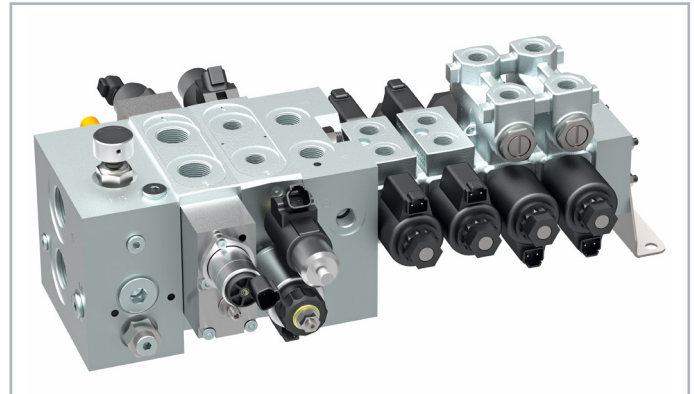
The product range extends right to the valve block itself, where up to 35 functions for controlling highly complex machines can be integrated. As a further variant of the single-acting hitch control (available for towed and self-propelled machines), a double-acting hitch control is also available for towed machines such as slurry wagons with trailing-shoe applicators. With the help of the double-acting LVS hitch-control valve, the trailing shoes can always be kept on the ground with the right contact pressure, regardless of hard or soft ground. This optimizes the ground pressure distribution for careful working as well as the depth control.

Simple ON/OFF actuator functions integrated in the block

Complementing the technically demanding functions that are controlled proportionally via LVS valves, Bucher Hydraulics now offers additional components for integration into the LVS modular control block system: valves for simple ON/OFF actuator functions requiring only low flow rates are available as spool or seat versions. On an as-needed basis, these expansion units are incorporated in a control block together with the premium LVS valves. Supplementing the well-known SVH04 directional valve that features bidirectional seat-type shut-off, new directional spool valves have been developed, which can be complemented by hydraulically actuated or electrically switchable seat valves. This enables machine manufacturers to create simple ON/OFF functions very cost-effectively.

Auxiliary-function sections improve travel comfort

The full range of adaptable electrohydraulic systems that Bucher Hydraulics offers specifically for towed machines is reflected in the EPOM program (Externally Propelled Off-Highway Machines). All the hydraulic and electronic components are characterized by their high reliability in the field: they deliver optimum service even with strongly fluctuating temperatures, high mechanical loading and



01 Supplementing the well-known SVH04 directional valve that features bidirectional seat-type shut-off, a cost-optimized modular system of directional spool valves, series D-DS06, was developed. These can be extended with hydraulically actuated or electrically switchable seat valves.

electromagnetic interference. With Bucher Hydraulics, users can choose between two control units for the analog-proportional control of up to 8 or 11 valve sections via toggle switches and rotary potentiometers. The package solution is completed with a wiring harness. The components have a tank-line pressure rating of 210 bar, so that no damage to the hydraulic system occurs even with a wrongly connected hose. Thanks to the low off-load and block head losses, up to 150 l/min at the actuator ports is possible with a pressure difference of only 9 bar.

Highlights of the EPOM program include specially designed auxiliary-function sections aimed primarily at improved travel comfort: the top cylinder, undercarriage, and drawbar suspension sections facilitate increased traction, maintenance of a constant level, and the absorption of travel shocks. The use of the TÜV-approved axle-lift section reduces tire wear and diesel fuel consumption. The axle-suspension section enables weight-dependent control.

WORLD OF INDUSTRIES

Editorial board:

Winfried Bauer (Editor-in-chief), E-mail: w.bauer@vfmz.de
Nicole Steinicke (Editor-in-chief), E-mail: s.steinicke@vfmz.de
Manfred Weber, E-mail: m.weber@vfmz.de

Managing editor: Winfried Bauer

Assistant editors:

Petra Weidt, Melanie Lerch, Angelina Haas, Ulla Winter, Doris Buchenau

Design/Layout:

Anna Schätzlein, Sonja Daniel, Anette Fröder, Mario Wüst

E-paper designer:

Anna Schätzlein

Publishing house:

Vereinigte Fachverlage GmbH
Lise-Meitner-Str. 2, 55129 Mainz, Germany

Commercial register No.: HRB 2270, District Court of Mainz

VAT-ID: DE149063659

Privacy statement: ds-vfv.vfmz.de

Managing director: Dr. Olaf Theisen

Publishing director:

Dr. Michael Werner, E-mail: m.werner@vfmz.de

Correspondent India: Sushen Haresh Doshi M.Sc.

