

Look

Success stories from industrial automation

Book



KEBA[®]

Automation by innovation.

Edition April 2023

Welcome

Automation changes – Our world and that of our customers

We at KEBA are proud every time a customer project is successfully completed. We are all the more pleased to be able to present selected success stories to you in this book.

Why do we do this?

To adulate ourselves? No! We would like to take you with us into the diverse world of industrial automation and show you what possibilities are available. We automate industrial production continuously or selectively, with hardware and software solutions that are as individual as our customers' wishes. In doing so, it is particularly important for us to work together as partners, because our solutions do not start with our know-how, but with the needs of our customers.

Why is it worth reading the stories from the KEBA world?

They were exciting joint projects that are worth writing down and seeing. Dare to look beyond the industry and experience what can happen when you meet at eye level to develop solutions.

Enjoy reading!



Martin Schwarz
Managing Director / CSO
KEBA Industrial Automation

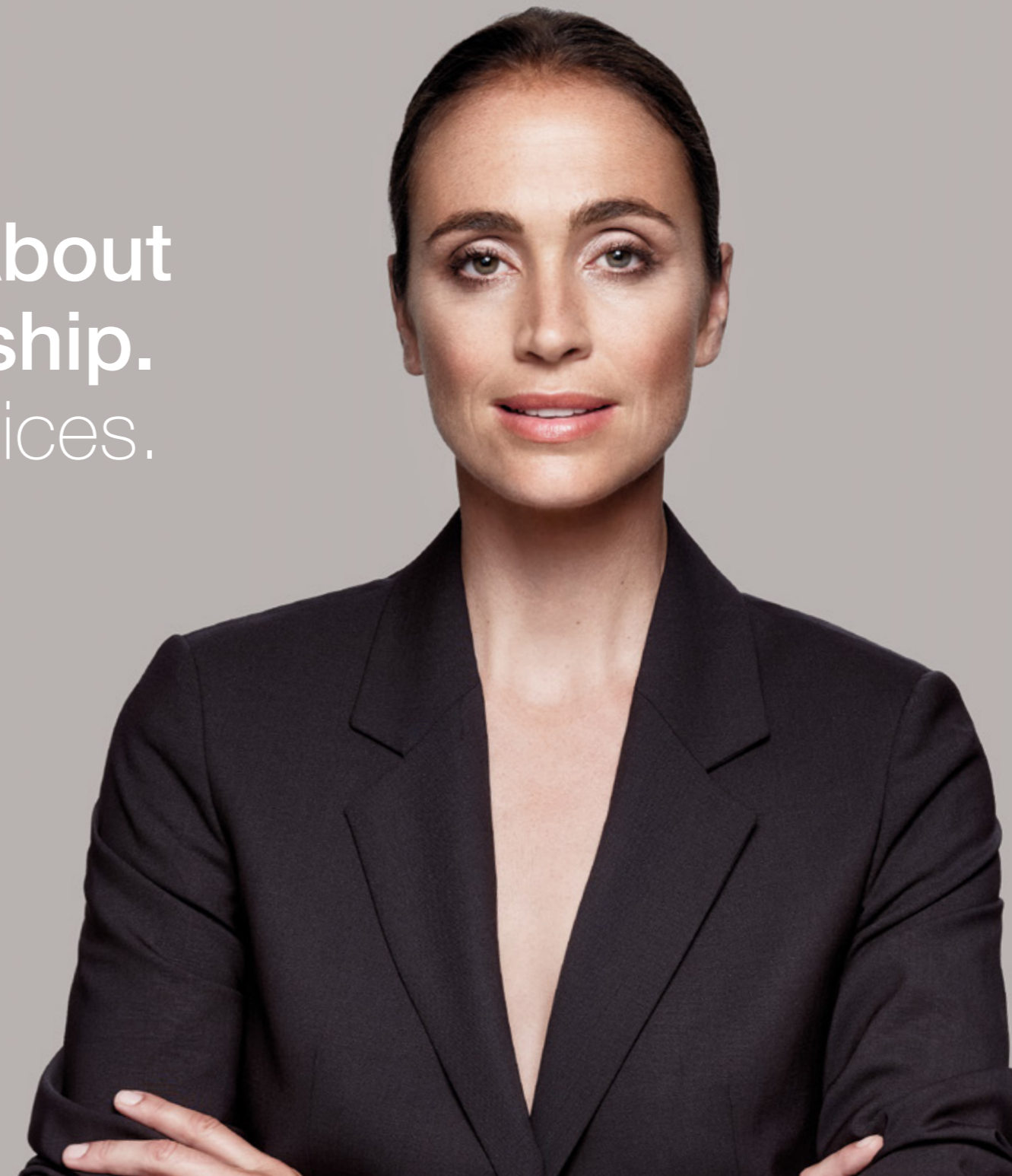
Markus Schatz
Managing Director / CEO
KEBA Industrial Automation

content

Content

// NETSTAL	Trends in the PET industry	06
// TGW Robotics	More speed, precision, compactness and flexibility	14
// Daetwyler Graphics	Automation for the world's most precise printing rollers	22
// Comau	Integrated robotics made easy	28
// igm	Automated XXL welding	34
// Pfiffner	Rotary transfer machines: next level in machine operation	40

It's All About
Partnership.
And Choices.



Trends in the PET industry

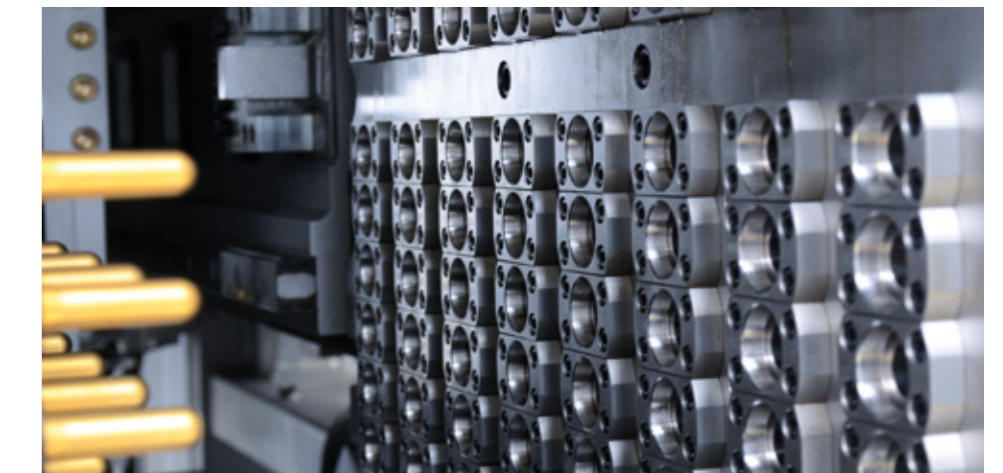
Possibly the most valuable milliseconds in the plastics industry

Because power outages can be expensive and time-consuming, the Swiss company **NETSTAL Maschinen AG** started looking for a solution for PET manufacturing that would be able to handle such outages in a cost-effective manner while affording protection from damage. Together with KEBA, such a solution was developed.

NETSTAL (Näfels, Schweiz) is a developer, manufacturer and seller of machines and complete systems for the injection molding industry, in particular medical engineering, thin-walled packaging as well as caps and PET preforms for the beverage sector.

The injection molding process is highly automated, and the machines are running 24/7. Some of the machines are located in regions where power outages can occur and where the reliability of the power grid is not necessarily a given. Power outages can be expensive and time-consuming, so **NETSTAL** started looking for

a solution for PET manufacturing that would be able to handle such outages in a cost-effective manner while affording protection from damage.



NETSTAL

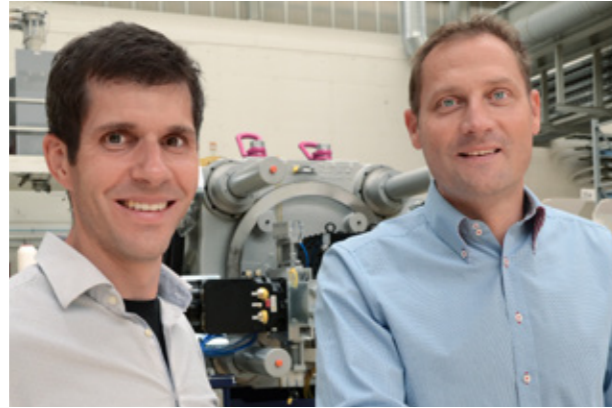
Trends in the PET industry

The history of the PET bottle (PET stands for “polyethylene terephthalate”) starts in the late 1960s. The international “career” of the PET bottle took off when Coca Cola introduced a 2-liter bottle in the US, which back then still came with a bottom shell made from a different material.

