

b

on
top

THE MAGAZINE OF
OTTO BIHLER
MASCHINENFABRIK
GMBH & CO. KG
2015



FOR PERFECT VALUE ADDED



◀ About the title photo

Perfect value added comes from the interaction between all the individual process steps that make up the overall lifecycle of a product. The final result is maximized value added – as in the case of this 52-carat diamond whose unique shape was perfected through many different operating steps.

b. on top
The magazine of
Otto Bihler Maschinenfabrik
GmbH & Co. KG

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Dear readers,

Digitization and the fourth industrial revolution are moving forward fast. The increasing networking of people, machines and production is opening up new potential that we are already benefiting from today and will continue to profit from in the future - whether it be in planning, production, storage or logistics - as intelligent systems offer us the economic advantages that we need to guarantee our success in the competitive global environment. Because internationalization is also moving ahead - with new suppliers, more exacting quality standards and ever more complex customer requirements.



High-performance production plant that generates maximized value added along the entire process chain is an essential element in our response to these changes. And that is precisely the reason why we have developed our NC technology. With shorter setup times, higher throughput and optimum product quality, this technology makes it possible to complete new projects successfully and modernize existing plant to operate competitively in today's markets.

However, high-performance, forward-looking technology such as our NC systems is only one part of the solution to the tasks of tomorrow. Because the challenges of Industry 4.0 and globalization demand not only

a wealth of experience but also the courage and transparency needed to come to terms with new markets and cultures, make investments and be ready for change, whatever form it takes.

Otto Bihler Maschinenfabrik supports every one of its customers on their journey into the future and makes its entire range of resources available to them: not only when they are buying a Bihler product but also whenever help is needed during the pre-project and post-project phases. This help is provided within the framework of a genuine partnership based on the very special reliability and confidence that our company has represented for many decades. In this way, we can offer our customers the skills and expertise that will allow them to move forwards and embrace the challenges of Industry 4.0.

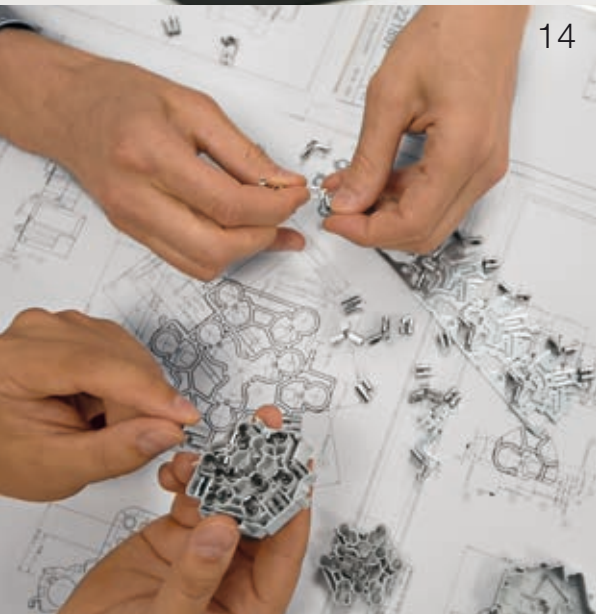
In this edition of *b on top*, you can discover for yourself the many different ways our customers have worked with us to prepare the path for a successful future and be inspired by the wide-ranging support that our company has been able to provide them.

I look forward to completing many more fascinating projects with you and hope you find the current edition stimulating and inspiring!

Mathias Bihler



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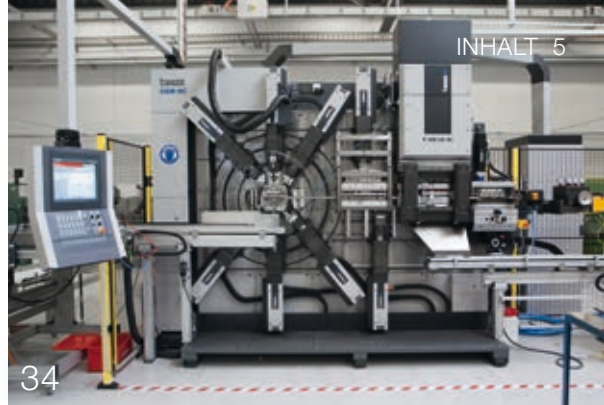
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NEW ALCRONA PRO HARD MATERIAL COATING

OPTIMIZED COATING
PROPERTIES

In the middle of the year in the Halblech plant, the Balzers PVD coating system was converted to use Bihler's new Alcrona Pro hard material coating. Using this coating, users are now able to get even more out of their Bihler machines. They now benefit from the optimized

coating properties of the leading all-round solution for the stamping and forming industries, improved productivity thanks to the significantly longer service lives of the active tool components, and enhanced process reliability through optimized friction properties.

for an exceptionally wide range of applications and materials, these coatings also improve the stamping and forming properties of the tools, ensuring that the manufactured parts possess even better surface characteristics. Our service package also includes very short delivery times and the comprehensive transfer of the necessary know-how. We can also perform coating tasks for you even if you use non-Bihler equipment. Just contact us. ■

**Longer service lives,
higher productivity**

Alongside Bihler's Alcrona Pro, five other hard material coating systems can be used on the Balzers coating system. Perfectly designed

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BNC SERVO PRODUCTION SYSTEMS

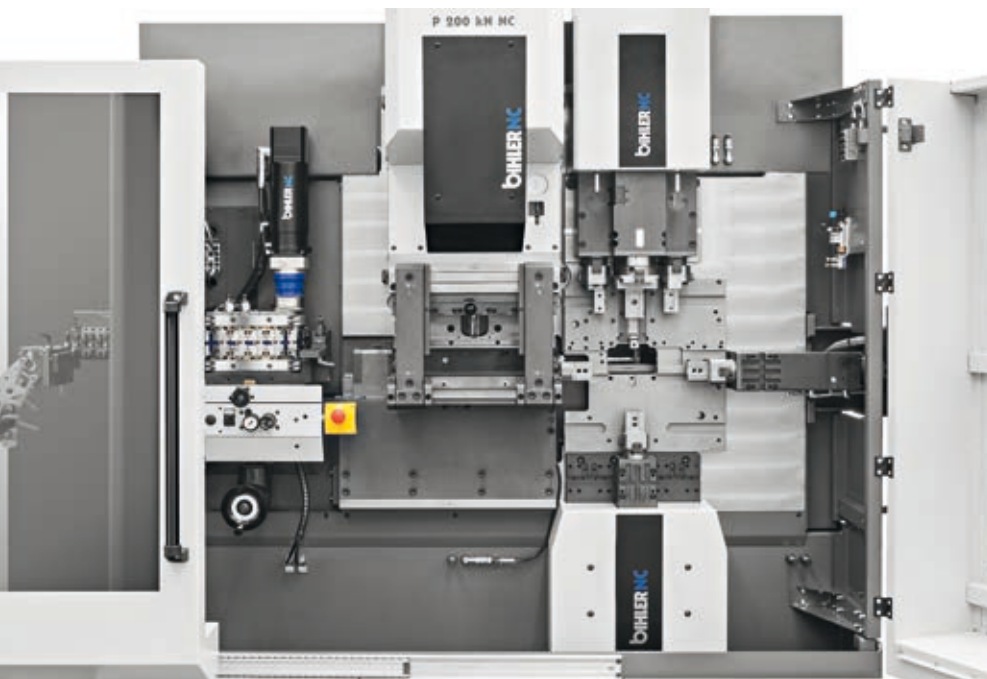
MORE TIME FOR PRODUCTION

With Bihler's new BNC servo production systems, users can now produce simple stamped and formed parts made from wire and strip material far more economically than in the past. The servo machines and all the associated units are fully compatible with the MRP standard. All the tools used on MRP machines of type UB2/B, UB3/B and UB4/B

can be adapted and optimized for the BNC series machines quickly and easily. This brings many advantages. Because machines manufactured by Meyer, Roth & Pastor are characterized by their advancing age, very time-consuming adjustment operations during machine setup and retooling activities, and the difficulty of obtaining spare parts.

**Fully compatible with the
MRP standard**

By migrating their existing MRP tools to the BNC machines, users now benefit from very short setup times, fast tool changes, 100% reproducible retooling operations and speedy deliveries of spare parts for the machines and controllers. The compact servo units guarantee considerable freedom of movement, especially since the stroke, working position and movement profile can be freely programmed across the entire working area. This ensures that the material is machined at the optimum speed at each station. This increases process reliability and the service life of the tools. What is more, the travel profiles for the individual movements during tool changes can be converted quickly and easily at program level. ■



Opening Ceremony BIHLER Machinery Kunshan



BIHLER MACHINERY KUNSHAN

NEW BRANCH IN CHINA

On 15th and 16th September 2015, Bihler opened its new branch in China with a very well attended technology forum organized in cooperation with the Chinese research institute SEARI. With the Bihler Machinery Co., Ltd in Kunshan, Bihler has strengthened its presence in the Chinese market which dates back to 1983.

Fast, expert support

“The focus of our activities lies in providing fast, expert support for local customers as well as in assuring direct communication with Chinese businesses,” says Theo Angerer, Bihler Sales Manager for Asia. Frank He, manager of the high-performance team in China, is responsible for technical sales and gives potential customers their first insight into Bihler technology. Markus Hipp is responsible for all service operations including installation, maintenance and spare parts. Joyce Zhang takes care of quotations, methods of payment as well as spare parts imports. ■

EXPANDING CAPACITY

STRENGTHENED SALES TEAM

With Andreas Notis and Stefan Krieg, Bihler has strengthened its sales team at its headquarters in Halblech. Andreas Notis is the Sales Manager responsible for Germany, Austria, Switzerland and the Principality of Liechtenstein. Stefan Krieg is Sales Manager for the whole of Europe (with the exception of the French-speaking countries and Russia (CIS)) as well as for Africa and Central and Southern America. Thanks to their many years of sales experience, the two new Sales Managers and the Technical Sales Service team are the expert point of contact for all questions or requirements concerning Bihler technology. ■



In Kunshan, Bihler has opened a branch specially intended for the Chinese market. The focus is placed on direct communication with local companies and customers.



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ACHIEVE MORE?





ENJOY THE BENEFITS OF SYSTEM SOLUTIONS!



One-dimensional functionality is out. Today's and tomorrow's markets are increasingly demanding multifunctional overall concepts that make it possible to achieve more. Otto Bihler Maschinenfabrik shows how such concepts can be used to perform end-to-end manufacturing tasks from the initial idea through to final implementation: It offers forward-looking system solutions that allow customers to generate maximum value added along the entire value added chain – and guarantee them a decisive competitive advantage throughout the entire product lifecycle.

With annual growth rates of more than two percent every year since 1995, the mechanical and plant engineering sector is a symbol of Germany's industrial strength. In the wake of the economic and financial crisis of 2009, production recovered quickly and strongly. 2015 also started positively. However, competition is expected to become even more intense as suppliers vie with one another ever more vigorously. This increased competition is putting ever more pressure on margins and existing success models. As an established seal of quality, "Made in Germany" still allows the German mechanical and plant engineering industry to set higher prices than its competitors. Despite this, its advantage is declining as international competitors continue to improve their quality at lower costs.

Solutions business on the rise

At the same time, the fact that customers are increasingly demanding individual system solutions is placing new demands both on the composition of the product portfolio and on internal processes. What is more, domestic and overseas customers increasingly expect a comprehensive after-sales and service offer. Despite this, according to a recent study published by McKinsey, suppliers of standalone machines are still on average one percent more profitable than vendors of end-to-end solutions because they profit from a higher level of standardization, efficiency benefits and a stronger focus on their core skills. By contrast, suppliers of full-range solutions are growing on

average three percent faster than standalone manufacturers due to the high level of demand for customer-specific system solutions. It is to be expected that the demand for customer-specific end-to-end solutions will continue to grow in all sectors.