Advertising sales director:

Beatrice Thomas-Meyer, E-mail: b.thomas-meyer@vfmz.de

Advertising sales manager:

Oliver Jennen, E-mail: o.jennen@vfmz.de
Andreas Zepig, E-mail: a.zepig@vfmz.de

Sales representatives

Austria:

Heinz-Joachim Greiner, E-mail: verlagsbuero-greiner@vfmz.de

Denmark, Sweden, Finland, Norway:

Malte Mezger, E-mail: verlagsbuero-mezger@vfmz.de

France:

Marc Jouanny, E-mail: marc-jouanny@wanadoo.fr

Great Britain, Ireland:

Rob Brewer, E-mail: rob.brewer1@btinternet.com

Italy:

Edgar Mäder, E-Mail: publications@emtrad.it

Switzerland:

Hermann Jordi, E-mail: info@jordipublipress.de

USA, Canada, Mexico:

Patrick Venezia Jr, E-mail: verlagsbuero-venezia@vfmz.de

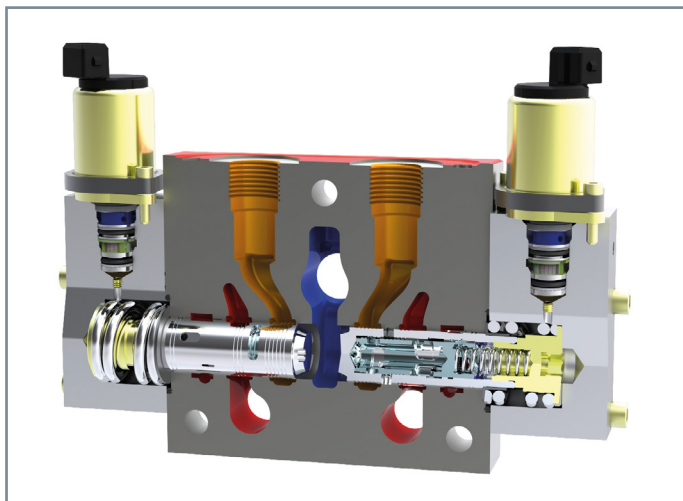
Advertising disposition:

Isabell Faß, E-mail: i.fass@vfmz.de
Brigitte Glücker, E-mail: b.glueckler@vfmz.de
Nevenka Islamovic, E-mail: n.islamovic@vfmz.de
Heike Rauschkolb, E-mail: h.rauschkolb@vfmz.de

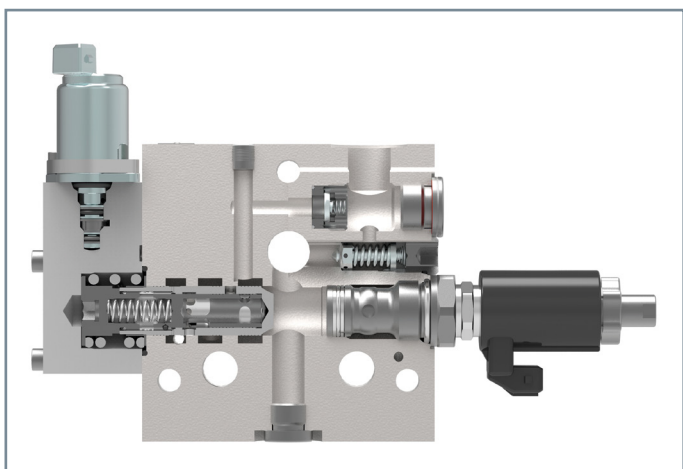
In cooperation with:

Hannover Fairs International GmbH,
MesseGelände, 30521 Hannover, Germany

Internet: www.world-of-industries.com



02 The LVS12 dual-flow control valve is used for pressure-independent, parallel operation of two single-acting actuators and saves both installation space and weight



03 Highly dynamic lift/lower module for load-compensated lifting and lowering up to 150 l/min and 350 bar

Well-proven steering systems and changeover facility

Agricultural machinery must, of course, offer a high level of driving safety in addition to optimum in-field performance. In the case of towed machines, the systems predominantly in use are based on castor steering. These only work in forward gear and are otherwise locked by seat valves. With a special electrical additional steering system, Bucher Hydraulics offers a component to increase safety: this additional steering system is also active when reversing and is used for the speed-adjusted steering of one or two axles.

Also available are electrohydraulic steering systems from the EPOM program. With these systems, users benefit above all from the special design of the steering valves featuring a downstream pressure compensator. These steering valves can be integrated directly into the valve block without the need for the otherwise

standard additional priority function, which saves cost and space. Other highly responsive valves, specialized for the harvesting process, provide automatic steering, which ensures ongoing corrections as well as row-sensing. Another special feature is that Bucher Hydraulics equips its steering valves with self-compensating spools, with the result that, after a displacement, the restoring force back to the neutral position is independent of the load.