Today, about 1.5 trillion beverage containers in different sizes are produced annually, using a variety of materials—about one third of them (500 billion) are PET beverage containers. 80% of these are manufactured for water and carbonated sweetened beverages.

This is exactly the market for which NETSTAL designed their new series launched in 2020: PET-LINE, a system tailored in particular to the processing of recycled PET (rPET) without limitations.

Due to the fact that the recycling concept for PET containers is very mature and widely used, the SUP (Single-Use Plastics Directive) did not question PET processing, unlike the approach used for other products such as cotton swabs or drinking straws. In addition, PET containers can be manufactured



Manuel Hausammann, Control Systems Engineer at NETSTAL (left); Stefan Kleinfeld, Product Manager at NETSTAL (right) © KEBA

entirely from recycled PET (no new material needed) – the demand for recycled PET is extremely high and actually outstrips the supply.

PET beverage containers are on the rise – the PET market for beverage containers is growing by an average of about 4% each year. Food packaging also increasingly uses PET, for example in the manufacturing of clamshell containers for produce.

Stefan Kleinfeld, Product Manager at NETSTAL: “During the coronavirus pandemic, many events and conferences around the world were canceled. People were unable to go on vacation. The result

“The demand for recycled PET is extremely high - greater than the supply.”
Stefan Kleinfeld, Product Manager at NETSTAL

trends

was a drastic collapse in the demand for PET beverage containers, especially in the small bottle segment (< 1 liter) that constitutes the lion’s share of PET packaging (about 80%). Now, the market is recovering and manufacturers are investing in new machines; our order books are full.”





NETSTAL plants of the latest generation need 10-15% less energy.

Injection molding machines made by **NETSTAL** are a step ahead when it comes to energy consumption, speed and user friendliness. The machines of the latest generation need 10-15% less energy for comparable processes and under comparable conditions than the machines made by the competition. **NETSTAL** systems can be commissioned after just a few days of training – because the **NETSTAL** Smart Operation approach means that every machine can be controlled using just four buttons. In addition, the PET-LINE machines are currently the fastest on the market: with a lock-to-lock time of 1.9 seconds they achieve the fastest cycle time and highest output – in other words: maximum utilization.

NETSTAL launched their very first PET system in 1981. The Swiss-based company sells their injection molding machines for the PET industry also in markets and regions where the reliability of the power grid is not necessarily a given and where fluctuations in the power supply can occur. This includes some very lucrative markets, such as countries in South America, Southeast Asia, etc., and this is a growing trend. Because they need to be able to continue production in a controlled manner even if a power outage occurs, **NETSTAL** started looking for a solution. Engineers at **NETSTAL** developed a theoretical model; the practical implementation was done by KEBA Industrial Automation GmbH.

Conflict: ever-higher power needs vs. unreliable power grids

The new PET-LINE comes with a high degree of electrification. Manuel Hausammann, Control Systems Engineer at **NETSTAL**: “We work with a nominal power of up to 240 kW – power and output in injection molding have been increasing more and more over the years. But there are still many regions where the power grids are unreliable. This combination is rather precarious. Power outages or disruptions happen time and time again, you just have to be prepared. As machine manufacturers, what we can do is to make sure that the rejects rate and the effort for restarting the machine are minimal.”

If an injection molding machine stops abruptly, it means that the cycle cannot finish. The worst case is if the disruption occurs during the injection process while the cavity is not yet entirely filled with plastic, resulting in “short shots”, half-finished PET preforms. They need to be removed by hand, which can destroy the mold or damage the coating. One disrupted cycle can produce up to 144 short shots – with production losses of two to three hours due to the cleaning and restarting effort in such a case.

Controlled completion of the cycle

NETSTAL has developed a feature that bridges the time between the power outage and the end of the cycle. Hausammann: “Our goal was to finish the current cycle in a controlled manner without any external power supply – similar to shutting down the machine at the end of production – while keeping the mold and

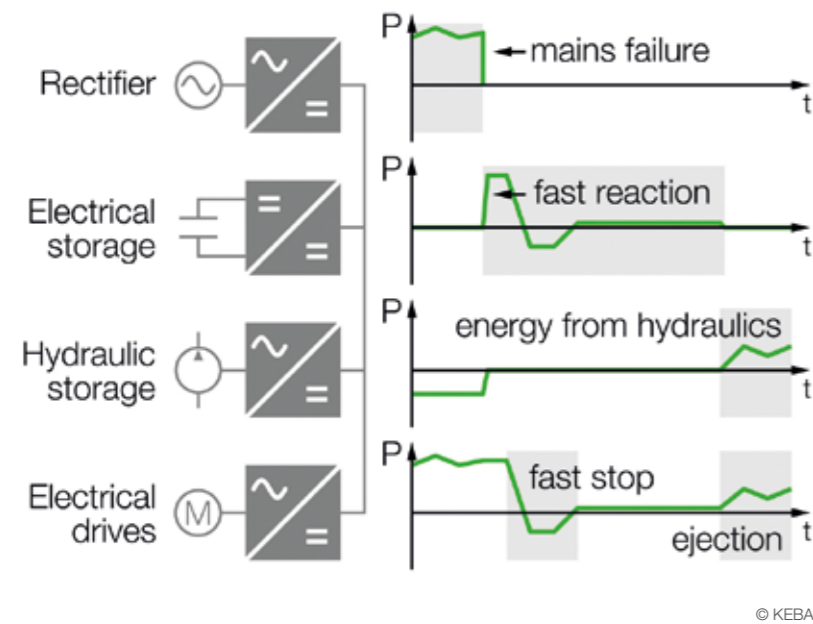
the plasticizing unit clean and making sure that the preforms made during the last cycle don’t turn into rejects.”

The solution was given the name Cycle Guard and includes two main components: an ultra-fast electric energy storage unit for the brief time immediately following the power outage, and a hydraulic storage unit for larger amounts of energy for unmolding the plastic products and shutting down the machine.

The idea behind Cycle Guard: if the supply from the power grid fails, the energy from the hydraulic storage unit will be used to continue the operation of the machine. In order to make this energy usable, the direction of the hydraulic pump must be reversed. This takes about 100 milliseconds. KEBA’s KeDrive D3 energy storage system is used to bridge this time and provide the missing energy.

The power outage is detected and the electric energy storage system responds within just one millisecond: for 10–20 ms, it replaces the grid power supply with a power supply of up to 300 kW. Simultaneously, all electric axes perform a quick stop, which does not interrupt the injection process. The braking energy produced by the motors is taken up by the energy storage unit, which then stabilizes the DC link of the drive system until the hydraulic pump starts working as a generator and provides energy. These initial 20 milliseconds are essential for the Cycle Guard feature.

The system continuously monitors the power supply and, in an emergency, it provides sufficient energy to shut down production in a controlled manner.



© KEBA

This means that Cycle Guard includes two storage systems:

// An ultra-fast **electric energy storage system** for the reliable bridging of brief power outages or power fluctuations in the millisecond range: It consists of an energy storage unit with high-performance electrolytic capacitors and an energy manager that controls the power flow and monitors the energy storage unit. This system has been optimized for high power requirements with the shortest possible response time, small size and easy integration into the drive system. The use of storage capacitors ensures that the system can handle high load cycles at high frequency without problem.

// A slower **hydraulic energy storage system** consisting of a pump and a hydraulic storage unit. It stores about 100 times as much energy as the system described above. This system ensures that longer disruptions can be bridged. In case of longer power outages, the current cycle is completed in a safe and controlled manner. The injection of the preforms is completed, and they are then unmolded. After the grid power supply has been restored and after a quick system check, production can restart quickly.

The challenge is to match the configuration of these two storage systems so precisely that in any scenario, the power outage can be bridged and the cycle can be completed in a controlled manner. This fine-tuning is the job of aXos 9, the controller of the injection molding machine.