Hybrid value added chain

The provision of customer-specific system solutions is based on the close intermeshing of industry and services. The corresponding user-oriented bundling of the two sectors is known as "hybrid value added" and covers the entire value added chain. The term refers to the collaborative combination of individual parts to create a complete product. The lifecycle-oriented value added chain is of particular importance for hybrid business models. This takes account of activities throughout the entire lifecycle of a product. It includes upstream activities such as engineering and development services as well as consulting during implementation and training activities. The services that take place downstream of manufacturing and production comprise continuous optimization and development, logistics services, as well as repair or spare parts management. These upstream and downstream services extend the value added chains of industrial companies, increase the complexity of their products and therefore constitute a considerable competitive advantage.

Skills and qualifications as the basis for success

Despite the increase in demand, a recent study published by IW Consult shows that hybrid business

models account for only 16 percent of the economy and are therefore not yet widely established. For such an approach to be possible, it is necessary to satisfy a number of fundamental requirements. On the one hand, the supplier must communicate intensively with its customers and be very familiar with their business. On the other, the supplier must possess a wide range of skills and qualifications. In this respect, developing internal expertise is just as important as extending competencies through cooperative ventures and networks.

Industry 4.0: An additional challenge

In addition, it is also necessary to face up to the challenges of Industry 4.0, the fourth industrial revolution. This is set to bring about the full digitization of the factory environment and all industrial processes. The concept promises to permit flexible production, right through to the manufacture of individual parts at levels of efficiency conventionally reserved for mass production. The highlights of the new factory environment will be: intelligent machines and products that have knowledge of their manufacturing processes and utilization, as well as storage systems and operating equipment that are networked at all levels using information and communication technologies that extend along the entire value added chain - from logistics, through production and marketing, and on to service. Even though networking of the type predicted for Industry 4.0 has already started, it will be a long process that will demand cooperation between different

► industries, enterprises and even the political sphere. With its high-level IT expertise and extensive know-how in the fields of embedded systems and automation technology, Germany is ideally placed for the advent of these new technologies. According to a recent market study, these new developments could lead to an additional 200 billion euros of GDP in Germany by 2025.

Bihler is a supplier of system solutions

Otto Bihler Maschinenfabrik was one of the first suppliers to address these new challenges and now, as in the past, is making a decisive contribution to boosting value added and improving its customers' competitiveness. "Bihler is able to deliver a comprehensive solution concept for every manufacturing task because we possess not only the necessary system technology but also the corresponding skills, coupled with many years of experience in implementing production solutions," explains Mathias Bihler. "This ensures that all our customers benefit from maximized value added – irrespective of whether they want to optimize their existing processes or put completely new production ideas into practice." To achieve this, Bihler also deploys its expertise in neighboring areas, starting with the machining of a huge range of input materials through to the follow-up processes that occur downstream of the Bihler system, such as the tempering of the parts.

Support right through to the implementation of the manufacturing solution

Providing support all the way along the value added chain, Otto Bihler Maschinenfabrik first of all helps its customers choose the right input material. This task is performed in parallel with product development, which involves the definition of the component geometries and the creation of sample parts for validation. At the same time, process technologies ideally suited for the job at hand are developed – including all the necessary additional steps, for

example from the areas of welding, feed and thread cutting technology. The manufacturing technology is then preferably implemented using Bihler NC technology, for example on a GRM-NC or RM-NC stamping-bending machine or the BIMERIC production and assembly system. With exceptional throughputs, minimum setup times and full tool compatibility with older systems, these solutions in themselves ensure a dramatic increase in value added that gives our customers a long-term competitive advantage. However, when used together with the VC1 controller and integrated data interface via the View Systems' MES system, they also provide users with innovative functions that permit the optimized networking and transparency that Industry 4.0 aims to achieve.

Knowledge transfer inhouse and at the customer's premises

However, for Bihler, the value added process goes far beyond the shipment of the system. Because even while the manufacturing solution is being developed, knowledge and expertise is being transferred by means of training courses, seminars and inductions at the company headquarters in Halblech. This ensures that all customers and users always benefit from state-of-the-art Bihler technology, know how to use it efficiently and profitably and are able to generate the greatest possible value added during their manufacturing operations. These commitments are reflected in the new Training Center, which Bihler has set up in Halblech to provide its own inhouse Bihler Academy. This is where, in future, a young, well-trained team with outstanding IT skills will ensure knowledge transfer between the company and its customers – from information on the customer's specific Bihler machine via tool-related training courses and on to the communication of specific product and program-related

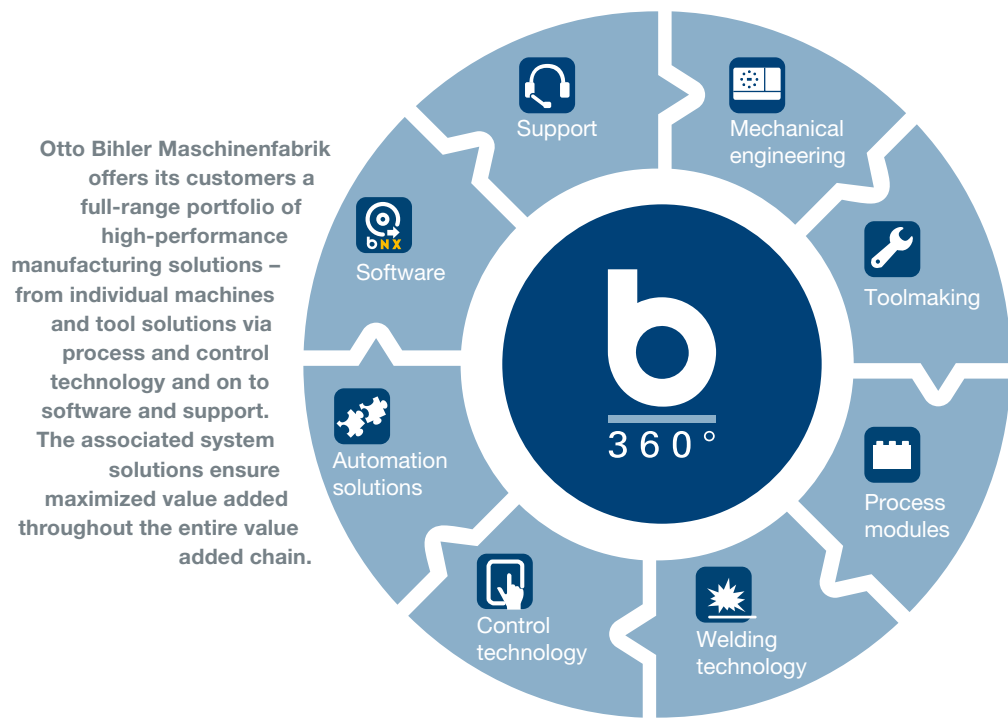
expertise. And the company recently set up its own NC Consulting Group specifically for users of Bihler's NC technology. This passes on expertise relating to the pioneering servo technology and also provides users with additional benefits.

Multimedia support following commissioning

Once the new Bihler system is successfully up and running at the customer's site, Bihler remains in close contact with the user and ensures a continued, long-term increase in value added by means of a wide range of tools and measures. These include, for example, on-site service with maintenance and repair activities, the Bihler telephone hotline, the bASSIST multimedia diagnostic and help system or the integrated remote maintenance solution. This makes sure that manufacturing operations run optimally, that potential problems are detected in good time and that downtimes are minimized. This means: Bihler accompanies its customers along the entire value added chain – from the wire or strip semifinished product to the market-ready article and then on beyond the end of the product lifecycle. Because when a customer phases out a product, other products can be switched over to the Bihler system to undergo optimization. Then the whole value added chain starts again and the investment made in the Bihler system proves itself once more as Bihler accompanies the next product on its lifecycle.

Help during strategic orientation

"Thanks to our technology and our expertise, our customers are able



to maximize their value added and guarantee themselves an excellent long-term competitive position,” summarizes Bernd Haussmann. “At the same time, as an enterprise acting at international level and a global market leader, Bihler knows what is happening on the world’s markets and is able to advise its customers on their future development or realignments – and do so impartially and openly.” And the questions may range from the adoption of the right manufacturing technologies, the choice of tools to meet specific technical challenges, product adaptations or even logistical tasks. Mostly, however, it is the market itself that is in focus, together with its challenges and the business processes of the leading corporations. And here, it is very clear that what is required is more effective production processes that allow companies to react flexibly to fluctuations in demand and individual customer demands and to manufacture even short runs economically. This is accompanied by the demand for more versatile machines, shorter setup times and increased throughputs.

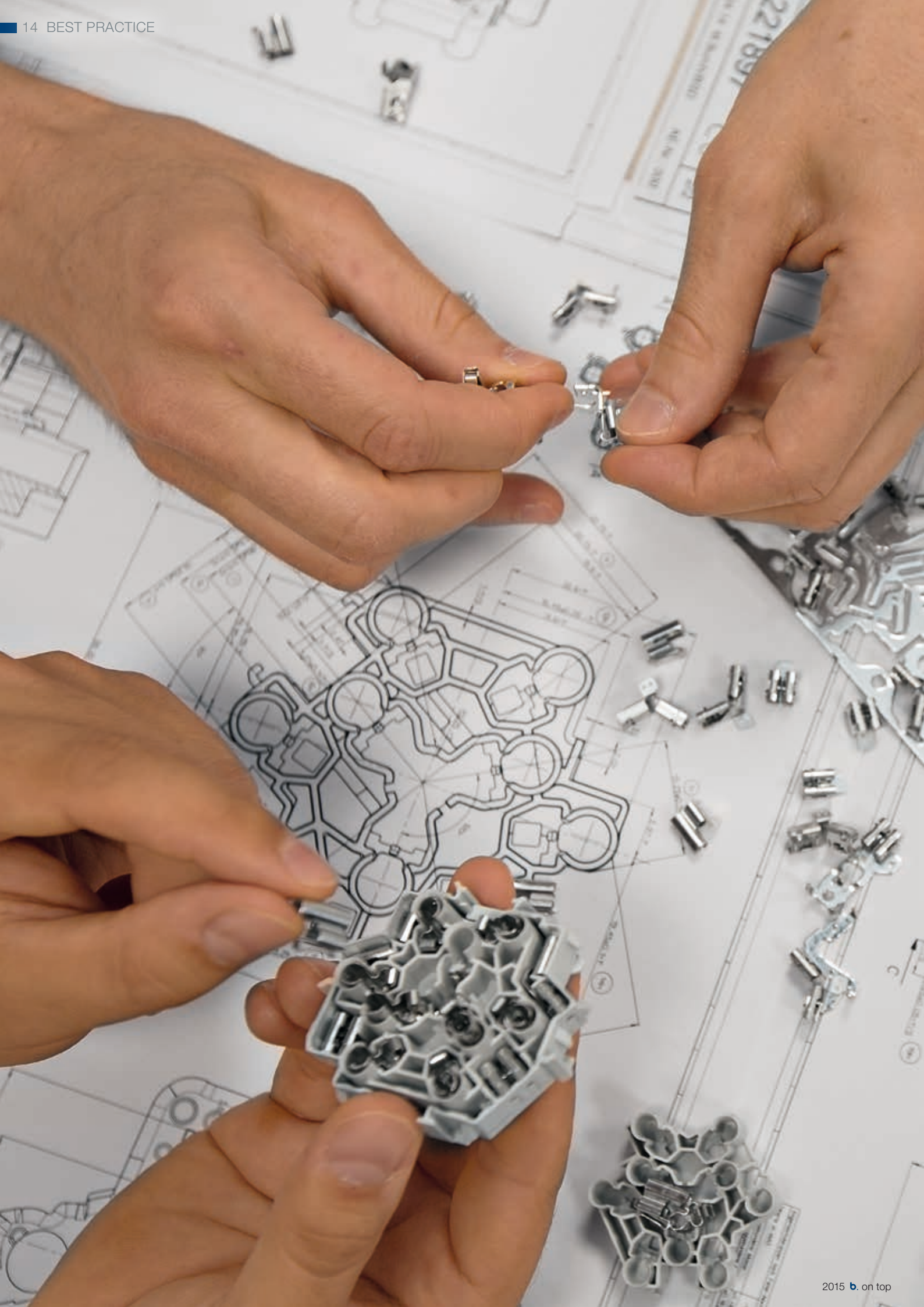
Support during modernization

Bihler’s NC technology is the ideal response to these requirements. The growing number of customers that have successfully changed over from the older, purely mechanical systems to servo

technology provides a convincing endorsement of this claim – in particular since many of them are now able to generate orders that would not previously have been possible. And the best thing is: The experience gained, often over a period of decades, in the handling of the older systems is not lost but is instead stored in the VCI controller and can be called up at any time. “If they are to remain competitive, companies must modernize their machine pools and get ready for the challenges of today and tomorrow using NC technology,” says Bernd Haussmann. “Of course, the changeover from mechanical to servo-controlled systems represents an enormous change, but it is one that can determine the success of the entire company. We support all our customers with advice and concrete actions during this process.” Ultimately, it is like the introduction of the computer, which replaced typewriters. At that time, many people were doubtful about the new technology and its benefits. Now it is an established fact. NC technology is similarly revolutionary – and now constitutes the new standard, in particular in the field of stamping and forming technology.