The adaptability of Bucher Hydraulics' solutions for towed machines is also reflected in the connection to the tractor supply, where the company is a technological pioneer. The valve operation can easily be set for either fixed-displacement or load-sensing supply systems. Using an adjustable pressure compensator in the inlet section, which can be changed over from 2-way to 3-way functionality, users can employ the same valves for both open- and closed-center systems, thus ensuring that a constant flow rate is always available for the valve block in the towed machine regardless of the type of pump system in the tractor. Even when there are higher pressure drops in the lines, sufficient pressure is always available for control functions in this application, which in total saves energy costs.

Special functions for self-propelled machines

The highest possible harvesting performance is based primarily on uncompromised and reliable functionality, as found in the harmonized Bucher Hydraulics system for self-propelled machines.

In particular, savings in terms of space, weight and cost were crucial for the design of an innovative expansion section with a split spool. The special feature consist of two spools in one valve body with one spool bore. This means that two actuators can now be controlled independently of one another – and in conjunction with a flow control valve that handles 180 l/min at 350 bar. The large oil galleries reduce pressure losses, increasing energy efficiency thanks to reduced diesel fuel consumption.

The split-spool technology enables a wide range of functions such as dual-flow control functions, lift/lower module in flow/return or return/return. The dual-flow control feature saves installation space and weight and is suitable for pressure-independent, parallel operation of two single-acting motor drives, for example.

The details guarantee unique solutions

The lift/lower module impresses with load-compensated lifting and lowering. To ensure the stability of such a system, Bucher Hydraulics uses highly dynamic valves that can accurately implement control signals even at a high command frequency with signal durations of just ten milliseconds. The flow and return function corresponds to an adjustable pressure support, in that the flow and return spools can be actuated and positioned independently of each other. By varying the ratio of the flow and return openings, any required pressure can be created at the actuator outlet.

All in all, with its broad-based concept Bucher Hydraulics offers all the functionalities required for a wide variety of applications. With the LVS platform, manufacturers of towed and self-propelled machines can systematically design customized solutions that deliver 100 % on the required benefits, and significantly reduce costs through the use of innovative technologies.

www.bucherhydraulics.com



A new world of automation

Nowadays, mechanical engineering is software development. The new ctrlX Automation platform is Bosch Rexroth's answer to this market requirement. It encompasses the latest engineering software technologies and all PLC and motion tasks. Software functions are combinable in any number of ways with ready-made, customized and customizable apps. These apps can be created in a variety of programming languages such as C++, script languages such as Python, or new graphical languages such as Blockly. This gives machine manufacturers new-found freedom.

ctrlX Automation offers users a choice: they decide whether to program in IEC 61131, PLCopen or G-Code, or in conventional



high-level or Internet languages. Configuration and commissioning of the automation components is completely web-based, eliminating the need to install software. Within minutes of

switching the system on, the software is programmed. A completely virtual ctrlX Automation system environment is available, enabling programming without hardware. System functionalities can be extended at any time via the user's own process functions, apps, and open source software. In total, ctrlX Automation cuts the engineering time and effort by 30 to 50 %.

www.boschrexroth.com

Melservo MR-J4 amplifier with multi-network interface

The MR-J4 servo amplifier series from Mitsubishi Electric incorporates a multi-network interface called "Servo Open Network". It enables the user-friendly drive to be compatible with all relevant motion control systems worldwide. Communications is simplified by offering mainstream industrial Ethernet protocols including CC-Link IE Field, Profinet, EtherCAT and Ethernet/IP. Another important advantage of the servo control systems from Mitsubishi Electric is the level of OEM support available globally. On-site support from the manufacturer is offered during commissioning and maintenance. Network protocol selection is easy and user-friendly thanks to the plug & play concept applied to the servo amplifiers. A Quick Start Guide is available for each of the networks alongside immediately usable and expandable sample projects and function blocks, which are supplemented by flexible connection options. The servo systems for the power range from 0.05 to 22 kW are highly compact, occupying up to 50 % less volume than comparable products. They are also supported by a large selection of motors with high power densities; offering maximum flexibility in design and efficiency with a minimum footprint.

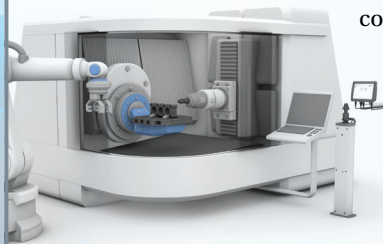


www.mitsubishielectric.com

Digitalization of existing machines

Tool identification using Balluff Industrial RFID increases production efficiency, as it makes incorrect tool allocation or missing tools a thing of the past. This enables optimizing the service time utilization of the tools. In addition, scrap and rework due to excessive use of tools are virtually eliminated. With Easy Tool-ID, Balluff has provided an affordable entry-level solution into tool management for a long time now. Version 2.0 has

now been released on the market. It is convenient to upgrade and is characterized by being easy to install and configure. It features an additional touchscreen display and offers the user even greater convenience in practical operation as well as during configuration via web browser without intervention into the machine tool.