“Cycle Guard provides enormous benefits to manufacturers who use injection molding,” says Wolfgang Kapp, KEBA Sales Manager for Switzerland. “The system continuously monitors the power supply and, in an emergency, it provides sufficient energy to shut down production in a controlled manner. Cycle Guard does not use any batteries, which means it is very low-maintenance and low-cost in operation.”



“ Cycle Guard provides enormous benefits to manufacturers who use injection molding. ”
 Wolfgang Kapp, Managing Director KEBA Schweiz

NETSTAL offers Cycle Guard as an optional feature – an investment that pays off very quickly, sometimes after less than ten power outages that have been bridged, depending on the product. Currently, about 40% of the PET machines shipped by NETSTAL include the optional feature.

Long-standing partnership and cooperation

NETSTAL and KEBA have been collaborating for over 14 years. NETSTAL appreciates in particular the close cooperation with the development team and the support provided by KEBA’s Swiss office. Hausammann: “Our collaboration is very easy and efficient. We have direct points of contact in development and in product management – there is a solution for almost every question and every requirement. Because of our excellent cooperation with

KEBA during the introduction of a new generation of axis controllers and because of their comprehensive experience in the field of energy storage, we relied on KEBA again when it came to the development of an energy storage system. Thanks to NETSTAL’s and KEBA’s sophisticated simulation capabilities, we were able to develop the right product in a very short time span.”

Currently, NETSTAL and KEBA are planning to switch the ELION and ELIOS product lines to KEBA KeDrive D3 drive modules. “And we are already in talks about some future projects,” says Hausammann.

TGW Robotics

More speed, precision, compactness and flexibility

How a logistics solution provider ensures speed and flexibility.

The logistics industry is facing major challenges, especially due to the boom in e-commerce. „More speed, precision, compactness and flexibility“ also applies to **TGW Robotics GmbH and its business partners - such as **KEBA**. Together, they have already been able to successfully implement several projects to optimize the logistics process and thus solve essential pain points in intralogistics.**

The logistics industry is facing a lot of challenges right now because it is booming—booming like crazy. E-commerce is thriving, not least driven by the Covid pandemic, but at the same time it needs to be able to react quickly and adapt to new requirements. **TGW Robotics GmbH** specializes in the development and realization of highly complex custom solutions for intralogistics, robotics, and special conveyor systems. Their product portfolio includes gripping, palletizing and depalletizing solutions as well as carton handling. And they need to be able to respond with the same speed and flexibility as their partners whom they provide with solutions.

Challenges in the logistics industry

The astounding e-commerce boom is changing things. The number of purchase orders for individual items is seeing a heavy increase. Even before the pandemic, some parts of the industry experienced growth rates around 30%, and today, even more business is being triggered by pandemic-related consumer behavior: customers order more items, more regularly and more quickly—in other words they want to receive more items to choose from because trying out items at the store is not always possible or is viewed as inconvenient. In addition, even people who used to shop exclusively at brick-and-mortar stores now order online, perhaps out of necessity.*

Stefan Holzner, Senior Technical Consultant & Patents at **TGW Robotics** in Germany, is observing these changes from a front-row seat. “There are many changes, and they have a great impact. Many carrier companies have moved beyond just carrying goods and have branched out more and more into operating distribution and logistics centers.” In such cases, **TGW** provides on-site teams that help operate the plant because initially, many carrier companies lack the required know-how.

*The interview with TGW Robotics took place in 2022.

” The result is new business models, that provide for completely different processes.

Stefan Holzner, Senior Technical Consultant & Patents at TGW Robotics, Germany



© TGW

Stefan Holzner: “New business models are emerging that use very different processes from the ones we’ve known so far – just think of grocery orders delivered right to people’s front doors. This is different from before: the delivery chain reaches from the manufacturer all the way to the customer. Flexibility on the last mile is crucial, and many manufacturers want to control this part. As a result, many brands now do their own deliveries, sometimes even with their own fleet. They are adding this last mile to their service offering in order to be able to deliver as quickly as possible.” Because customers’ expectations have also changed. More and more, they are looking for “ordered today, delivered yesterday”.

One effect is that multiple vehicles drive to the same address on the same day – in the past, all of this was taken care of by the postal service. Another trend is the growing frequency of sales peaks in e-commerce, emphasizes Holzner. “Easter and Christmas you can largely plan for, but ‘Black Fridays’ and ‘super sales’ are happening more and more frequently – the logistics industry needs to be incredibly flexible.”

Intralogistics pain points and TGW Robotics solutions

The mantra of the logistics industry is: more speed, precision, compactness and flexibility. This also applies to TGW Robotics and their business partners. **TGW Robotics** and KEBA have been collaborating since 2017. The first project that the companies worked on together was the optimization of a single-pick method for automated picking.

The goal was to enable two simultaneous picking processes by recognizing two source and target boxes at the same time – the robot moves without interruption, the box recognition alternates.

Martin Drexler, KEBA’s sales representative for **TGW Robotics**: “This required a custom-designed axis solution that coordinates and moves the six axes in space without wobbling despite the high speed. The challenge was the particular arrangement of the mechanical axes for optimal coverage of the rectangular movement space including the edges.” A solution involving a larger standard robot was out of the question. While such a robot would have been able to move along the entire distance, the size of the movements would have made it undynamic so that the required precision would no longer be achieved.

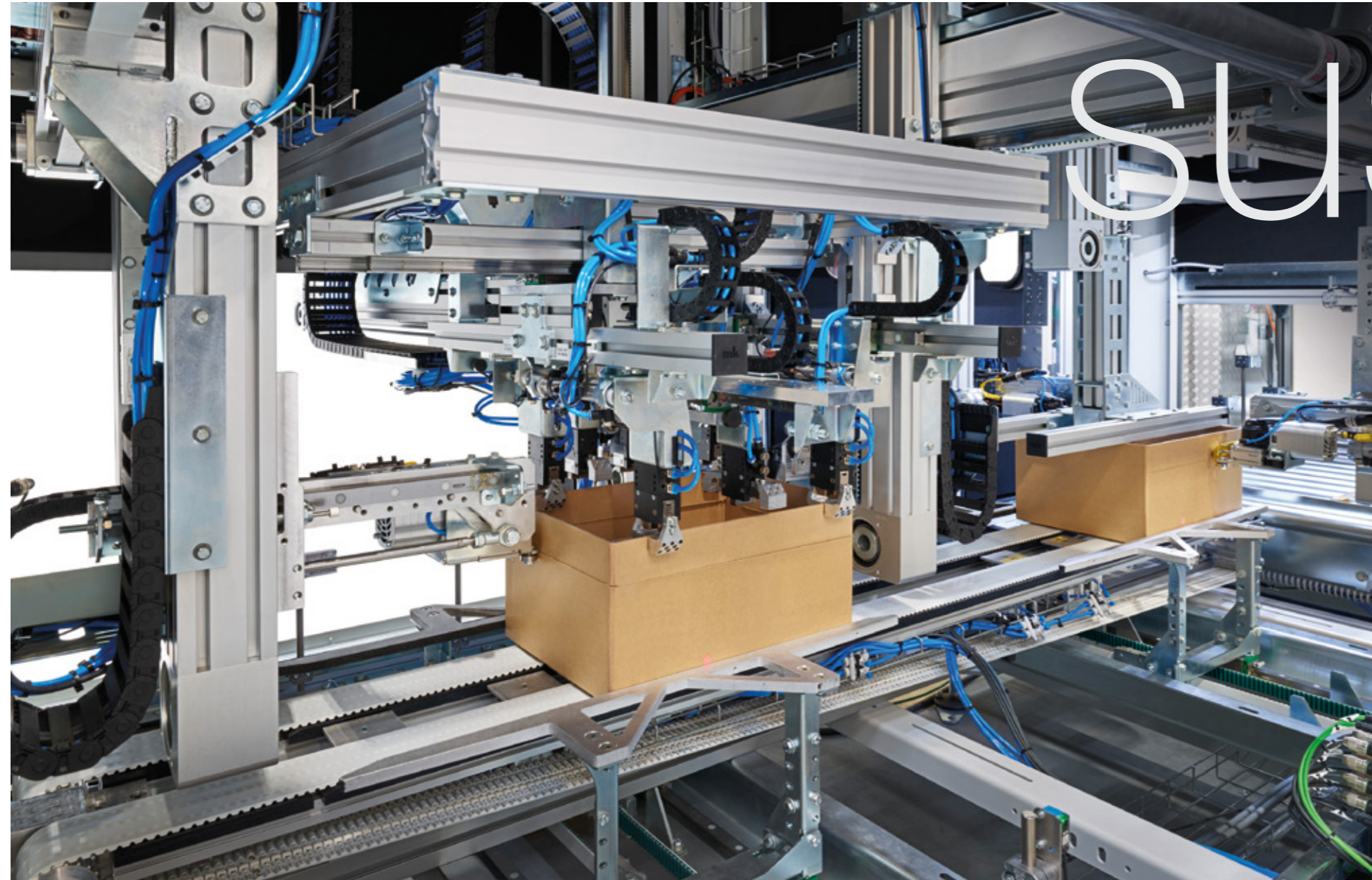
KEBA was able to build an extremely compact solution – dubbed “Rovolution” – which allowed for very short distances from the safety fence. Says Holzner: “KEBA’s approach enabled us to complete one entire pick in under four seconds – an outstanding value.” The requirements also included an easy-to-program system

using a standard programming language (IEC) and with great flexibility for extensions and add-ons to support the integration of customized software. Says Drexler: “In addition, a fundamental prerequisite was the use of a Siemens controller, which we solved through the Profinet slave option in our motion controller.”