Ready for Industry 4.0

Last but not least, Bihler’s NC systems, such as the GRM-NC, RM-NC or BIMERIC system also meet all the requirements placed on Industry 4.0. With their networking capabilities, they offer the end-to-end design and transparency required in order to tap previously unused potential. In the future, large corporations will demand this transparency from their suppliers even more than in the past, for example so that they can plan and manufacture more economically and manage their capacities better, in particular when faced with short-term demands. With its manufacturing solutions, Bihler is already laying the technical basis to ensure the success of such approaches. Support via bASSIST, remote maintenance, View Systems and the Bihler hotline are all also increasing productivity and clearing the way toward the implementation of Industry 4.0 for all the company’s customers. And just as importantly, Bihler inspires the trust and openness that are crucial for the type of intense, real partnership that makes it possible to work together to overcome whatever challenges the future holds. ■





COMPLEX PRODUCTION TASKS PERFECTED



Thanks to the new BIMERIC BM 3000, the complex task of creating this fully-assembled socket is now performed on a single system - including all the individual steps such as punching, welding and assembly.

With the manufacture of a new fully-assembled socket, Feller AG demonstrates just how to implement complex new large-scale projects. To make this possible, Otto Bihler Maschinenfabrik supplied a tailor-made production solution in the form of a BIMERIC BM 3000 which runs all the necessary welding, punching and assembly processes on a single system. However, the crucial contribution to the project's success lay in the support the customer received from Bihler – from the initial idea through to go-live.



FELLER AG, HORGEN (SWITZERLAND)

FINDING THE RIGHT SOLUTIONS FOR SUCCESS

Anyone who presses a light switch in Switzerland today can be fairly certain that the underlying technology comes from Feller AG in Horgen on Lake Zurich. Here, the company, which is part of the Schneider Electric Group, has been manufacturing switches, sockets and controllers for lighting and communications applications for over a hundred years. “Unlike

many other businesses, we have not outsourced the manufacture of individual components to low-wage countries,” explains Martin Eberle, Head of the Industry Business Unit at Feller AG. “Instead, we focus intently on automation, efficiency and process optimization, we manufacture successfully here in Switzerland and we are constantly launching innovative

large-scale projects.” The most recent example of this is a triple-outlet socket for the Swiss market which consists of 19 different parts. “With this pioneering project – the largest we have undertaken or will be undertaking for some time – we are exploring new avenues in the production of one of our main sources of revenue. In this way, we are adapting our capacities to





High-precision inline manufacturing on the BIMERIC BM 3000 also ensures the dimensional accuracy required for assembly – with clearance of only 0.25 millimeters.

- ▶ the current level of demand and additionally have the flexibility to manufacture to order.”

Three challenges: welding, punching, placement

The new type T13 socket is more compact and slimmer than existing models, a fact that greatly simplifies the cabling to the power supply and gives the product a decisive competitive advantage on the market. At the technical level, this innovation consists of a triple-outlet socket with three plug connectors whose open leads are distanced just three millimeters apart. This necessitated an extremely complex welding, punching and assembly process that guaranteed the required level of precision. “At the start of the project, we took a fresh look at our entire manufacturing process and identified three key challenges,” explains Fabio Rusca, Head of Industrialization and Operating Equipment Design. “The first was the task of welding the wire connection terminal to the baseplate. So we needed to look for someone with expertise in this area. The second was to use the right tools to manufacture the demanding punched baseplate parts for the socket. And the third point was the high-precision insertion and placement of the components.”

Inline manufacture for outstanding precision

The original idea was to punch the baseplate, weld the wire connection terminals to it and then insert the assembly in the socket housing.

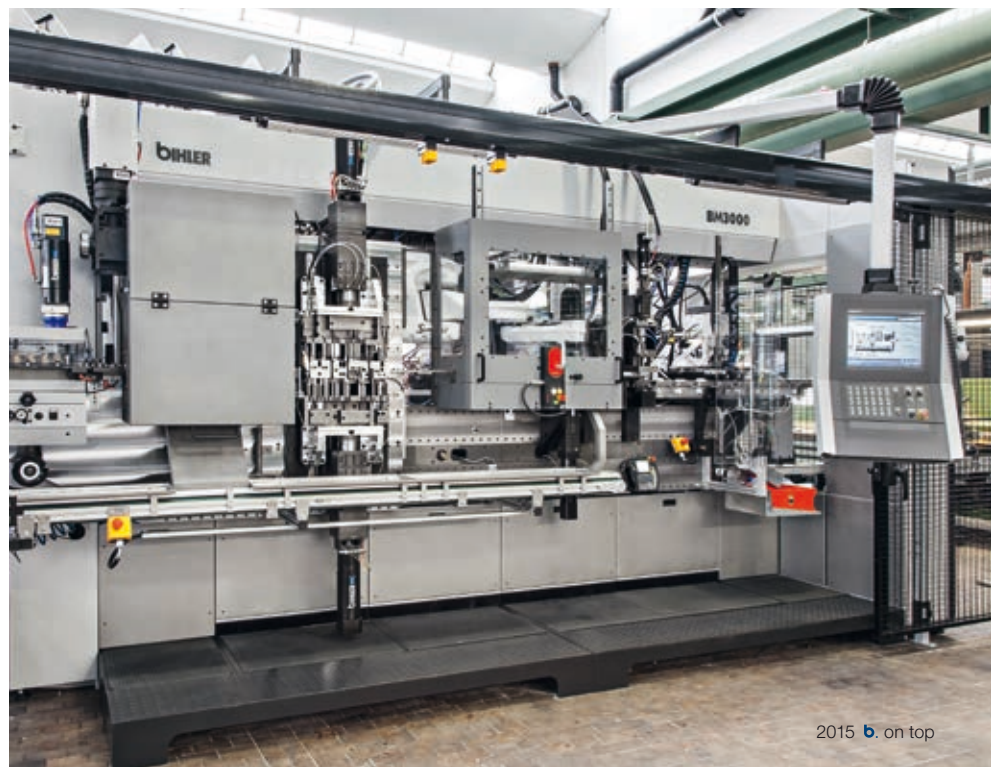
However, it soon became clear that this approach would not achieve the level of precision required in order to insert the assembly in the housing. “Bihler gave us the technical capability to perform the entire process inline in a single production workflow,” continues Rusca. “In this way, the entire component package can be picked up before being separated. This allows us to achieve the required precision with clearance of only 0.25 millimeters and do so without damaging the linkage.”

The product is manufactured on the Bihler BIMERIC BM 3000 servo production and assembly system. First of all, the system manufactures the spring clips and feeds these on to the next stage where the casing and intermediate plate are added. At the same time, the base plates are punched and the spring clips are welded on. The welded assembly is then inserted in

the casing, the intermediate plate is placed in position and the plug contacts, which are produced in parallel, are attached.

Feasibility studies that guarantee success

However straightforward and logical this process might sound, it demanded an enormous amount of preparatory work. Things got underway back in early 2012 when the project was launched internally at Feller AG. After nine months, the company came into contact with Otto Bihler Maschinenfabrik for the first time. “Initially, we were considering four suppliers offering very different solutions,” recalls Rusca. “Although Bihler’s solution was not the cheapest, the fact that it allowed us to integrate the manufacturing processes for individual parts ultimately meant that it was the most economical.”



However, that was not the only criterion: “Equally important was the certainty that we would achieve our aims with Bihler at our side. Because the detailed studies conducted by Bihler prior to project start had already shown us that the solution could be implemented perfectly at the technical level. By contrast, we were a little skeptical about the offers of the other suppliers.”

All-round solution from a single supplier

The proposals made by the competitors regarding the critical processes were also too involved and too cost-intensive. With Bihler, by contrast, we soon had an elegant, clearly defined and logical solution to look at,” says Rusca. “And only Bihler was in a position to supply a solution that met all the challenges on its own – without third-party suppliers, without bought-in components, without additional contact persons, without long communication chains. It was simply the best solution.”

Reliable, clear, honest collaboration

The flawless cooperation between the two companies also played a particularly important role during the development of this solution. “The outstanding, constructive cooperation was crucial for project success – in particular because

Bihler always provided us with a wide range of constructive propositions with clear, precisely defined options for every challenge we faced. And whatever was suggested, we could be certain that it would work and would be delivered on time,” says Luc von Orelli, Industrialization Project Manager at Feller AG. “We valued this level of reliability extremely highly and it was another factor in the constructive and enjoyable collaboration between the two companies,” adds Rusca. “The whole range of the support we received testifies to Bihler’s depth of expertise”. Heller also appreciated the fact that the downstream production stage involving the final assembly and packaging steps was not included in the offer – this testified to Bihler’s honesty and boosted trust in the relationship.

Project completion on schedule and within budget

However, the technology supplied by Otto Bihler Maschinenfabrik, the expertise demonstrated in finding the ideal solution and the outstanding collaboration were not enough. “It was also important that the entire project should be completed both on schedule and within our budget. In cooperation with Bihler, everything functioned perfectly and there were no extra costs relating to the functions and performance capabilities we required,” says Rusca.