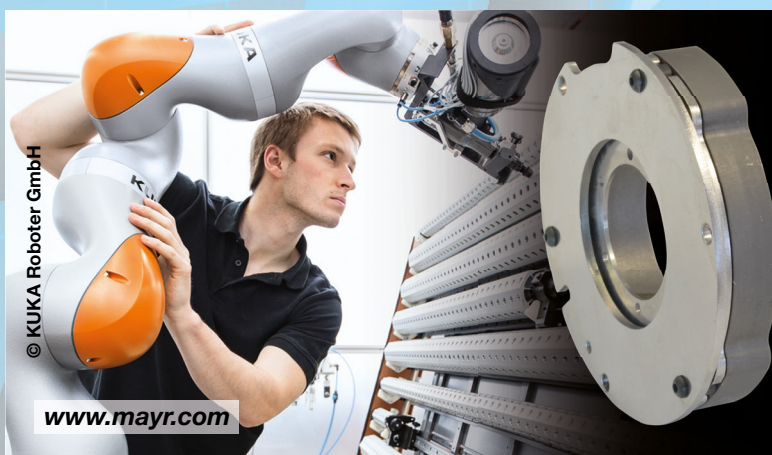


www.balluff.com

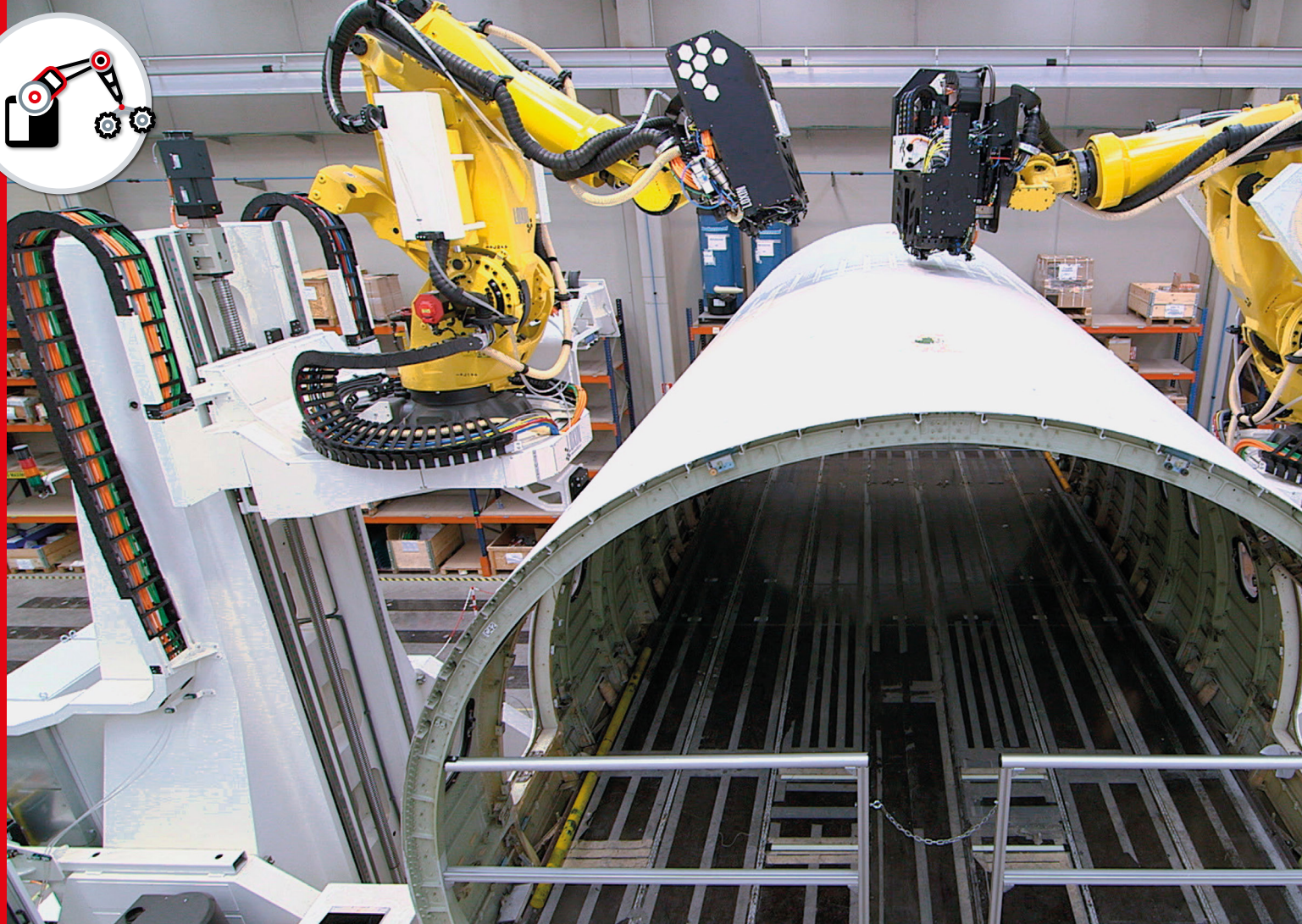
Brake technology 4.0 for maximum demands