Packing machine © TGW

Solutions



Sustainable

Cartons: sustainable reduction

When it comes to cartons for packaging, trucking companies typically have a number of basic sizes available – the standard sizes are rarely the best fit, so the cartons are cut to size or reduced in height after they have been filled. Says Georg Trenker, product manager for PackChain cartoning machines at **TGW Robotics** in Germany: “Cartons are a pain point for every single carrier company. The better they can adjust the size of the packaging to the content, the less space is needed on the truck - the effect is immediate. In addition, every trucking operator is looking to reduce the number of basic sizes.

The goal of the project was to create 20% less volume, which would effectively mean 20% less space needed on the truck.

Trenker: “There is enormous potential here with an extreme effect on cost – and it is not just about reducing the volume. We also set ourselves the goal of completely eliminating the filler material.” The issue with the filler material is not just one of sustainability,

it is also about the experience when the customer opens the box: what will I find and how long will it take me to spot the items I actually ordered? The aesthetics play a big role here. Says Trenker: “Our carton height reducer is now able to cut the size down to as little as 50 mm.” This also reduces the shipping cost because in some countries, such as Switzerland, there is a large price increase as soon as the height of a package exceeds 50 mm.

Opening cartons: manual effort and safety hazard

Another work step for which **TGW Robotics** needed a custom solution is the cutting open of cartons after they have been received. Says Holzner: “The particular challenge was the large number of manual work steps which, in spite of protective measures, still entail a great risk of injury.” The developers at **TGW Robotics** in Stephanskirchen in Bavaria came up with a concept for the fully automated cutting open of cartons. Their goal: firstly zero injuries, and secondly more speed by completely eliminating manual work steps – at a rate of 900 cartons per hour.

Their goal: firstly zero injuries, and secondly more speed by completely eliminating manual work steps - at a rate of 900 cartons per hour.

Says Holzner: “This task was really tricky because of the fact that the cartons that arrive don't follow any standards for sizing and in addition, the cartons may have been damaged or deformed in transit.” In other words, when it comes to goods receipt, each carton is unique.

The solution offered by **TGW Robotics** ensures that each carton is measured before it is opened. The axes are adapted to the dimensions of the respective carton. A sizing unit uses a camera system to measure any deviations or irregularities with respect to length, width and height. This allows the blades to cut open the carton lid with high precision and without damaging any of the contents.



coop eration

Technology: what it's all about

For the carton height reducer and the carton opener, it was again about the simultaneous movement of many axes. Says Holzner: "Standard industrial robots were not suitable and we needed a custom gantry solution that would be simultaneously flexible and compact enough to achieve our goals." Not a trivial task for a cycle rate of 900.

Says Holzner: "KEBA drives are much smaller in size than competitors' products. This compact design is unique – without it, we would have had to redesign everything." And such a redesign would have meant building a bigger and more robust system, requiring compromises with regard to dynamics, precision and

speed and taking up more space. Adds Drexler: "For the carton height reducer and the carton opener, we are talking about 19 axes in total. The multi-axis system made it possible to implement this application in a very compact format. The system controller, a 10-kW power supply unit and seven axis controllers with three axes each fit into a cabinet that is not even 50 cm wide!" This has raised the bar really high.

TGW Robotics decided to equip all machines in carton packaging with KEBA technology. Aside from the carton height reducer and the carton opener which have already been modified, this also includes the carton erector and the carton lidding machine. Holzner is looking to the future: "We might also

use it for gantry systems. They involve complex movements in space where time and again, we are confronted with performance limitations due to the motion."

Cherry on top: smart simulation model as bonus

Another important aspect for **TGW Robotics** is knowledge transfer, both within the **TGW group** and also with customers. Says Holzner: "In-house, we were thinking about how best to teach the new philosophy, which robot would be best suited to that purpose, etc. and based on that, KEBA came up with the idea of building a simulator." It provides the flexibility to offer training internationally without any major investment in a specific type

of robot. KEBA was provided with the 3D data for a visual representation. The simulation model makes it possible to program movement models, to simulate and to optimize them. Life-time services, maintenance, the replacement of axes etc. can also be simulated. Says Holzner: "A physical system would have been very expensive. Also, we would have had to pick just one model, which would have included a high risk potential. The simulation model developed by KEBA is extremely simple and very inexpensive." During the first stage, **TGW Robotics** uses the simulation for in-house training teaching KEBA technology. Says Holzner: "The simulation tool allows our workers to become familiar with KEBA technology. This gives them the confidence to start working on the actual machine and assist with the

monitoring and start-up of the system. The next stage is to use the simulation tool for customer training.

The result of the cooperation with KEBA: tailor-made logistics solutions and a partnership on eye-level

Out-of-the-box solutions available on the market were not an option for **TGW Robotics**. They needed a partner who develops tailor-made solutions and fulfills certain requirements. Says Holzner about the cooperation with KEBA: "Something that's great about KEBA is that they have points of contact with solid engineering competence and who don't change all the time. When you call them on the phone, you get to talk to the right point of contact

who can suggest a solution for your issue. At other companies, they assign you a support ticket..." Another thing that **TGW Robotics** appreciates about KEBA - aside from the fact that KEBA was able to provide a complete solution for the task at hand - is their great flexibility and excellent support during the project and start-up phases. Says Holzner: "Geography is important, too. We receive support quickly, and our engineers collaborate smoothly and effectively.

Down to the last micron

Automation for probably the most precise printing cylinders in the world

Daetwyler



For the production of its high-quality turning and grinding systems for the manufacture of printing rollers, the Swiss company Daetwyler Graphics has relied on KEBA components for years.

Hansjörg Michel, Head of Technology at Daetwyler Graphics, appreciates not only the quality of KEBA components, but also the open, cooperative and customer-oriented collaboration at eye level.

They want precision. They want extreme precision. "Micron" must be the most frequently used word at **Daetwyler Graphics AG** at their plant in Oftringen in Switzerland. Here, a 60-strong workforce painstakingly develops and builds about 60 turning and grinding systems annually that are used for the manufacturing and processing of rotogravure cylinders (printing cylinders with engraved images) used in printing presses for intaglio printing. The company is part of Heliograph Holding and generates an annual revenue of about 15 million euros.

Rotogravure is used mainly for printing jobs in which visuals and/or security play an important role. This is true for example in the case of flexible packaging, such as in the cigarette industry, or in the case of printing banknotes and securities. The technique is also used in high-volume catalog printing. The export rate is very high: **Daetwyler Graphics'** most important market is Asia.

Companies that operate the systems made by **Daetwyler Graphics** make the most precise printing cylinders in the world. Such systems must ensure that end customers will be able to treat and process their cylinders with a precision in the micrometer range. The tolerance range is 10 µm cylindrically and 5-10 micron (µm) for the diameter, depending on the cylinder size. In order to achieve this, the guides of the machine are straightened with a precision of about 3 µm. If the cylinder does not rotate with the highest precision in the printing press, colors will deviate or be missing altogether. In other words, the bar is very high when it comes to quality, and this also counts for components such as drives and controllers.