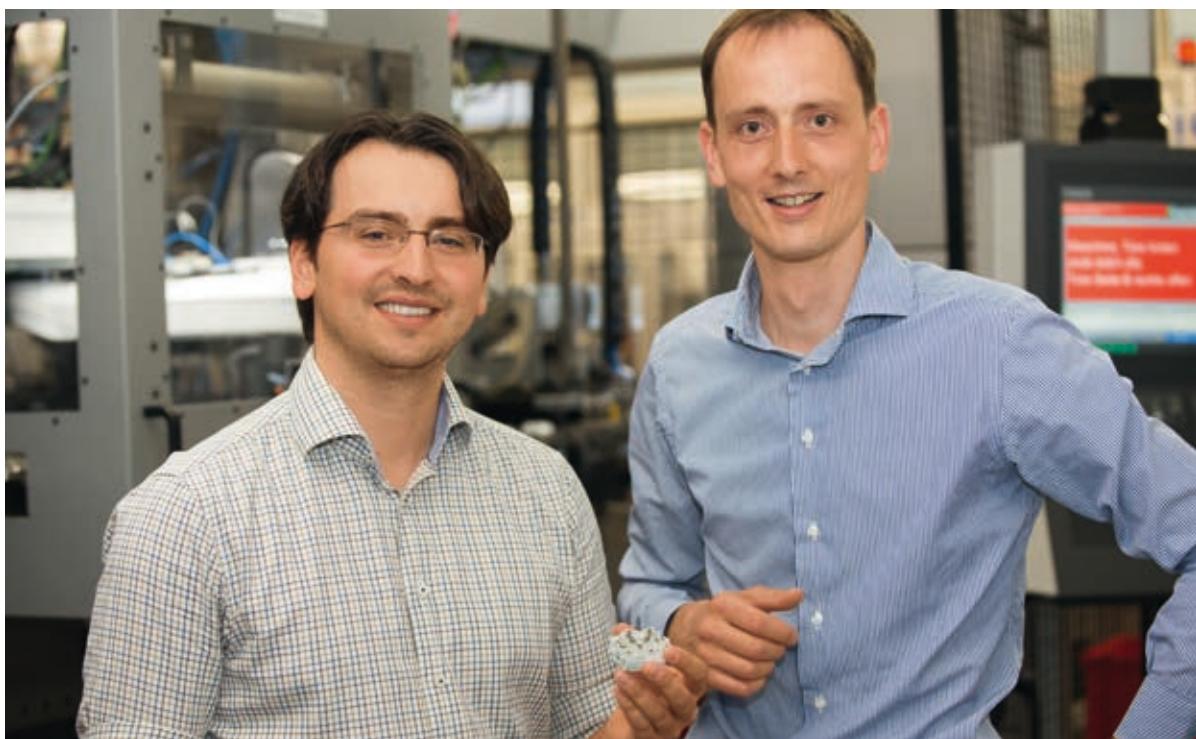
New horizons

The contract with Otto Bihler Maschinenfabrik was signed in June 2013 and the BIMERIC BM 3000 was delivered to Feller AG in November 2014. “Since then, the system has been operating without any difficulties and offers a high level of process reliability that is reflected by the flawless product quality,” says Rusca. “The way that Bihler has combined punching and assembly technology in a single system is a unique, fascinating achievement. And in this way, the project has pushed back the boundaries of what is technically possible for us.” This is something the company will benefit from in the future: “Thanks to this new system, we can keep our manufacturing skills in house and strengthen our local production capabilities,” summarizes Eberle. “Not only can we manufacture and deliver extremely quickly in proven Swiss-Made quality, but the entire project has also opened up innovative possibilities for the development of future products.” ■

www.feller.ch

Feller
by Schneider Electric

Successfully completing the new project in cooperation with Bihler: Fabio Rusca, Head of Industrialization and Operating Equipment Design (left) and Luc von Orelli, Industrialization Project Manager at Feller AG.



VALUE ADDED THROUGH MODULAR PRODUCTION

“STANDARDIZATION IS THE ORDER OF THE DAY”



Growing numbers of product variants, innovative materials and networked systems are now determining requirements in the automotive industry. Professor Ferdinand Dudenhöffer explained to *b on top* just what this means for value added and, in particular, how small and mid-sized enterprises can succeed in a competitive environment.

b on top: What factors are specifically impacting on the value added process in the automotive industry?

Prof. Dr. Ferdinand Dudenhöffer: The value added chain in the automotive industry has changed dramatically over the last 30 or 40 years. The factors contributing to the creation of value added have actually remained much the same, because the task is still to use materials to manufacture parts, fabricate modules from these parts and then assemble them to build systems which can be combined to create the completed vehicle. What is new, however, is the requirements that have to be fulfilled while generating this value added. These include, for example, reducing vehicle CO₂ emissions, a challenge that will bring about long-term changes in the industry. Another important consideration

is lightweight construction using innovative, weight-saving materials. These constraints are transforming the existing value-added chain. Although a little exaggerated, you could say that a hole in the bodywork can be more valuable than a metal component in the same place.

b on top: What trends continue to be relevant, especially for the supply industry?

Prof. Dr. Ferdinand Dudenhöffer: In addition to reduced CO₂ emissions and lightweight construction, the growing number of model variants is playing an ever more important role. Whereas, just fifteen years ago, the leading carmakers had ten or so different series of models, they now already have thirty variants and the trend is for more to come. This individualization is a major issue and the value added chains must

therefore also be structured in a way that makes it possible to master this individual variety on the basis of a number of basic designs or vehicle architecture modules – and do so at low cost while simultaneously offering the necessary flexibility. Standardization is therefore the order of the day. But despite this, as the range of variants increases, so, too, does the number of parts needed. Value added based on a module structure is also relevant for mid-sized enterprises because they have to react quickly, flexibly and economically to market and product requirements.

Another trend is the manufacture of so-called low-price cars. This responds to the demand for simple, low-cost vehicles. Traditionally, mid-sized businesses have been advised not to compete in this market where larger corporations dominate because they are simply able to produce more cost-efficiently.



b on top: What role does networked production in the form of Industry 4.0 play in all this?

Prof. Dr. Ferdinand Dudenhöffer: The speed of value added creation has greatly accelerated. Nowadays, production takes place within a so-called customer-oriented sales process in which practically every order can, to a large extent, be personalized and can also be modified right up to shortly before completion. This means that customers can intervene directly in the production process much more than they could in the past. For this to be possible, the machines and systems naturally have to be networked with one another. In this way, the customer's demands can be incorporated very quickly in the relevant production sequences based on the values stored in the systems. Furthermore, systems that can balance out fluctuations in demand are also beneficial. In addition to networking, the machines must – as in many cases they already can – be able to recognize parts by themselves even more efficiently and, for example, sort them independently. Quality assurance will also be particularly important

in the future. Ultimately, we need intelligent parts that can tell us when they fail. In the automotive sector, for instance, this will make it possible to trigger callbacks in good time.

b on top: What tasks will automotive industry suppliers have to cope with in the future?

Prof. Dr. Ferdinand Dudenhöffer: In the automotive sector, in particular, the number of models and variants is growing and suppliers must be able to reflect this variety in their modular machine structures. In the future, the key factor influencing competition will not be the price of the machines, but what a machine can do more of and better than a standard machine run by a mass manufacturer. Suppliers must also be able to handle material mixes, for example in order to be able to build particularly lightweight yet robust components.

The question, as always, is the extent to which you want to embrace such technologies. However, it is precisely through innovation that you can stand out in a competitive global environment. And tradition-

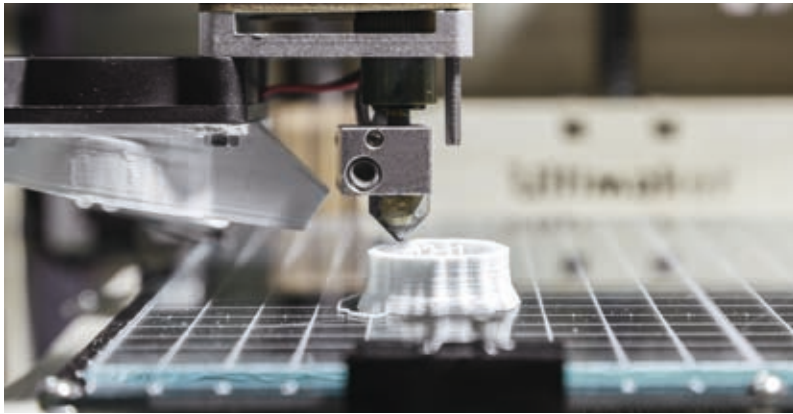
PROFESSOR FERDINAND DUDENHÖFFER,

was born in 1951 in Karlsruhe and studied economics at the University of Mannheim. After graduating and working as a university assistant, he worked for Opel and Porsche, as well as for Peugeot and Citroen. Between 1996 and 2008, he was Professor of Marketing and Management at the Gelsenkirchen University of Applied Sciences before taking up the chair of General Business Economics and Automotive Industry Economics at Duisburg-Essen University. Here, he founded the CAR (Center Automotive Research), of which he is now director, in 2008.

ally, our mid-sized enterprises have outshone the major groups when it comes to innovation because, so to speak, they have a greater personal investment in their products and their further development. And here in Germany, it is precisely the small and mid-sized enterprises that demonstrate a particularly well-developed culture of innovation. This is an advantage that we must not fail to maintain in the future. ■

SEBASTIAN BREMEN, INDUSTRIAL ENGINEER,
FRAUNHOFER INSTITUTE FOR LASER TECHNOLOGY (ILT), AACHEN

“NO MORE WAREHOUSING AND TOOL COSTS”



Innovative methods such as 3D printing are opening up new possibilities for manufacturers – either as stand-alone processes or in combination with established technologies, such as punching-bending processes. Sebastian Bremen, qualified industrial engineer and head of the Aachen Center for 3D printing at Aachen-based Fraunhofer Institute for Laser Technology (ILT), explains the potentials of the new technology and shows how it can be used in practice.

b on top: What does 3D printing technology have to offer? What are its advantages compared to existing processes?

Sebastian Bremen: 3D printing technology, which is also known as additive or generative manufacturing, is the name given to the layer-by-layer construction of components on the basis of a CAD model. The materials that can be processed in this way range from polymers through metals and on to ceramics. The additive manufacturing process developed at the Fraunhofer Institute for Laser Technology (ILT) in 1996 is known as Selective Laser Melting (SLM) and makes it possible to construct complex components from metal materials such as steels, for example, or from aluminum, nickel or titanium-based alloys. Manufacturing is performed by means of the complete selective

melting of powder materials at the required locations using a laser beam. Compared to conventional manufacturing methods, such as molding and machining, the SLM process requires no special molds or tools. What is more, because of the layer-by-layer construction method, it is possible to integrate complex structures, such as grids, or additional functions, such as contoured cooling ducts, in components with no extra effort. In addition, all the modules can be manufactured in a single, monolithic process and the joining processes familiar from traditional manufacturing operations are no longer required.

b on top: How can this increase value added across the entire process chain?

Sebastian Bremen: When configuring or designing a component

or module, the choice of geometries is practically unrestricted and application-specific functionalities can be integrated in the design. Additive manufacturing technology guarantees the 1-to-1 realization of the digitally designed part. Compared to conventional production processes, the unit costs in additive manufacturing are practically independent of the complexity of the component – thus justifying the claim “complexity for free”. The only thing that influences construction time during the Selective Laser Melting process is the volume of the part. Furthermore, additive manufacturing offers considerable potential in the aftersales sector. In the future, replacement parts can be stored solely as virtual products. When ordered, the required parts can be manufactured quickly and economically using additive technology. The use



of this technology does away with warehousing costs and the need to stock specific tools.

b on top: How can this technology be used in practice, in particular by small and mid-sized metal-working enterprises?

Sebastian Bremen: Thanks to additive manufacturing, SMEs can specialize in the production of extremely complex parts or in the production of short component runs at attractive prices. This is because the unit costs involved in additive manufacturing technology are independent of the batch size. When it comes to one-off products and small batches, the production costs are considerably lower than when conventional manufacturing techniques are used. In accordance with the principle "individualization for free", companies can manufacture their products on a highly customer-specific basis. This will increase their ability to compete in the market.

b on top: How does the 3D generation of metal parts compare to conventional punching-bending technology?

Sebastian Bremen: Like molding and cutting, the stamping and forming technologies are established manufacturing methods with numerous advantages when producing series parts in large runs. They can also be used to manufacture one-off parts and small batches. However, the effort and expense involved in manufacturing small volumes is relatively high due to the need for tools, the required setup times and the associated costs. By its very nature, this is not the case with additive manufacture because the only tool needed is the laser. This means that the manufacturing companies of the future can use an intelligent combination of additive and conventional technologies depending on the required parts numbers and complexity.

b on top: What directions will the development of 3D printing take in the future? Where and how will it become established?