ROBA®-servostop — compact, high performance-density safety brake for robot joints

 **mayr**[®]
your reliable partner



www.mayr.com



An extraordinary movement artist in aircraft construction

Industrial robots rotate a thousand times over several axes whilst riveting aircraft fuselages. A stress test for data, pneumatic and energy cables. To endure the movements, a Spanish plant manufacturer, relies on cable guides made of high-performance plastic.

Passengers think of a lot of things on the flight to their summer holiday. Of relaxation, the beach and a cocktail. But very few think of rivets, of the inconspicuous fasteners that safely hold the fuselage parts of the aircraft together. In a task that takes weeks, skilled workers beat the rivets into metal fuselages that weigh several tons. Wasn't automation of this laborious activity possible? Desirable, yes but it had been impossible for a long time, because robots were not sophisticated enough. They needed more than just flexibility to reach every point of a fuselage. They also had to master several work steps – from drilling and milling to riveting. With a precision of 0.2 millimetres.

Author: Jörg Ottersbach, Business Unit Manager e-chains, igus GmbH, Cologne, Germany

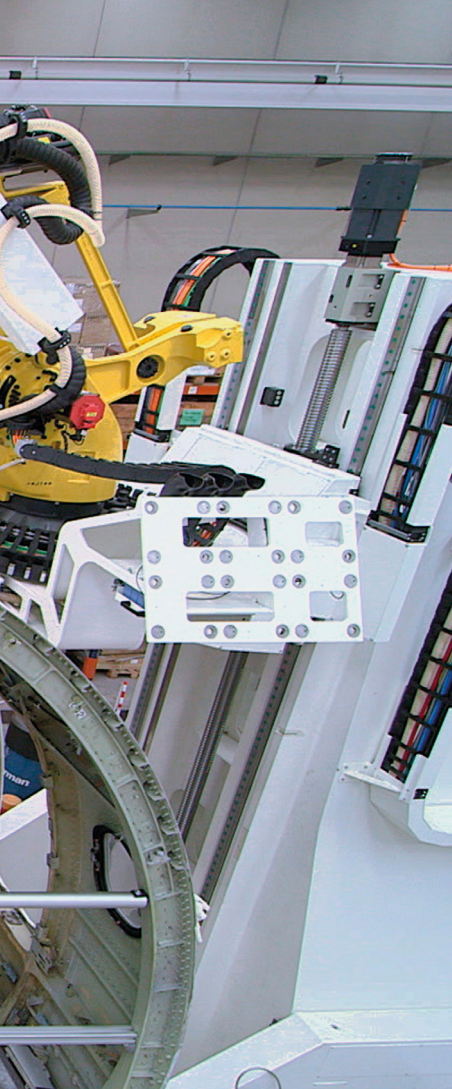
Fuselages are riveted together by 6-axis robots

Loxin 2002 succeeded in automating the riveting process. The multi-axis robots of the Spanish company work in the production division of a large aircraft manufacturer. Left and right next to the raised fuselage. The robots are mounted on platforms that can be raised up to a height of several metres by linear units – similar to a forklift (lead picture). Arriving at the right height, the heavy robot weighing tons, moves to the operating point with millimetre accuracy over six axes. It drills a hole in the metal, mills a recess for the rivet head, vacuums up the dust, applies a sealant and sets the rivet.

Depending on the fuselage section, the robots must constantly change the angles and diameters during drilling, milling and riveting. But this flexible multitasking was not the only hurdle that Loxin had to overcome during development.