Daetwyler Graphics and KEBA

Hansjörg Michel, Head of Technology at **Daetwyler Graphics**, explains: "Heliograph Holding has been using controllers made by LTI Motion GmbH (note: part of KEBA since 2019) for years. At an SPS trade fair, our developer team discovered the KEBA controllers and was fascinated by their compact design."

The business relationship became even closer in 2017 when **Daetwyler Graphics'** main supplier of motion controllers discontinued a product and could not readily provide a substitute that satisfied **Daetwyler Graphics'** requirements. Michel: "The proposed solution would have meant going back to the drawing board: starting development over from scratch. For this reason, we called for bids from our existing suppliers and asked them to develop a concept and submit an offer." In total, six automation specialists were contacted and participated in the bidding process. Michel:



© KEBA

"KEBA won the bid – not because theirs was the lowest price, incidentally they came in second on that count, but because the overall package was right and they provided other persuasive benefits."

Automation does not happen in isolation Flexibility & openness in a compact design

KEBA's Kemro X hardware and software platform comes with open interfaces as standard. This makes these solutions open to other applications, both proprietary and third-party. Customers can thus make their own decisions about which technologies to use where, which technologies they wish to protect and in what areas they are willing to accept dependencies.



At an SPS trade fair, the development team discovered KEBA controllers and was fascinated by the compact design.

Hansjörg Michel,
Head of Technology at
Daetwyler Graphics

This approach ensures sustainable automation solutions while at the same time safeguarding the company's flexibility.

Michel: "Other automation providers offer single-source solutions, but they act like isolationists at the product level: They make it impossible to integrate third-party or proprietary applications, which is a massive drawback."

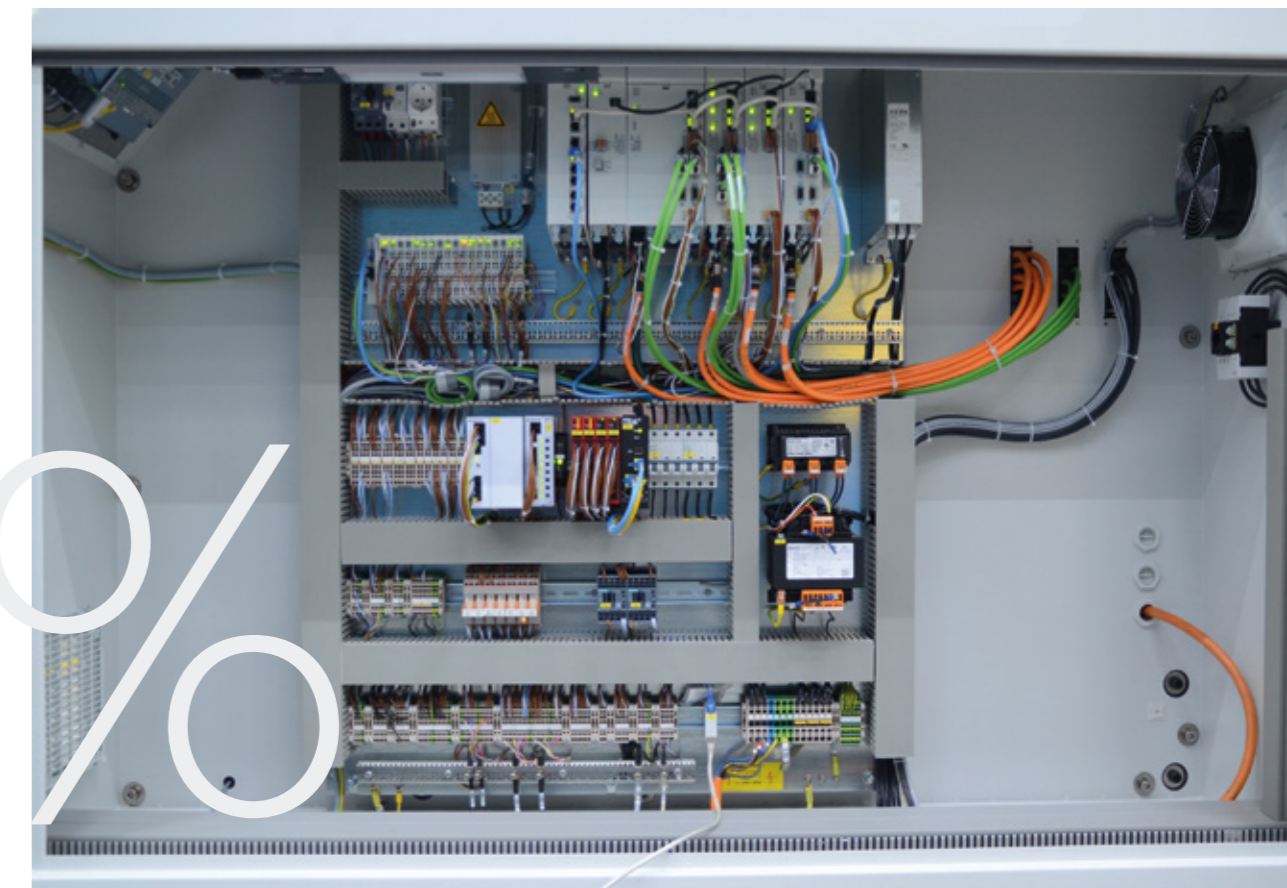
Another boon when comparing the bids was the principle of built-in safety in the KEBA – in other words, the required SLS safe stop protocols etc. are already included in the basic control system and all controllers come with the necessary safe inputs.

Because KEBA puts as much intelligence as possible into each component, they can save a lot of space in construction

This compact design was a crucial benefit. Michel: Support for Codesys, for example, was very important. My condition, however, was that Codesys needed to be integrated into the control system rather than use a separate PC. If we keep rigorously to this compact design approach, about 30 % of space can be saved in the control cabinet." Shrinking the control cabinet to this much more compact size allows **Daetwyler Graphics** greater freedom in the design of new systems – a critical factor in particular for smaller system types. Size is not the only benefit – the uniform design of the KEBA components also helps machine manufacturers.

-30%

Michel: "Regardless of which KEBA controller we install, whether servo controllers or frequency controllers, they all have the same dimensions and the same shape. This is a massive help in our design process. Daetwyler Graphics is already planning their new product series on this basis."



Saving costs and working time by reducing the size of the control cabinet © KEBA

open honest

Unique:
Team and culture

“What we particularly enjoy about working with KEBA is the easy communication,” says Mr. Michel. “Our point of contact in Switzerland takes care of all our concerns and gets back quickly to us with feedback. This works great and goes very smoothly because he in turn has direct points of contact within the company and a very short communication chain.”

What else does **Daetwyler Graphics** like about their partner KEBA? The fact that KEBA has great vertical integration and extremely knowledgeable staff. Michel: “During the consultation talks in the preparation phase, we can really feel that KEBA is itself a manufacturing company and produces for example circuit boards.” The experts work where the products are built. And this massive benefit is also tangible later when working with the support team.

“KEBA’s employees are closely involved with the product. This enables them to provide quick, professional consultation. They don’t forward your call to an endless string of people. Instead, as a customer you get to talk to an expert at eye level.”

How would he describe the cooperation with KEBA in just a few words? “Open, honest, cooperative and customer-friendly,” is the lightning-quick answer. Mr. Michels emphasizes that this is true for the KEBA office in Switzerland as much as for the teams in Germany and Austria.



KEBA servo motor with great dynamic and power in a very compact design © KEBA

Comau

Integrated robotics made easy



The HMI teach panel solution developed for Comau © Comau

Robot manufacturer **Comau** and KEBA succeeded in solving several customer problem areas at once with a joint development in the field of integrated robotics.

Comau, located in Turin, Italy, has been developing high-performance industrial robots to integrate and enhance innovative applications in any industrial sector since 1973. **Comau** robot families range from traditional robotic arms to collaborative and wearable robotic solutions, with various payload capacities, leveraging IoT and AI based technology.

Comau and KEBA have had an intense business relationship since years. The cooperation between both companies started as KEBA developed a fully customized HMI teach panel solution for **Comau** that met market requirements and excelled with robustness and ergonomics, characteristics which are typical of **Comau** products.

” There were many requests to equip Comau robot arms with the KEBA system to operate.