Sebastian Bremen: 3D printing will be welcomed wherever it can offer significant cost benefits and design freedom. The lightweight construction field is one area with particularly high potential. In the aviation industry, metal parts such

SEBASTIAN BREMEN, INDUSTRIAL ENGINEER,

Born in Aachen in 1983, he studied engineering at the RWHT Aachen University where he specialized in mechanical engineering. Since 2011, he has been working in a scientific capacity in the Fraunhofer Institute for Laser Technology's additive manufacturing division (Selective Laser Melting, SLM) where his research focuses on ways of increasing the productivity of the SLM process. As of 2015, he has been head of the Aachen Center for 3D Printing and is also deputy group manager of the Rapid Manufacturing research group at Fraunhofer ILT.

as turbine components, injection nozzles, door fastenings and connecting elements are being continuously optimized in terms of weight. The first 3D parts are already being tested or, in some cases, are already in use. We can expect the number of parts produced using additive manufacturing technologies to increase significantly in the future. ■

RM-NC STAMPING AND FORMING MACHINE

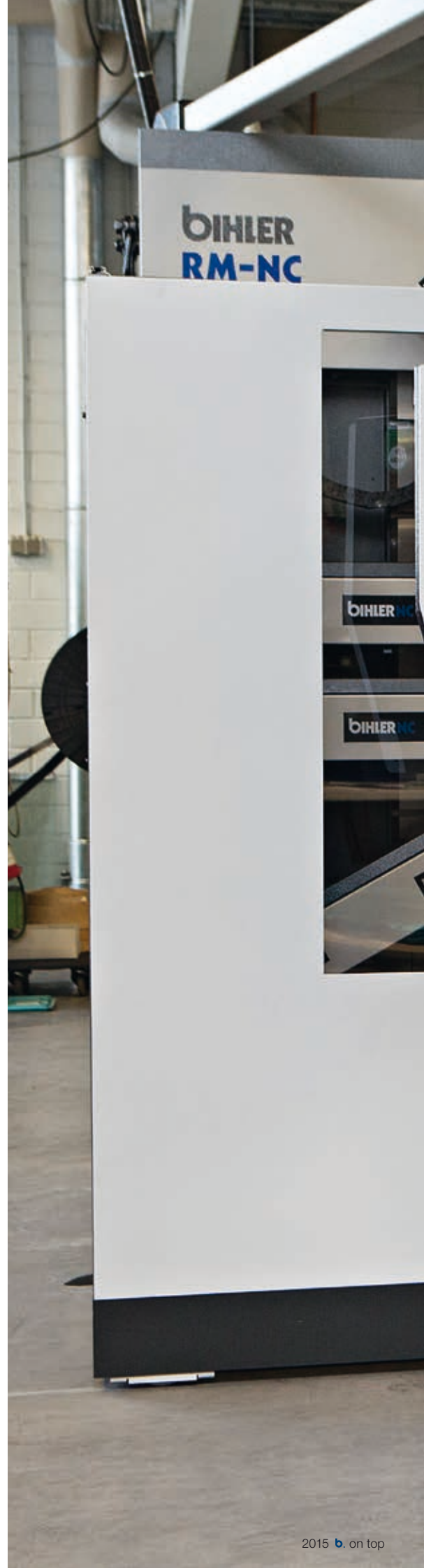
THE VALUE-ADDED MACHINE

A system that guarantees outstanding product quality, more than doubles output rates, minimizes tooling times and even offers full tool compatibility? What was seemingly impossible has been made reality by the RM-NC servo-controlled stamping and forming machine. The value added that this brings about in everyday use is illustrated by Julius Pfisterer GmbH & Co. KG in Birkenfeld-Gräfenhausen. The company replaced its existing mechanical systems with a new RM-NC – and is now able to manufacture complex stamped and formed parts economically even in small runs.

How is it possible to manufacture complex stamped and formed parts and wire components extremely efficiently even in tiny batches? How can a business react quickly and flexibly to short-term customer requirements? And how can output rates be increased by up to 300 percent? Otto Bihler Maschinenfabrik has an answer to these questions – in the form of the world's fastest servo-controlled stamping and forming machine, the RM-NC. Just like the GRM-NC, the system guarantees

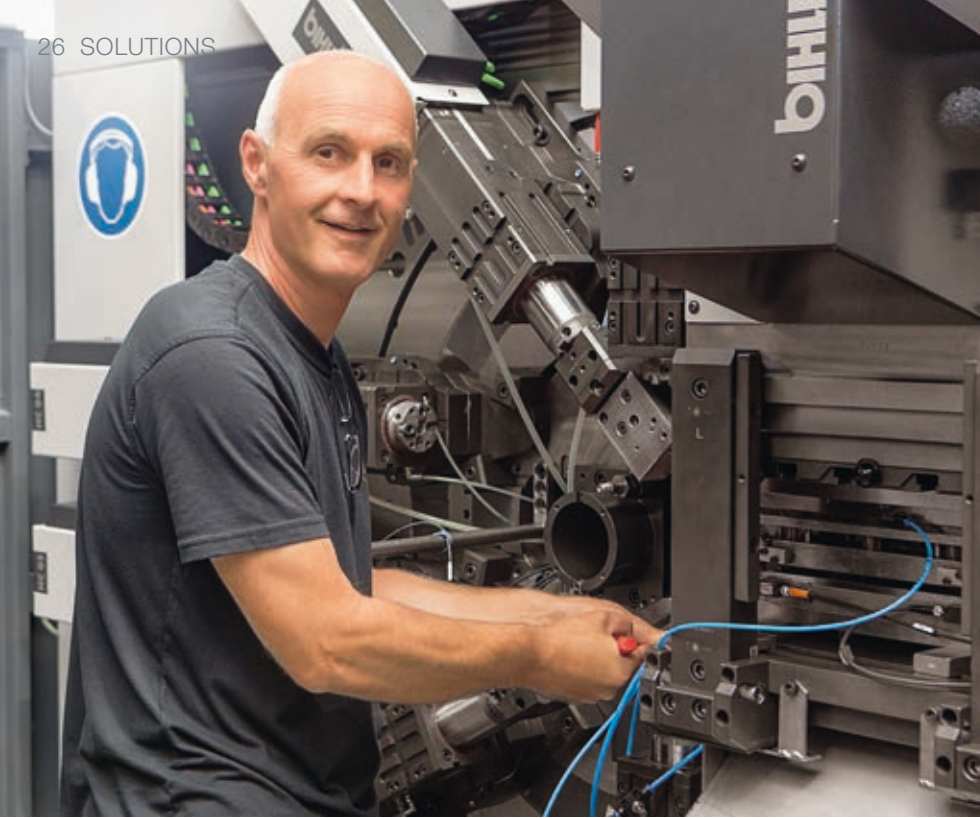
increased efficiency and value added during the production of small and very small runs as well as during mass production operations. In this way, practically all conventional stamped and formed parts and their variants can be manufactured with outstanding productivity and flexibility.

And Otto Bihler Maschinenfabrik is able to list all the advantages that an RM-NC is able to offer every user: Exceptional production efficiency of up to 300





Brothers Andreas and Dominic (left) Ketzer, Managing Partners at Julius Pfisterer GmbH & Co. KG, have ensured their company's continued success with the new RM-NC.



The inhouse team (here, for example, Head of Production Thomas Peichl) is delighted with the shorter setup times and increased throughput.

- ▶ parts per minute, setup times up to nine times faster, a clear reduction in tool costs, including through full tool compatibility with the RM series, as well as convenient operation using the VariControl VC 1 controller.

Tested in practice: a new RM-NC at Pfisterer

All these arguments are overwhelmingly convincing – but can these benefits really be achieved in practice? “Yes, all the figures have been confirmed as expected. But anyone who is familiar with Otto Bihler Maschinenfabrik knows full well that the company does not make any promises it cannot keep,” explains Andreas Ketzer, Managing Partner at Julius Pfisterer GmbH & Co. KG in Birkenfeld-Gräfenhausen. And he should know because a brand-new RM-NC has been installed in the company since October 2014. “By changing over to the servo-controlled RM-NC, we have revolutionized production, which used to be based on our mechanical RM 35 and GRM 80 systems. We are now able to respond quickly and flexibly to the wishes of our customers, who want ever more complex parts in ever

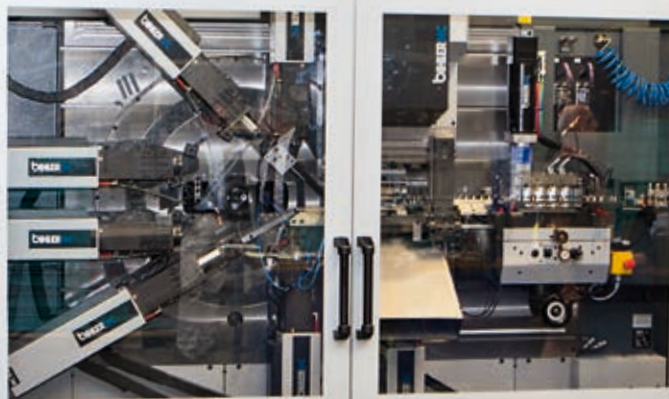
smaller batch sizes. With the new RM-NC, we make the benefits of this new technology available to our customers – highly efficiently and economically.”

Full tool compatibility with mechanical systems

The company, which was founded in 1945, employs some 40 people and manufactures several 100 million stamped and formed components and modules for the automotive, electronic and medical engineering sectors every year, gave the performance capabilities of the RM-NC a thorough examination. The first project for which the company used the new RM-NC involved the manufacture of bronze contact springs for the building technology sector, a task previously carried out on the RM 35. “Because the tools are fully compatible, transferring our existing stamping and forming tool required just a one-off adjustment,” says Dominic Ketzer, the company’s second Managing Partner. “As a result, all our existing tools can be adapted quickly and easily for use on the servo machine for all our other projects and we can continue to use them economically for many years to come.”

Twice the throughput, half the setup times

And were the promised increases in terms of stroke rate and reduced setup times also confirmed? “We observed a significant improvement in productivity,” answers Dominic Ketzer. “During operation, the setup times were reduced from the previous seven or eight hours to just three, while the stroke rates increased from 80 to 160 per minute.” On the one hand, this clear increase in value added is due to the fully automatic slide positioning unit. It travels to the positions stored during initial setup fully automatically and with flawless repeat accuracy. On the other hand, the fast change mechanisms on the processing units and the press guarantee dramatic time savings. “Whereas the adjustment of the mechanical material feed used to be a time-consuming task, it now just takes a few minutes thanks to the RZV 2,” continues Dominic Ketzer. “At the same time, the servo drives guarantee optimum material processing speeds at every station and this has dramatically increased process reliability and the service life of our tools.”



At the heart of the system:
The radially arranged NC units.
These ensure outstanding
production quality at maximum
stroke rates.

Adjustment and support at the touch of a button

Machine and process control using VariControl VC 1 has also proved to be extremely successful. "It permits simple, flexible machine adjustment and guarantees fast retooling times without the need for any additional programming devices. All the production menus and user interfaces are freely configurable and all the measured values and production data are recorded automatically," explains Andreas Ketzer. "What is more, bASSIST provides our machine operators with all the information on the system they need quickly and clearly – even during live operation. And with the integrated remote maintenance solution, we can always count on fast,

professional support from Bihler's experts whenever we need it."