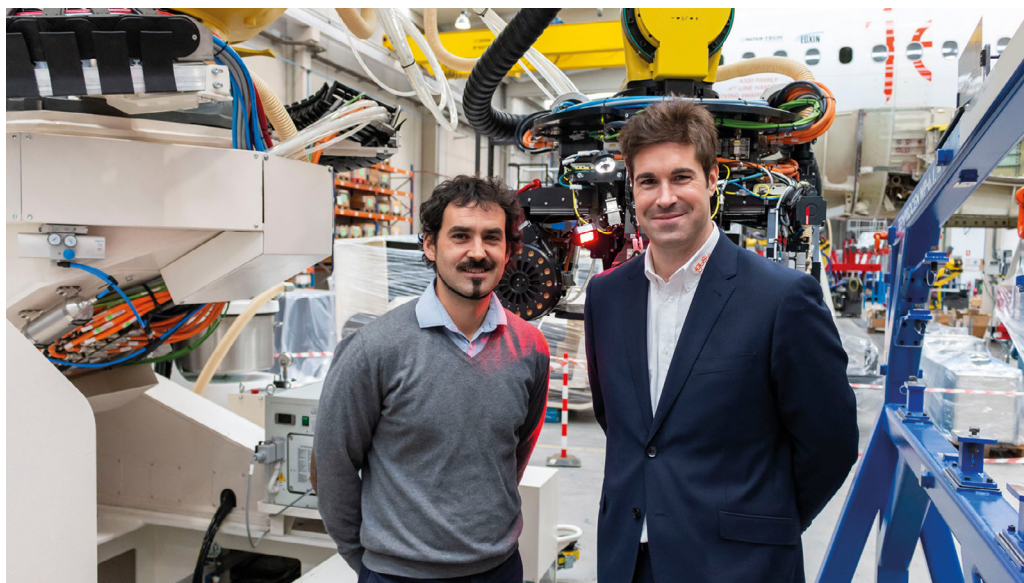
Challenge: cables have to withstand complex movements

The engineers had to design the robots to be truly flexible. Six axes are used to move the head to any part of the fuselage. The issue of energy supply is equally complicated. The tools on the robot's end effector are connected to numerous energy, pneumatic and data cables. And these cables must follow the contorted movements of



01 A twisterchain protects the cables from the base of the robot arm to the first axis. The energy chain allows 540 degree movements.

02 Unai Martínez Díez, Senior Sales Engineer at Loxin (left), together with Francisco Martínez, Sales Manager e-chain systems (igus Spain)



the arm perfectly, even at high speed – without rubbing against each other or knocking against the sensitive surface of the fuselage. Otherwise, long downtimes due to cable breaks and damage to the aircraft occur.

In search of a reliable energy supply system, Loxin compared systems from several manufacturers. “However, for a long time we could not find a robust and reliable solution,” recalls Unai Martínez, Chief Engineer at Loxin. “The number of cables and the weight was a problem.” Loxin had experimented with corrugated tubes. Due to the rapid wear from friction, they break easily. In everyday life, material failure would have meant replacing the entire tube, including removing the cables on the heads. In the worst case this would have resulted in a shutdown for several days.

3D cable provide maximum degrees of freedom

Loxin finally found what it was looking for in Germany. At igus, the motion plastics specialist from Cologne, which has been developing cable guides for decades! The range includes, among others, the triflex series. These are hose-like protective cages made of wear-resistant high-performance plastic, which follow even the wildest three-dimensional movements of industrial robots. Inside, the cables for data, pneumatics and energy supply are securely fixed and protected against wear. “The cables are protected against mechanical stress due to tensile load, torsion and expansion. This protection is particularly important when the robot heads take their maximum position,” explains Unai Martínez.

To ensure that the triflex energy chains mounted on the right and left of the arm move as close to the arm as possible and do not hit the aircraft, Loxin uses the triflex RSE retraction system. If the robot arm returns to its original position after a movement, the mechanical system retracts the chain – round brackets, which are mounted

on the arm, ensure safe guidance. The robot arm has full freedom of movement, without having the parts of the chain rub against each other or form loops. “The igus energy chain also has a much better friction behaviour than the corrugated tube and will therefore not break and cause a stoppage,” says Martínez. And if a chain link reaches the end of its service life, it can be replaced in a few simple steps. By using the triflex chains in conjunction with the triflex RSE retraction system, Loxin has also been able to achieve a better mobility of the robots, which can now simplify their work steps around the fuselage even more easily, which saves valuable assembly time.

Energy chain allows circular movements of 540°

Another product from Cologne is used on the robot arm: the twisterchain, an energy chain that protects the cables from the base of the robot arm to the first axis. The chain moves in a guide trough. If the robot arm turns, the chain folds as the upper run of the chain rests on the lower run. The chain allows a circular movement of up to 540° at speeds of up to 1 m/s. Since it also consists of high-performance plastics, it is very wear-resistant. Tests in the igus test laboratory have proven that the service life of the energy chain is over one million cycles.

“We are very satisfied with the solution, as our plants now have less downtime,” concludes Unai Martínez from Loxin. igus is also pleased with this extraordinary reference. Loxin was presented with the 2018 vector award for the challenging energy supply solution. This award is organised by igus every two years and its winners are chosen by an independent jury.