Giulio Scifo, Partner & Sales Development Manager at Comau, Italien



© Comau

In 2017 the cooperation was taken one level higher as both parties decided to co-develop and co-market a solution for integrated robotics. The goal of this development project was to be able to control Comau’s wide range of robot kinematics with KEBA’s robot solution, KeMotion.

Giulio Scifo, Comau Partner & Sales Development Manager: “There had been many requests to run Comau robot arms with the KEBA system. Above all, customers who already knew KEBA were looking forward to this combined approach, which is unique in its kind and covers an interesting gap in the market.” As a platform, KeMotion combines robotics core, SPS Motion, control drives, safety technology and HMI. Comau customers should also be able to benefit from this.

The goal was to select the respective robot model at the click of a mouse, and within a few hours it would be ready for use thanks to KeMotion’s tools. This is because KEBA not only has IEC robot libraries, but also a ready-to-connect solution: via configuration and parameterization, the kinematics can be integrated into machine logics with just a few clicks.

In order to reach this goal, technical developments were required. Scifo: “Our products had been compatible before, but further adaptations were needed like sharing sensitive data of the Comau robot in order for KeMotion to be fully autonomous in the Comau system. So we started step by step and made incremental changes using two models of 4-axis robots – which was a bit easier than starting with 6-axis robots.” In focus of Comau and KEBA were two main product ranges: palletizing robots and SCARA Rebel-S6 robots. Scifo: “KEBA had been really strong in the packaging industry – that was a true benefit for the development and gave us a head start.” Initial target markets for these robot types were Switzerland, Spain and Italy.

Comau e.DO experience © Comau



Comau and KEBA tackling customers' pain points.



Comau Smart Factory © Comau

Not only did both companies co-develop a much sought-after solution, they were also able to address and solve customers' pain points. One of them being space occupied by hardware in production lines. Scifo: "Very often there are three, four or even five robots in a line, which means you need a control cabinet for each robot."

When using the KEBA system, however, only one control cabinet is needed for the entire line (PLC + robotics). With the „Multi-Rob“ feature, up to 16 robots can be operated on one controller, even if they are different types of kinematics.

A second pain point customers have to deal with is skilled employees. "In order to commission and operate a line, you normally need workers with different skills: one employee is handling the PLC and the system and the second one is able to program the robot in the Comau language", says Scifo.

”
The KEBA team has an enormous technical expertise, a broad knowledge in the field of robotics.

Giulio Scifo, Partner & Sales Development Manager at Comau, Italy

The cooperation between Comau and KEBA captured in a single word: easy

With the Comau / KEBA solution, one person, who has knowledge of KEBA products and protocols can handle all jobs. Having only one programming language also means time is saved: On average customers will save about a week of training and one day for fine tuning the line before commissioning.

A third benefit of this combined solution lies in the synchronization between line and robot. The entire line now has only one central "brain", which means one single intelligence to control all machines and axes, including all features like diagnostics.

In the eyes of Scifo, the cooperation so far has really gone very smoothly. "Of course it takes time when two teams join forces and co-develop a new product, they need to get to know each other – also on the technical level. After that was settled, though, we took up speed very swiftly. Especially in the area of sales and marketing we had great synergies and used offered chances as well as we could – this with a superb support from the KEBA team in Italy." Also here, "easy" seems to be the word that describes the cooperation and the product that results out of it best.

Not only is the solution "easy-to-integrate" for integrators and machine builders. The solution is also easy to use, easy to install, easy to maintain, and offers an easy-to-use HMI.

Such a project can be described as "easy" only if the level of expertise is very high – on both sides. "The KEBA team has an enormous technical expertise, a vast knowledge of robotics – in the project we were always on the same page, that is what makes it easy. People at KEBA are passionate about industrial automation, they get as close as possible to their customers", Scifo emphasizes.

According to him, KEBA does not focus on marketing, but on hardcore technical consultancy and fast reaction times - even in tough times or challenging phases in the project - which also applies to the sales team. Scifo explains: "They are very technical and not too pushy, focusing on customer's pain points. They solve the issue first and then go for closing the deal."

igm Roboter- systeme

Automated XXL welding

Austrian company **igm Robotersysteme AG** develops, manufactures and sells robot solutions that are specially designed for the welding of extremely large and/or heavy components where both the welding robot and the workpiece move. The company is headquartered in Wiener Neudorf in Austria and employs more than 300 people at two locations. **igm's** customers include **Liebherr, Caterpillar, Doppelmayr, JCB, Bombardier, Stadler, Alstom, to name just a few.**

Markets and trends

A third of the revenue comes from the earth-moving equipment sector and another third from railroad car manufacturing; the remainder is earned in the manufacturing of truck bodies and trailers, boiler production and agricultural machinery. "Business is booming," says Otto Auer, Control Engineering Manager at **igm,** " but conditions are more difficult than before. We can hardly find any



© KEBA

www.igm-group.com

programmers or automation specialists with welding knowledge and experience – this generation has almost died out."

The trends that **igm** sees among their end customers include an ever broader product variety; a high degree of customization; ever shorter throughput times; and the fact that there are barely any standards left. There have never been so many specific customer requirements. "Batch size one" has arrived even in this industry.

Says Mr. Auer: "Our customers are very focused on topics such as full automation, sensor systems for welding seam identification and tracking, and simulation. Luckily, there exists no process in this area at this point in time that would replace the welding technology, such as 3D printing or bonding." In addition to the ubiquitous delivery problems for raw materials, green energy is gaining importance (carbon footprint).



safety

”
The bottleneck was the safety engineering ...
... and the decision was made in favor of KEBA.
Otto Auer, Control engineering manager at igm, Austria



© KEBA

A quarter century of collaboration

igm and KEBA have been collaborating for about 25 years. Their collaboration started with designing a housing for a hand-held operation device and some associated sub-developments.

The collaboration intensified when igm was looking for a supplier capable of providing control systems as well as drive servos for robot controllers including the required safety technology. The market demanded safe axes, safe TCPs (tool center points), and safe speeds – which were also defined in standards.

Says Mr. Auer: “Safety technology was the bottleneck. igm was faced with the decision to either develop the safety concept in house, or outsource it to an external provider. But the market did not offer any off-the-shelf design that met igm’s requirements.” igm screened several companies to find a provider who would develop their safety concept, and decided in favor of KEBA. “What was crucial was our existing partnership in which we felt more comfortable in particular regarding the sensitive topic of safety.

“KEBA is an important partner for us, not least because the company has such a broad base: robotics, controllers, drives, powerful robotics safety, and everything on an open platform.”

KEBA’s solution

There are three features in KEBA’s solution that are particularly important to igm: Firstly, KEBA uses EtherCAT as their bus system (other manufacturers were favoring other bus systems at the time).

Secondly, KEBA provides a sophisticated solution for transmitting the encoder data from the robot servo motors to the drive controllers in the control cabinet. A decentralized encoder box collects the signals at the robots and then transmits them via EtherCAT field bus. This saves a lot of wiring and

makes the solution more robust as well as simpler during the entire life cycle. KEBA’s concept is the only product solution of its type on the market.

Third is the fact that a built-in PLC has become a part of the robot controller. Before that, igm provided their own PLC system (called “soft PLC”). However, the company wanted to focus on its core competency of welding engineering and outsourced the programming of the PLC.

Says Walter Schimpelsberger, Key Account Manager at KEBA: “igm benefits greatly from the KEBA platform – it saves them from having to invest in the development of basics such as operating system, diagnostics, safety concept, etc. igm uses the entire range of platform features, permitting them to focus on their core competencies: welding and their own robot path control optimized for welding requirements.”

Partnering with KEBA

Asked to describe the collaboration with KEBA in three words, the answer is unequivocal: supportive, solution-focused, flexible.

Not only does the communication between KEBA and igm work at all levels—from top management to individual software and hardware developers – igm also appreciates KEBA’s great willingness to make changes that igm is looking for.

Says Mr. Auer: “We are a key account customer, not just one among many. An example that I like to point out is the programming of Safety and PLC as a running process. We were able to say what we need, what is important to us, and we weren’t immediately confronted with a standard that can only do this or only do that.

Cooperation with KEBA in three words: supportive, solution-focused, flexible

With regard to path planning, too, we feel that we are really being taken seriously, and we can see that a lot of developments have been triggered at KEBA.”

And igm still has big plans for KEBA. “Not only will we take the safety approach to the next level, we also plan to integrate parts of KeMotion, in particular a large portion of the path planning feature, and use it to offer safe speed monitoring for all axes,” says Auer.