Economic efficiency to the power n

Taken together, all these features make the RM-NC stamping and forming machine a high-performance solution that provides exceptionally fast tool changes, the flexible handling of even very small batches and outstanding product quality. And those are things that the company's customers value: "We get very positive feedback about the new RM-NC. Ultimately, it allows us to pass on the economic advantages of servo technology directly to our customers and that results in new orders for us," summarizes Andreas Ketzer. And the benefits kick in as early as the design stage, since the entire machine together with

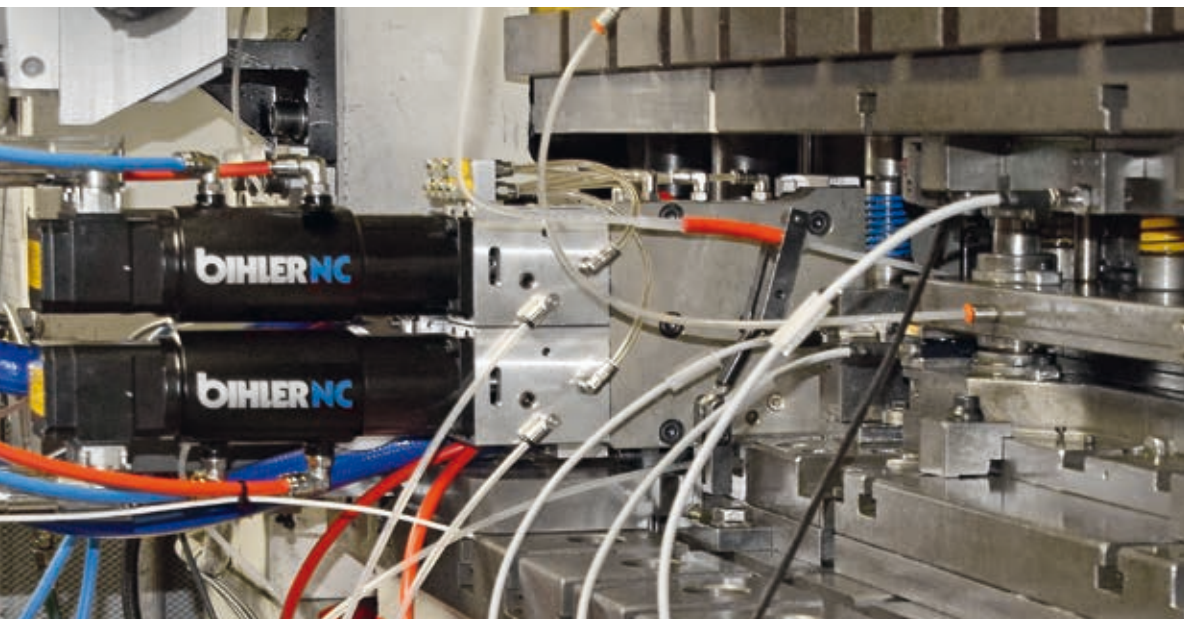
the tools can be fully configured and constructed in CAD and the entire processing sequence can be precisely defined and verified prior to production. "The fact that our specialists now have much more time for our machines and no longer have to spend hours performing setup operations should also not be underestimated," continues Dominic Ketzer "This gives us additional manpower capacity, which further increases our economic efficiency." ■

www.juliuspfisterer.de



WELDING INDEPENDENTLY OF THE SYSTEM CYCLE TIME

SERVO-CONTROLLED CONTACT WELDING



The Bihler D1K NC contact welding unit with two servo drives and the B 5000-NC welding control system permits high-precision, top-quality contact welding independently of the cycle time of the primary system.

Otto Bihler Maschinenfabrik provides solutions to improve efficiency and optimize processes not just in the field of conventional stamping and forming technology but also in related areas, such as resistance welding. The most recent example of this is servo-controlled contact welding, for example using the 5000-NC end-to-end system. The practical advantages of this new standalone solution are demonstrated by M.S.Ambrogio S.p.A. in the Italian town of Cisano Bergamasco.

With the new NC controller for electrode holders, Otto Bihler Maschinenfabrik is once again setting new standards in the field of welding technology and opening up innovative manufacturing potential for flexible production work from which all users can benefit. This is because, for the first time, the NC controller makes it possible to perform welding operations independently of the system cycle time by decoupling them

from the working rhythm of the primary system. This means: All the required contact welding units can be adapted individually to provide optimum performance or can be operated fully autonomously independently of the slide motion of the press. And thanks to the optimized movement sequences, it is possible, for example, to shorten the closing time of the electrodes to such an extent that the welding supports on

the underside of the contact are no longer deformed.

Integrating and controlling up to four NC units.

This end-to-end system combines the strengths of two established systems – the B 5000 welding control system and the VC 1 process controller. This makes it possible to optimally adjust, adapt and monitor



Already benefiting from Bihler's servo-controlled welding technology: Mario Sangalli, Managing Partner at M.S.Ambrogio S.p.A. (left) and Paolo Milani, Head of Contact Production.

welding performance. At the same time, the VC 1 controller offers maximum freedom during the programming of the NC axes. Consequently, it is an easy task to integrate up to a maximum of four NC units for the actuation of the electrode holders in the overall system. Here again, control can be performed asynchronously or synchronously relative to the primary system.

Nearly twice as many contacts

These benefits were enough to win over M.S.Ambrogio S.p.A., a company headquartered in the Italian town of Cisano Bergamasco and the first enterprise worldwide to deploy Bi-

hler's servo-controlled welding technology. More specifically, a Bihler D1K contact welding unit including two servo drives and the B 5000-NC welding control system was delivered to the long-standing Bihler customer in early 2015. On site, the NC electrode holder was integrated in a modular progressive tool below a mechanical eccentric press. The press manufactures electrical contacts and a profiled strip is used as the welding material. And this combination of NC electrode holder and B 5000-NC offers some very important practical advantages: "Thanks to the new system, we have been able to increase our output from 150 to 250 contacts per minute,"

explains Mario Sangalli, Managing Partner at M.S.Ambrogio S.p.A. "At the same time, the electrode service lives are extended and the surface quality of the welded contacts is improved." ■

www.msagroup.it



M.S.AMBROGIO GROUP

INNER VALUES

From shirt clips to cell interconnects, from bearing bushes to electrical sockets: many of the parts manufactured on systems from Otto Bihler Maschinenfabrik play a vital role in our everyday lives. And in particular when it comes to applications with critical safety aspects, all users can rely on their quality and security. Because that is what Bihler stands for – just as it stands for minimized setup times, optimized throughputs and economic value added in production.



SAFELY POWERED

Whether you want to listen to the radio, switch on the shaver or enjoy a cup of freshly made coffee: The sockets that supply these and many other devices with electricity can be found everywhere. These small, inconspicuous items often go completely unnoticed because, like the pictured triple socket outlet from Switzerland, they are a long-established part of our everyday comfort. But despite this, their inner workings conceal a sophisticated interaction of very different parts: from the metal baseplate through a range of plug contacts and on to the casing. The solution for the complex production operations involved in their manufacture is provided by the Bihler BIMERIC BM 3000 servo production and assembly system. This end-to-end system starts by manufacturing the spring clips before then stamping out the baseplates and welding the spring clips to them. The assembly is then inserted in the casing, the intermediate plate is placed in position and the plug contacts, which are produced in parallel, are attached. In this way, 15 ready-to-use triple socket outlets leave the production line every minute. The BIMERIC BM 3000 servo production and assembly system provides the required precision during assembly, and consequently guarantees the corresponding high level of safety during use – whatever device happens to be plugged into the socket. You will find further information on socket manufacture using the BIMERIC BM 3000 on pages 14-19. ■





IN PERFECT SHAPE

Whether for business or casual wear, long-sleeve or short-sleeve: metal shirt clips can be found in practically any newly bought shirt. These bended wire parts keep the item of clothing folded as it should be and stop the shirt from lifting up, slipping or unfolding. The parts are usually inserted at the textile factory and, used in combination with cardboard stiffening elements and numerous pins, keep the shirt in perfect shape until it is worn for the first time.

Shirt clips like this are classic stamped and formed parts that are manufactured on a Bihler RM 40K punching-bending machine. This system combines the advantages of the proven Bihler RM series with the innovative developments made possible by Bihler's latest technology. The result is outstanding product quality combined with the greatest possible performance, flexibility and economic efficiency. This is illustrated by the speed of production of the shirt clips, which leave the system ready for immediate use at the rate of 300 per minute. The easy-to-use Bihler VariControl VC1-E controller ensures trouble-free process control and efficient handling. At the same time, the powerful two-point eccentric press, which has plenty of space to accommodate even long die sets, creates the high pressures needed for productive operation. And if it is ever necessary to change over to another product, Bihler's innovative quick-change system guarantees particularly short changeover times for tools and cams. ■



PROVIDING THE POWER

Electromobility is one of the central issues facing us today. Its viability and widespread adoption depend very greatly on the performance of the vehicle drives. At its simplest, the battery that powers an electric vehicle consists of very many individual cells that are connected to one another by means of a cell contact system. It is important to use a high-performance cell interconnect which minimizes power loss, ensures the best possible equalization between the cells and is also suitable for fast, uncomplicated assembly.

In practice, the pictured cell interconnects are manufactured on the Bihler BIMERIC BM 6000 servo production and assembly system. It was developed precisely to cope with complex manufacturing tasks such as this and also guarantees extremely short setup times, outstanding product quality and the versatility to fulfill even complex customer demands efficiently and economically at all times. This versatile system outputs four completed cell holders per minute, manufacturing not only the interconnects themselves with absolute precision, but also placing them in a carrier frame together with other connecting parts. This makes the BIMERIC BM servo production and assembly system the perfect solution for the manufacture of extremely complex modules – including when small batch sizes and multiple variants have to be fabricated. ■



BEARINGS FOR ALL APPLICATIONS

Whether in the seat, transmission or chassis: Every car contains a large number of moving plain bearings that convert a wide range of angular and rotary movements. The key components of most bearings are the bushes that guide the parts as they move toward one another. Collar bushes, such as those pictured on the left, are used, for example, as bearings for dual mass flywheels in passenger cars, while purely cylindrical forms, such as those depicted on the right, are used as the bearing and rotation points in seat height adjustment systems. Because the two parts, which move relative to each other, are in direct contact with one another in plain bearings, outstanding precision is required during their manufacture. In the case of the bushes pictured here, this requirement was met by the RM 40B and GRM 80B bush forming machines. The two systems are optimally designed for manufacturing straight, cylindrical bushes and flanged bushes – and excel in this task thanks to their outstanding precision, extremely short setup times and exceptional production speed. For example, the throughput for the collar bush on the left is 160 parts per minute and for the bush on the right 200 parts per minute. A clearly structured tool concept, the very high level of machine availability and the excellent value for money that the solutions provide are other key advantages of these bush forming machines, whose performance range is rounded off by Bihler's extensive portfolio of support services. ■



CEO Gregor Häny, here seen on the left next to setup engineer Majkell Marjakaj, is continuing Oskar Rüegg AG's more than century-old success story with the new GRM-NC.



OSKAR RÜEGG AG, JONA (CH)

MODERNIZING FOR THE FUTURE

With a new GRM-NC machine, Oskar Rüegg AG in Jona, Switzerland has chosen Bihler's high-performance NC technology for the modernization of its existing machine pool. And the system is repaying the company's trust not only by halving setup times and doubling throughput in existing projects, but also by opening up a whole range of promising new options for the future.

The Oskar Rüegg Group is a leading manufacturer of complex stamped and formed parts and innovative assemblies. The family-owned company, which has sites in the Swiss city of Jona as well as in Bulgaria, dates back to the year 1891. Ever since the 1960s, it has worked together closely with Otto Bihler Maschinenfabrik, which has supplied the company with numerous punching/bending machines. And many of these systems are still running today. "Despite this, we have long been talking about the question of modernizing our machine pool," says CEO Gregor Häny. "For us, the deciding factor was a strategically important follow-up project resulting from an existing order and for which we needed particularly

efficient manufacturing capabilities in order to prevail over our Asian competitors."