Photos: igus

www.igus.com



Smart laser sensors inspect finest details

When manufacturing circuit boards (PCB), extremely high precision and high production speeds are required. Therefore, smart displacement sensors from Micro-Epsilon are used in pick-and-place machines. They perform reliable quality monitoring in the micrometer range and they are compact, precise, fast and digital.

Whether it is smartphones, medical devices or machine tools – almost all electrical devices have a PCB. However, these devices are getting smaller, more efficient and faster whereas the development cycles are becoming increasingly shorter. This also means that the boards have to become significantly more powerful by using highly integrated components. Miniaturization of switches and individual components as well as ever increasing packing density are essential elements to fulfill the required performance. In order to ensure that current in the form of electrical energy signals or as information signals easily flows through the components, exact positioning of electronic components is crucial. With PCB manufacturing, these must not only be in the right place but also on the

right level in order to properly connect them. For smooth function, the components must not be tilted.

High requirements for the measuring system

Sensors inspecting the position of highly-integrated components in the line must overcome a series of challenges. Primarily, these are high speed because of the highly dynamic production process, a small diameter of the focus due to extremely small components, and high spatial resolution due to minimal displacement changes that have to be detected. The smart optoNCDT 1420 laser triangulation sensors from Micro-Epsilon are designed for high-tech applications. These laser sensors measure without contact and do not affect the PCB or the highly-sensitive components. The non-contact measuring procedure enables the laser sensors to acquire and process the measurement values very quickly.

Designed for dynamic processes

In quality control of PCB production, the sensors are placed in such a way that they measure the PCB from above. A traversing system guides them over the PCBs and its highly-integrated components. With a measuring rate up to 4 kHz, they detect dynamic processes directly in the production line.

The sensor's compactness at just 46×30 mm and its integrated controller allow it to be integrated in restricted installation spaces. The smallest possible diameter of the light spot is just 45×40 μm , which enables high precision measurements on fine pins as the light spot can be sharply projected onto them.

Author: Erich Winkler, Product Management Laser Triangulation Sensors, Micro-Epsilon Messtechnik GmbH & Co. KG, Ortenburg, Germany

The sensor measures on permanently changing surfaces

Another essential prerequisite for reliable measurements on PCBs is a measuring procedure that can measure different materials, from plastics to metals, which is why the laser triangulation principle is the right choice. Therefore, laser sensors from Micro-Epsilon provide the innovative Active Surface Compensation feature. Particularly with a PCB, the sensor measures on permanently changing surfaces from matt black to shiny and reflecting targets, as well as from bright to dark. The ASC ensures that the exposure time adapts to the conditions presented by the respective measurement object. To determine the measurement values, the laser sensor projects a red laser point at a wavelength of 670 nm onto the target. The laser light is back-scattered in a certain reflection angle to hit the optical system of a CMOS line. With quickly changing objects from bright to dark, only a small amount of light would reach the receiving matrix without Active Surface Compensation. In contrast, the intensity would be too high when quickly changing from dark surfaces to shiny objects. In both cases, the result would be inaccurate or even useless. Therefore, the Micro-Epsilon sensor regulates the exposure time via the Active Surface Compensation and also the intensity of the light emitted during the measurement task in such a way that the reflection on the CMOS line is in the perfect range. Then the sensor calculates the distance values with micron accuracy via the three-point relationship between the laser diode, the measuring position on the object and the depiction on the CCD line. The values determined can be fed in as analog or digital output signal into the plant and machinery control system.

Measuring scribe lines on PCB panels

Another application in PCB manufacture is the scribing of pre-determined breaking points into the panels for depaneling. A PCB consists of several panels or smaller PCBs which go through the production as one large PCB. This kind of bundling is necessary for production reasons since it simplifies board assembly. The scribe lines are about 400 µm wide.

01 Also the scribe lines of the PCB panels must be measured precisely – the smart laser sensor is ideally suited to this application due to its combination of speed and precision with a compact design

The scribe lines of PCB panels must be measured exactly. Here, the optoNCDT 1420 laser sensor is also used due its unique combination of speed and precision combined with an extremely compact design for this application.