1
2
3

EtherCAT

encoder
box

SPS

Rotary indexing machines

The next level in machine operation

Pfiffner develops, manufactures and sells rotary indexing machines. This article describes the challenges the machine manufacturer is facing in the markets, how the cooperation with KEBA came about, and which KEBA solution approaches have become a unique selling point.

Pfiffner and Witzig & Frank (the Pfiffner Group) with headquarters in Utzenstorf, Switzerland, are part of FFG E&A, which is part of the globally active Fair Friend Group. It combines 15 established German, Italian, Swiss and American manufacturers of metalworking lathes, milling machines, rotary indexing machines, etc. FFG products are used by companies in the automotive sector, aviation and aerospace engineering, machine manufacturing, metalworking, the energy sector and many other industries. With a workforce of 250 employees, the **Pfiffner Group** makes about 70 million Swiss Francs of revenue annually.

The next level in machine operation

The two companies, **Pfiffner** and KEBA, first got to know each other at a trade fair, which is not uncommon in this industry. The location was the EMO trade fair, the year was 2017. Tobias Flaig, electrical engineer at **Pfiffner**: "At the time, we were looking for ideas and concepts for full-touch operating displays, because the industry trend was clearly heading that way. At the EMO, we came to know KEBA and found out that the Austrian automation specialist had already developed some concrete approaches." KEBA engineers demonstrated the KEBA panel and the engineering details underlying the concept. "Our Director of Development was quite impressed, both with the conversation and with KEBA's approach," says Mr. Flaig. "When our supplier at the time discontinued the existing panel product, things happened very quickly at our end."

Pfiffner

Recipe for success: Real time widgets and secure communication via PROFINET

A development project together with the previous supplier would not have been worthwhile, according to Pfiffner. With regard to the state of the art, KEBA was already much more advanced.

Pfiffner embarked on a development project “from scratch” with the UX design as the starting point. An external UX design firm was contracted to develop a completely new user interface in cooperation with KEBA. The project included a close examination of the processes and incorporated feedback provided by Pfiffner employees. The team then used KEBA’s KeView Style visualization software to create a framework

application that also takes care of window management and machine operation.

Says Mr. Flaig: “A common problem with full-touch screen displays is that the touch buttons are passed to the controller via OPC UA, which is not secure. The strength of KEBA’s solution were the so-called real time widgets, which make sure that all buttons of the machine operation device are passed to the PLC controller via PROFINET.” The hardware buttons of old were implemented as identical soft keys.

Says Mr. Flaig: “What was special about this solution was the fact that these soft keys are real-time enabled and can be transmitted to the controller in real time: they are written to the PLC via the PROFINET controller. Simultaneously, OPC UA exists as a second channel. This provides for secure communication with the PLC using soft keys.

” What was special about this solution was the fact that these soft keys are real-time enabled and can be transmitted to the controller in real time.

Tobias Flaig, Elektroingenieur at Pfiffner, Switzerland

Adding yet another twist: KeWheel

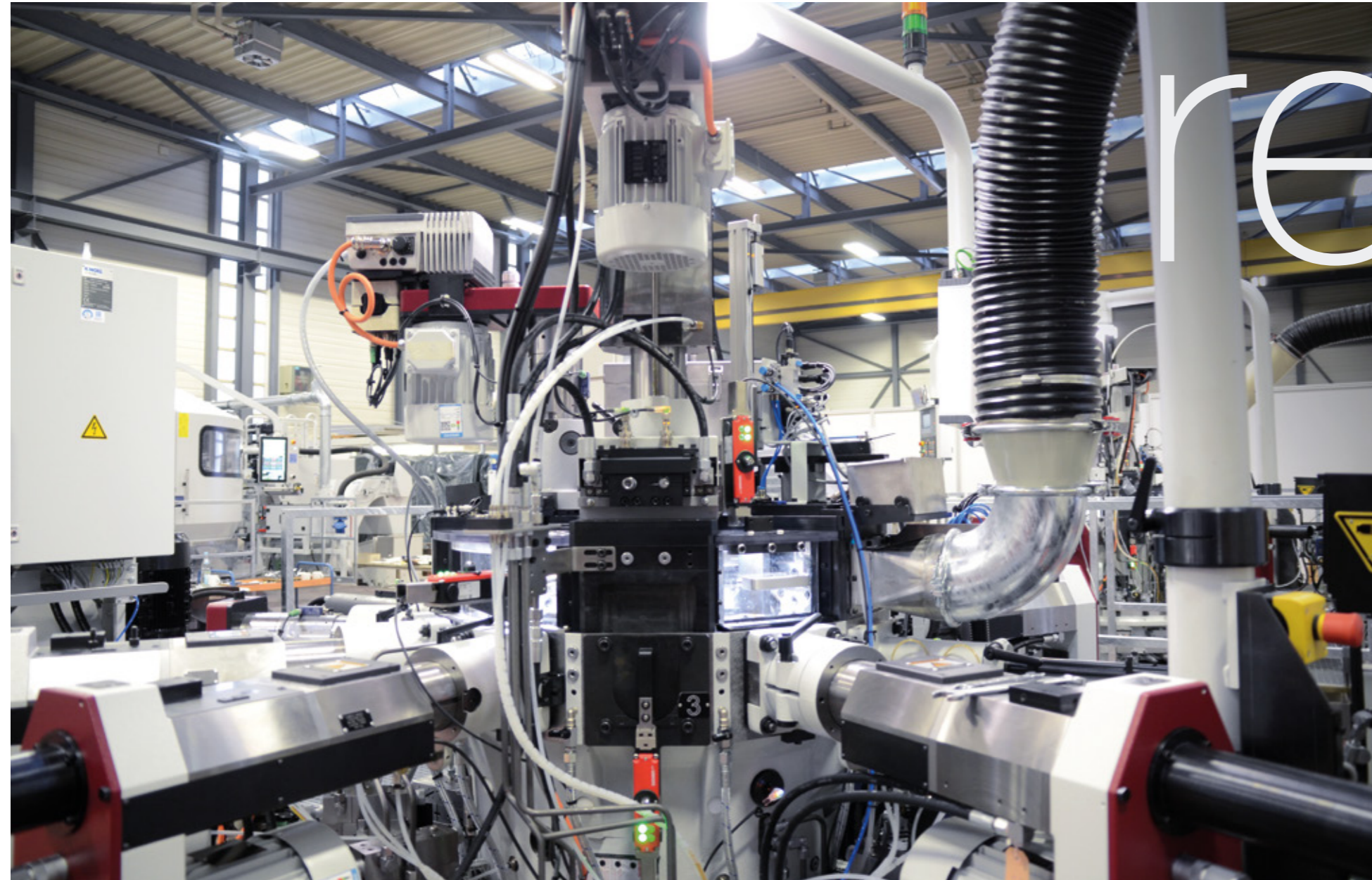
Another crucial factor for the decision to partner with KEBA for the development of the next-generation HMI was the KeWheel. The KeWheel is a fully adaptive rotary push button. Using the KeWheel as the main operating element, items such as overrides, hand wheels, mode-selection switches, axis travel buttons, and user interface inputs can be combined in a single device. The KeWheel provides the operator with additional information about the condition of the machine through a broad range of haptic feedback. Says Mr. Flaig: “We were seriously intrigued by the KeWheel and its options right from



the start. Until then, we had two overrides, one for feed and one for spindle, and we combined these two in the KeWheel. We plan to add more operator functions to the KeWheel, for example using it as a handwheel – there is still more potential we can utilize.