Modernization using the GRM-NC

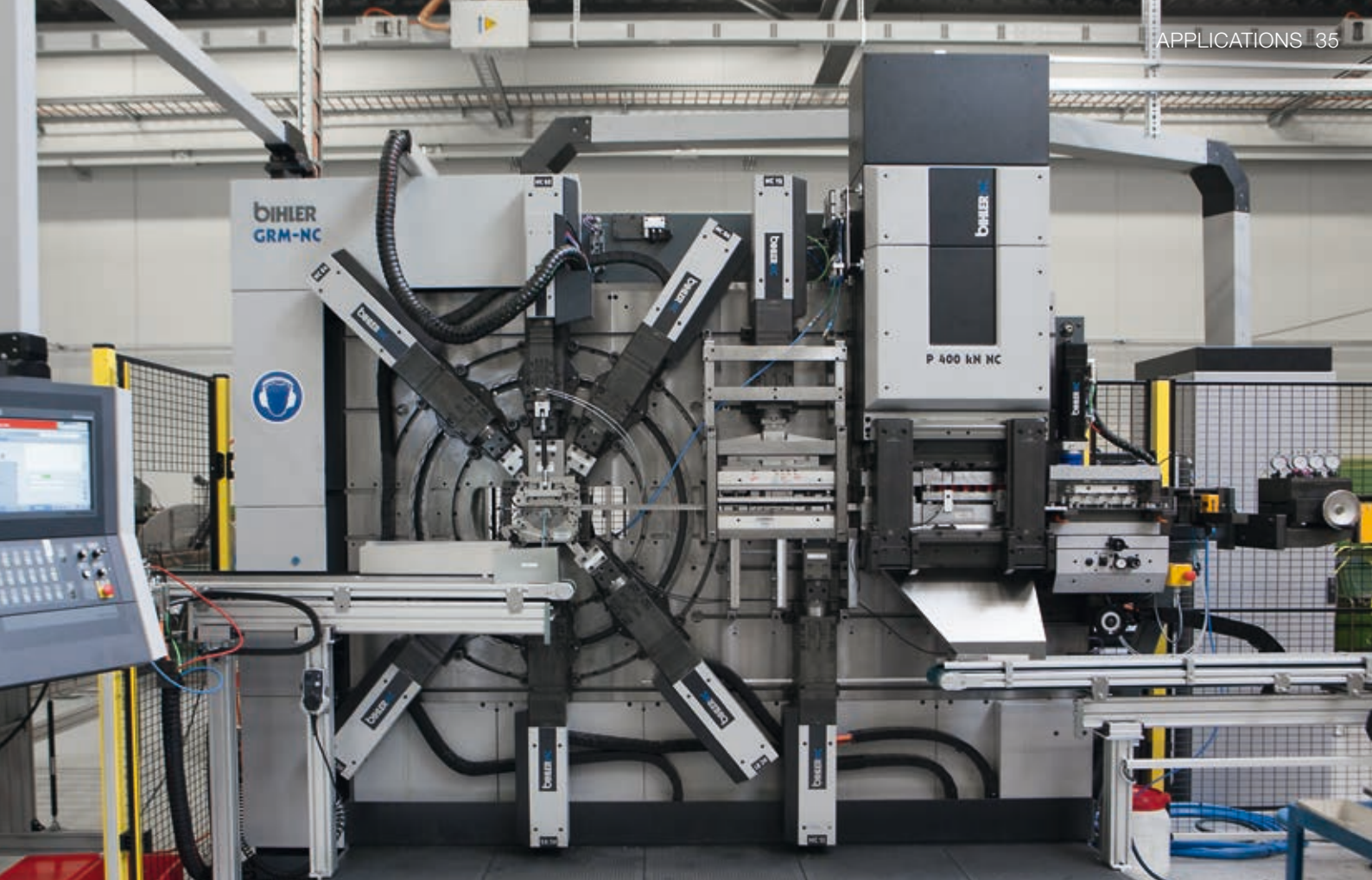
One thing was clear. The company continued to rely on Otto Bihler Maschinenfabrik and made the changeover to Bihler's high-performance servo technology by acquiring a new GRM-NC.

The system, which has been installed at Oskar Rüegg AG since September 2014, is used for two shifts a day to manufacture large quantities of xenon bulb holders for the automotive sector. The machine consists of the standard basic frame with radial and linear slide

units, the RZV material feed system and VC1 controller. The system was also extended by a number of project-specific design features in order to increase the manufacturing capability for certain specific large parts.

Halved setup times, doubled throughputs

"Since we generally manufacture very complex parts, it was interesting to see what is possible using NC technology," says Häny. "And using this new system, we were indeed able to greatly reduce our setup times and also increase throughput – while also achieving optimum product quality, guaranteed process stability and outstanding reproducibility. Another important advan-



tage was that we were able to migrate our existing tools to the new system without difficulty.”

Know-how transfer: the key to success

The cooperation between the two companies intensified as the process of acquiring the GRM-NC progressed. “We worked alongside many Bihler employees on site in order to transfer the new technology to our company and ensure we could make optimum use of it,” explains Häny. “We greatly appreciat-

ed Bihler’s openness and the dedication they showed right from the very beginning, and this positive collaboration was another key factor of success for us.”

Equipped for new tasks

With the GRM-NC, Oskar Rüegg AG has opened up extremely promising new options for the future. “The GRM-NC is the ideal extension to our product portfolio and offers us a whole new level of flexibility – not only with regard to technical feasibility but also in making

possible the economically efficient, small-series manufacture of complex parts,” summarizes Häny. “In this way, we will be able to attract customers from outside of the automotive industry in the future and open up new forward-looking areas of activity for ourselves.” ■

www.oskar-ruegg.ch

 **OSKARRÜEGG**
schneller perfekt



KATKO OY, VANTAA, FINLAND

BOOSTING SUCCESS WITH SERVO TECHNOLOGY

Equipped with a new BIMERIC BM 4500, the Finnish company Katko oy now manufactures its load break switches using Bihler's NC technology. The results are higher product quality, lower materials costs and a totally new dimension in versatility which ensures that the company can succeed in a competitive environment – now and in the future.



The changeover to NC technology is already paying for itself now and will to do so even more in the future. That is the conviction of CEO Jukka Hyryläinen (left) and Tomas Finell, R&D Manager at KATKO oy.

Katko oy, headquartered in the Finnish city of Vantaa, was founded in 1938 and has been manufacturing load break switches for over 60 years. The family-owned company supplies customers in over 40 countries, where its unmistakable load break switches, usually equipped with a characteristic yellow housing and red rotary switch, are used in many different sectors – from the food processing industry to steel works and paper mills, as well as in power stations, mining, oil and gas production, and maritime applications.

“The greatest possible reliability and safety of use are our top priorities, which is why optimized manufacturing processes coupled with outstanding precision and the

perfect machining of the various materials are essential for us,” explains CEO Jukka Hyryläinen. “They ensure flawless product quality that meets international standards – and, in an emergency, helps save lives.”

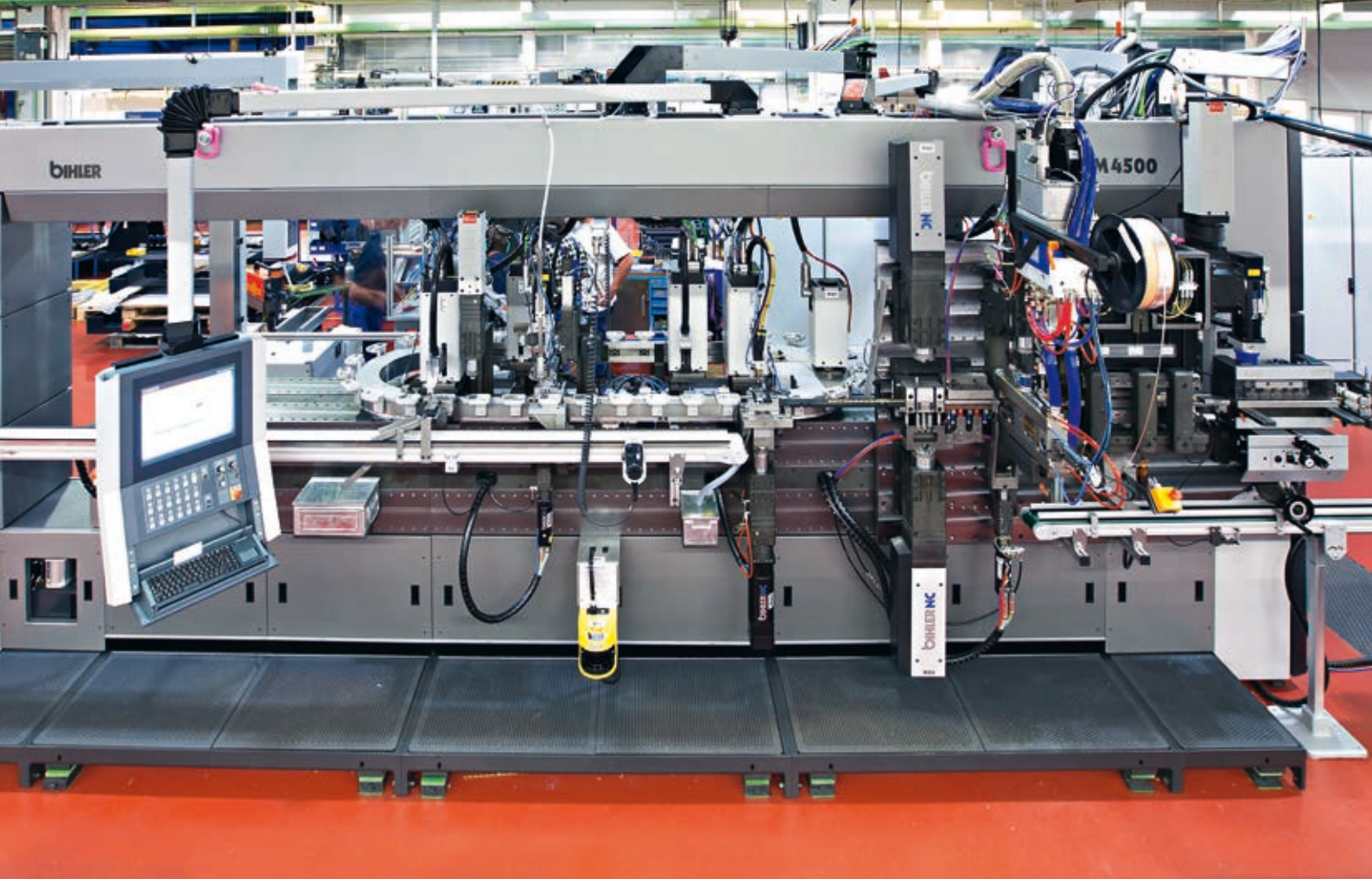
Higher quality, reduced material consumption

To make sure it meets these exacting quality goals, Katko has been using a Bihler BIMERIC BM 4500 since December 2013. At this system, the box terminals produced on a Bihler GRM 80 at Katko's factory in Poland undergo a series of punching, welding, bending and other operations to turn them into finished terminal components. “The

BIMERIC BM 4500 offers a whole range of advantages compared to our previous production operations which, for for almost 20 years, were entirely mechanical,” says Tomas Finell, R&D Manager. “Thanks to the precision servo technology, we have once again made significant improvements to the quality of our switches. At the same time, we have reduced overall material consumption by approximately thirty percent.”

Shorter tooling times for greater versatility

At the same time as the system was being delivered, a large number of Katko's employees successfully completed their training in the



operation of the machine at Otto Bihler Maschinenfabrik in Halblech. At present, the company manufactures eight different component variants on the BIMERIC BM 4500. This means that the machine has to be retooled between one and four times per week depending on product requirements. "Unlike in the past, retooling now only takes two hours on average," explains Finell. "In combination with the increased throughput, this means that we can now manufacture our products particularly efficiently. At the same time, we have become much more versatile and can manufacture and deliver to order practically on a just-in-time basis." The produced parts are stored in an internally constructed Logistic Center from which they are retrieved for the concluding in-house finishing operations.

Manufacturing potential for the future

At the same time, the new BIMERIC BM 4500 has considerable potential in reserve for future tasks, as Katko recognized from the very beginning: "Bihler's technology not only guarantees optimum

product quality, which can also be achieved extremely economically," says Hyryläinen. "The technical potential for pioneering new projects is also very exciting." These projects include, for example, the upcoming production of the current terminal component as a purely stainless steel variant. "What is more, the company is planning to manufacture the box terminals that form the input material on the BIMERIC in the future and produce the entire component inline on the

same machine." This will reduce the cost and effort involved in logistics and further increase manufacturing reliability. "All this means that our investment in the BIMERIC MB 4500 has already paid for itself – and has the potential to bring us a wealth of new benefits in the future," summarizes Hyryläinen. ■

www.katko.com



BKM PRÄZISIONSWERKZEUGE STANZ- UND BIEGETEILE GMBH, SCHWABACH

VALUE ADDED MORE THAN DOUBLED

With two new BNC 2 servo-controlled production systems, Schwabach-based BKM GmbH has switched over from its old MRP machines to Bihler's high-performance servo technology. As a result, the company has increased its productivity by more than 50 percent – and given itself a long-term competitive edge.