An optimal combination of functional properties

Using modern sensors such as the optoNCDT 1420 laser triangulation sensor from Micro-Epsilon ensures quality improvements while reducing waste and saving money. The smart laser sensor reliably measures displacement, distance and position with a repeatability from 0.5 µm. Its extremely small measurement spot detects even the smallest of components such as pins on PCBs with high

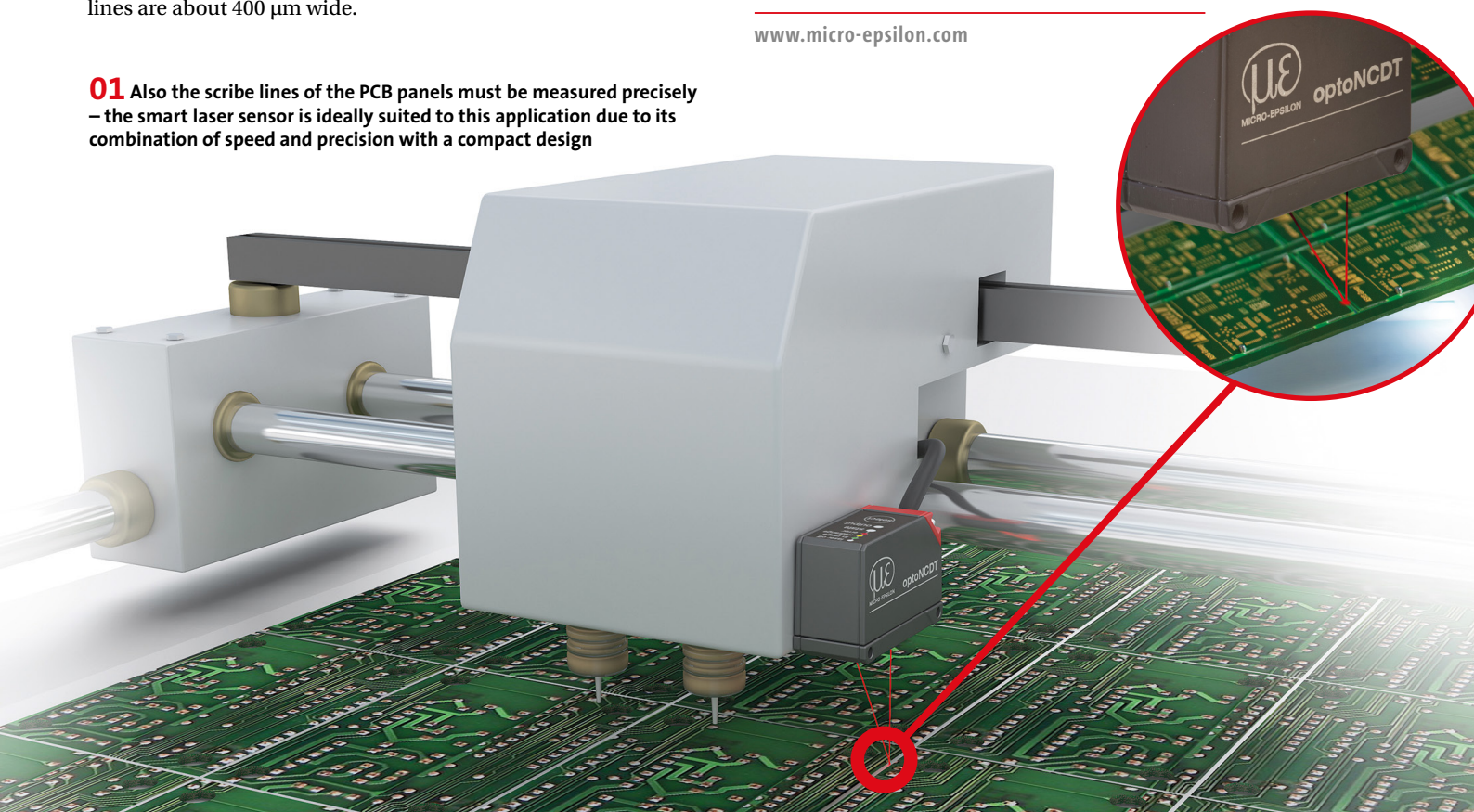
The smart optoNCDT 1x20 displacement sensors are specially designed for the high requirements placed by Industry 4.0

accuracy. With more than 4000 measurement values per second, this sensor is designed for highly dynamic processes such as those found in the electronics industry or in additive manufacturing. Its small design and the integrated controller enable easy integration into machines and systems even when installation space is low. The intelligent surface control balances the fluctuating intensity of the light reflected during the measurement process when color or brightness change rapidly.

The intuitive web interface allows the user to operate the sensor. It offers predefined set ups for different measurement tasks. Furthermore, up to eight user-specific settings can be stored and exported. The video signal display, signal peak selection and a freely adjustable signal averaging enable the optimization of measurement tasks. The characteristics that the optoNCDT 1420 combines is as unique as its design, which received the Red Dot Design Award.

Photos: Micro-Epsilon

www.micro-epsilon.com



JOIN MULTIMEDIA NETWORKS AND WIN NEW CUSTOMERS!



Take advantage of our
unique media network!



Please contact me, I will be glad to advice you!

Carmen Nawrath
Head of Marketing
& Corporate Services
Phone: 0049/6131/992-245
c.nawrath@vmfz.de