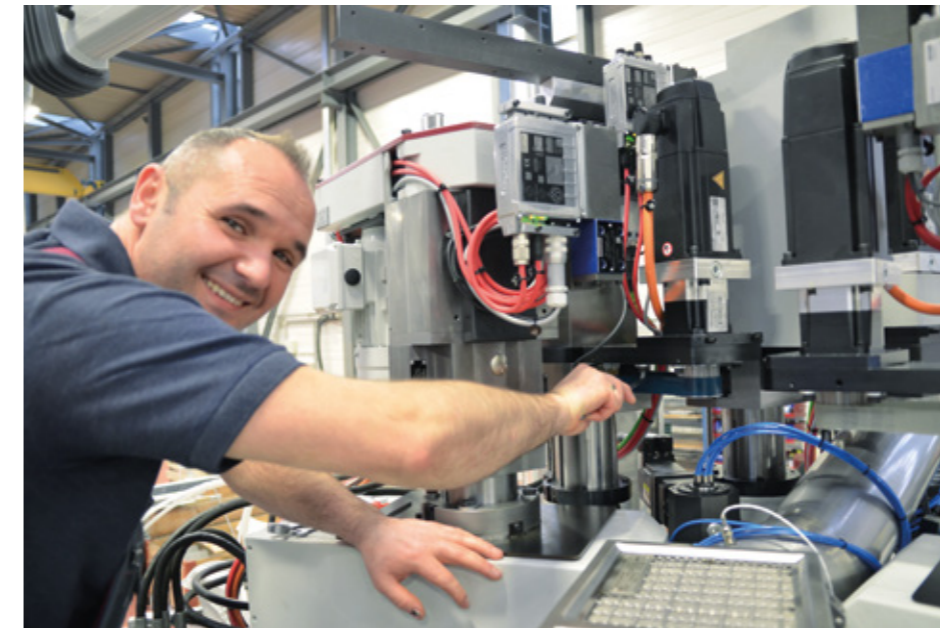
KeWheel





relationship

Communication at eye level

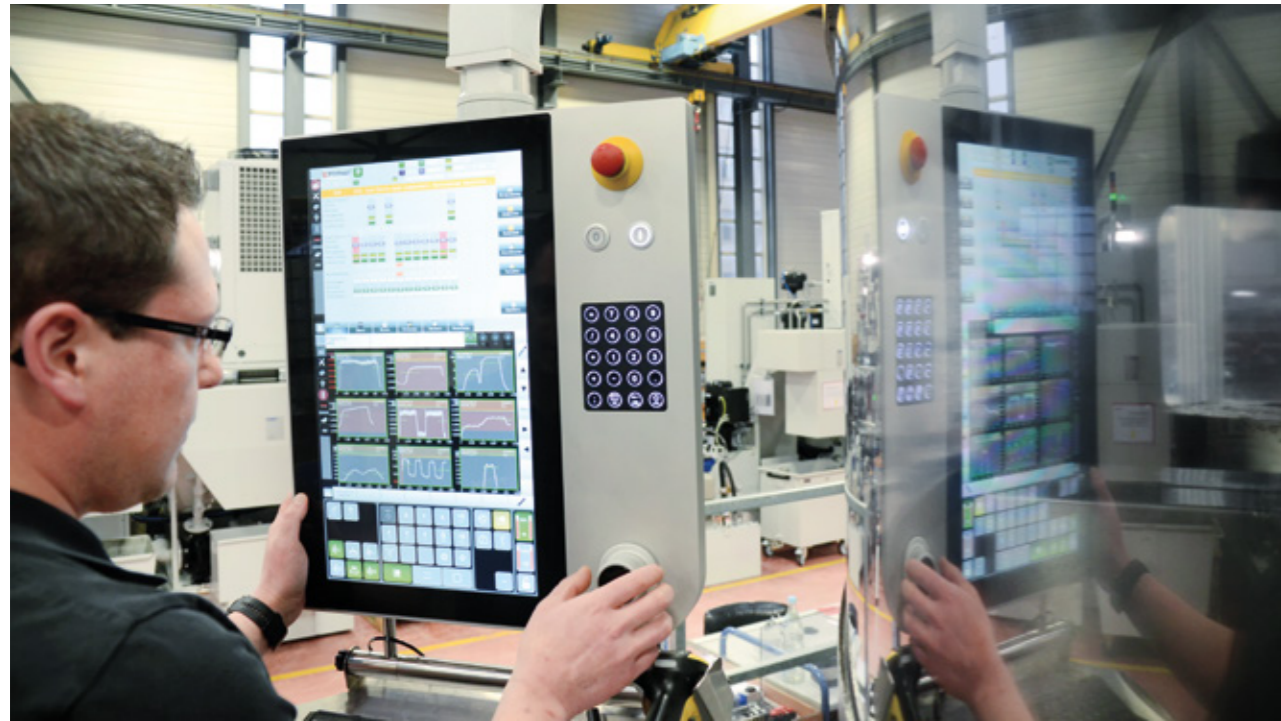


In order for such a comprehensive project to succeed, the relationship must be solid. "We noticed relatively quickly that everybody at KEBA is extremely competent and knowledgeable. We received answers to every question we asked, no matter how detailed. We started having this feeling right at the first conversation, and after that it only grew stronger. When we visited KEBA, we were able to see and feel KEBA's mentality and work ethic, and afterwards, everybody was even more motivated!", says Mr. Flaig.

Of course, there were also some obstacles in the project. The biggest issue was the fact that Bosch Rexroth Operations had to be integrated – previously, Bosch Rexroth was the software master, but this time it was the other way round: the KEBA framework integrated the Bosch Rexroth system. "A project of this scope does have its quirks, of course, but we handled them or will handle them precisely because the communication is so excellent," says Mr. Flaig.

© KEBA

Rotary indexing machines in the manufacturing sector



© KEBA

“Our rule of thumb is: With a processing time of 15 seconds, one machine can produce approximately 1.2 million parts per year”

Michael Ensel, Technology Sales Manager at Pfiffner, Switzerland

p

recision

Rotary indexing machines are machine tools in which the workpiece is clamped into a horizontal or vertical rotary indexing table. They are particularly suited to the mass production of quantities of 250,000 or more. Michael Ensel, Technology Sales Manager at Pfiffner: “Our rule of thumb is: With a processing time of 15 seconds, one machine can produce approximately 1.2 million parts per year.”

Pfiffner customers manufacture a variety of components ranging from electronics to housings for drive components, and they supply their goods to different industries: lock & key engineering, e-mobility, gas & welding engineering, electronics and communication etc. Machines made by Pfiffner can be used to produce components about the size of a fist (cube with an edge length of 100 mm). For larger components, machines made by Witzig & Frank – another company in the group – can be used. Says Mr. Flaig: “We are receiving more and

more requests for electronic components that are generally becoming ever more complex; it is no longer possible to just punch them. Our largest customer at the moment is a manufacturer of plugs for the high-frequency range“.

The benefits of rotary indexing machines are firstly that less space is needed, because one system can replace multiple conventional systems; and secondly significant cost savings, because one system also means that energy (only one cooling system), consumables, spare parts and service are only needed for one system. In addition, there is only one point of contact on the supplier side and only one process to be monitored and approved by the end customer, which is especially important in the automotive industry where every production system must be approved by the end customer. Typically, one machine operator can operate two, three, up to five rotary indexing machines.

Says Mr. Ensel: “There is no specific number of conventional machines that can be replaced by a rotary indexing machine. For a customer in Kazakhstan, for example, we set up two machines that allowed them to retire 38 individual conventional machines.”

The most important pain points for Pfiffner’s end customers are unit costs and precision. Says Mr. Ensel: “The workpiece tolerances are typically in the micrometer range. Our machines have 12 or 16 clamping stations and up to 24 processing units. This makes it extremely important that each station is aligned as precisely as possible.”

The materials to be processed are not an obstacle for rotary indexing machines – they can handle even difficult-to-machine materials. “I have been

with Pfiffner since 2014, and during this time we have never had to refuse a request because we considered the material impossible to machine,” says Mr. Ensel.

The Pfiffner engineers, too, must listen closely to their customers needs and develop solutions that address those. Right now, Pfiffner is putting the finishing touches on a software that allows customers to reconfigure their own machines. Previously, Pfiffner took care of reconfiguring NC control systems, drives, etc. via teleservice. Now, operators can do it themselves as part of the retooling process – and frequently used programs and settings can be saved as favorites.

KEBA Industrial Automation Germany GmbH

Gewerbestraße 5-9, 35633 Lahnau/Germany, Telefon +49 6441 966-0, info@keba.de

KEBA Industrial Automation GmbH

Reindlstraße 51, 4040 Linz/Austria, Telefon +43 732 7090-0, keba@keba.com

KEBA Group weltweit

China / Deutschland / Großbritannien / Indien / Italien / Japan / Niederlande / Österreich / Rumänien
Schweiz / Serbien / Südkorea / Taiwan / Tschechische Republik / Türkei / USA

www.keba.com



KEBA[®]
Automation by innovation.