Peter Nestler and Jürgen Gebhart (right), the two Managing Directors of BKM GmbH, will continue to rely on Bihler NC technology in the future.

BKM GmbH, which was founded in 1977, employs over 100 people at its three sites, where it manufactures stamped and formed parts, contact and leaf springs, as well as bended wire parts. The company took two new BNC 2 servo-controlled production systems into service at its headquarters in Schwabach in March and June of this year. The new BNC 2 systems from Bihler have revolutionized our manufacturing activities, which we previously performed using our old MRP UB2B machines. These were no longer economically viable for us due to the disproportionately long tooling times and the low throughputs, explains Technical Managing Director, Peter Nestler.

Shorter tooling times, higher throughputs

And the investment in Bihler technology started to pay for itself from the very beginning: "Once we had installed the machines, each of them was already up and running within 24 hours," continues Nestler "After we had performed the one-off task of adapting our existing tools to the new high-precision BNC 2 system prior to the start of production, we were able to significantly boost our throughput levels – by as much as 200 percent." The best example of this is the production of clips from prehardened steel strips which are now manufactured at the rate of 290 instead of 120 per minute. "At the

same time, setup times, which could often take several days have been reduced to an average of 1.5 hours."

Cost benefits

The higher throughputs and shorter setup times naturally represent an enormous cost benefit for the company. "With the new BNC 2 systems, we have been able to increase our productivity by more than 50 percent overall. The machines give us added security because, for example, the setup times can now be planned extremely precisely," explains Commercial Managing Director, Jürgen Gebhart. The servo-controlled drives of the new systems guarantee the necessary precision and ensure



outstandingly reliable, consistent product quality – which is even higher than before because the play and wear effects typical of MRP machines no longer occur.

Flexibility even for long series

“We also assume that the BNC 2 systems will show their worth for volumes of over 500,000 units per production batch,” continues Gebhart. “At the same time, thanks to the short retooling times, we can also profitably interpolate shorter runs as required.” This capability gives the company enormous flexibility at the level of order handling and also helps reduce warehousing costs.

This allows it to quote lower prices to its customers and improve its competitiveness in the market. “The new systems have enhanced our customers’ confidence in us and have helped us successfully land a number of new orders,” says Gebhart.

Collaboration with a view to the future

However, another crucial factor in the change-over to servo technology was the outstanding collaboration with Otto Bihler Maschinenfabrik, in particular given the fact that BKM GmbH was the first company to purchase a machine of this type. “The chemistry worked from the

very beginning and we always had the reassuring feeling that Bihler was the right partner for us,” says Nestler. And the chances that this cooperation will be extended look good. Both Managing Directors agree: “We are absolutely convinced by Bihler’s technology and will count on Bihler in the future.” Further BNC 2 systems and other plant acquisitions are being planned in order to replace other MRP machines and further extend the company’s competitive edge. ■

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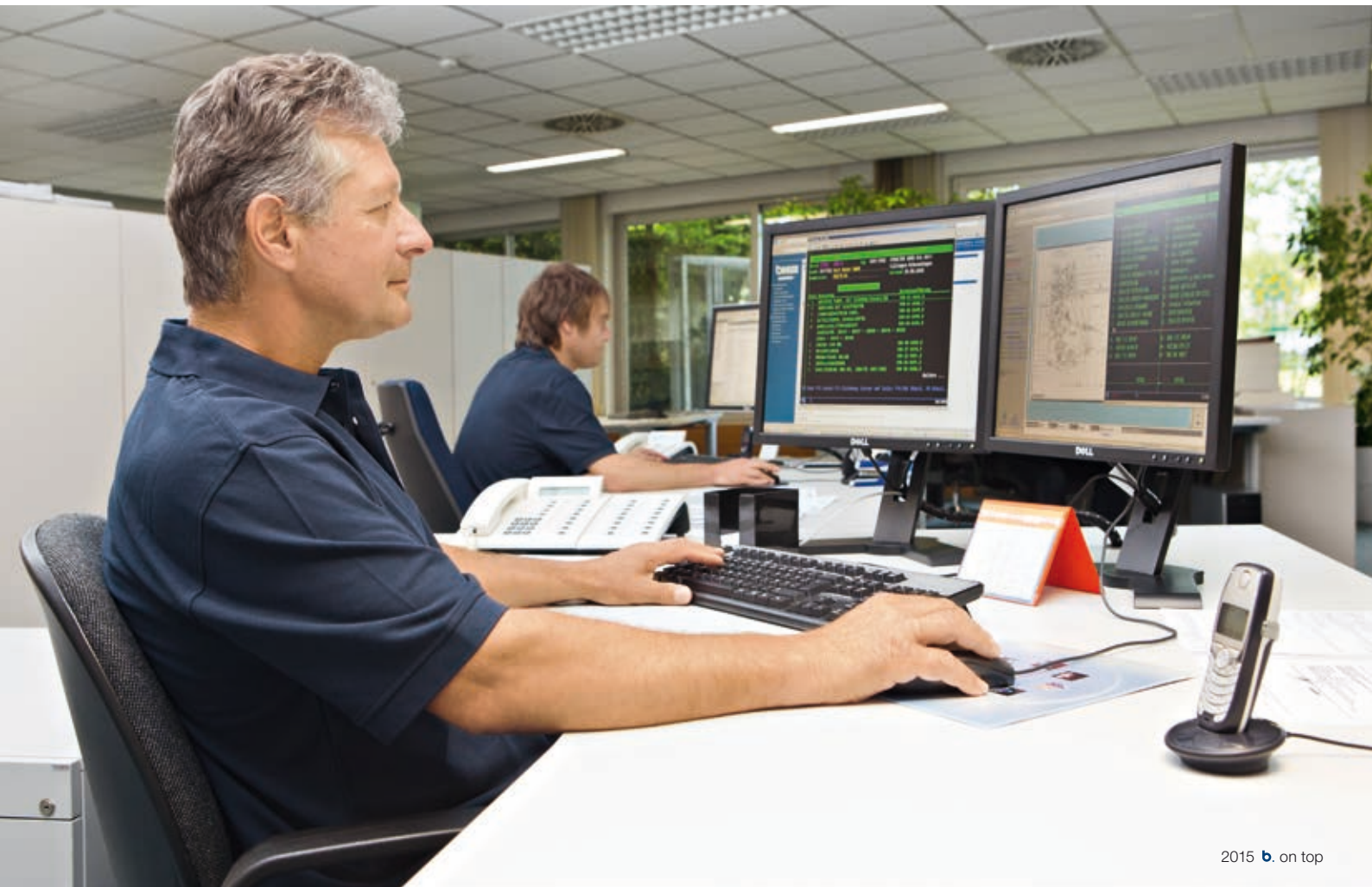


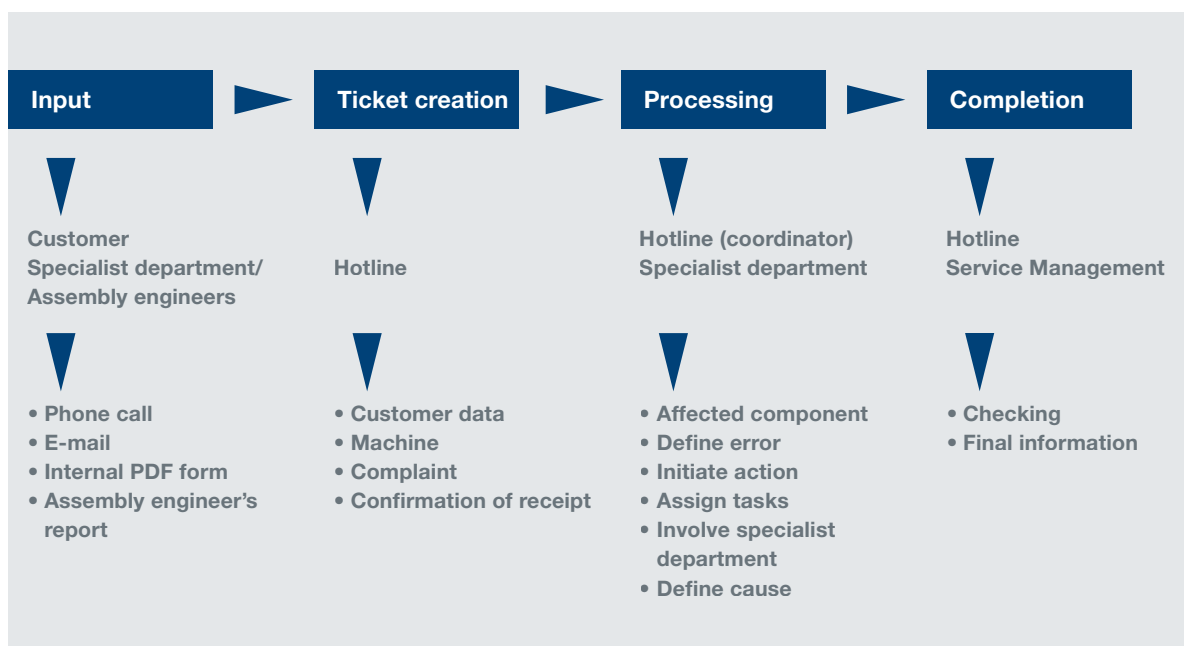
CENTRAL TICKET SOFTWARE

COMPLAINT MANAGEMENT

Despite every care and attention and the most precise planning, malfunctions and errors may occasionally occur at Bihler systems installed at customer sites. The company's internal complaints and quality management system (CQMS) makes sure that all problems are solved quickly and efficiently – and that productive operation can continue free from malfunctions and downtimes.

All customer complaints are recorded centrally by the Bihler hotline team. Further processing is performed on the basis of a precisely defined sequence of steps using the Bihler ticket system.





Products manufactured by Bihler excel thanks to their superior quality and extremely long service lives. Despite all the care and attention that go into planning and production, problems and errors may occasionally occur at machines at customer sites. These cases must be comprehensively recorded and documented and measures for the immediate resolution of the problem must be introduced. To do this, Otto Bihler Maschinenfabrik can rely on its internal complaints and quality management system (CQMS).

Incoming message via the Bihler hotline

The complaints management software makes sure that all issues are processed in a structured, traceable way and that recurrent errors are detected. Consequently, at Otto Bihler Maschinenfabrik, the CQMS is an important tool for ensuring customer satisfaction. That is why customer complaints always pass through a number of precisely defined steps: First of all – following the one face to the customer principle – the customer complaint is registered centrally via the Bihler hotline. The customer usually

notifies us of the problem by calling the central hotline (+49(0)8368/18-200) during the hours 7 am to 7 pm. It is also possible to report problems via the Bihler home page (Support\Contacts Support\Online Fault Reporting).

Structured complaints processing

Once a complaint has been reported, the employees on the Bihler hotline decide what prerequisites for the creation of a ticket are fulfilled and then create a corresponding ticket in the CQMS. This records all the relevant data supplied by the customer and naturally also the type of complaint. The subsequent processing of the ticket is also coordinated by the hotline team and documented in the CQMS. During processing, the corresponding tasks and actions, together with the associated deadlines, are sent to the relevant departments for handling via the CQMS. These perform a detailed error or fault analysis, identify the cause of the problem in consultation with other specialist departments and implement the actions designed to remedy it. The service hotline management then checks the tasks that have been

performed and draws up a final report.

Guarantee of efficiency and reliability

Beside the processing of all complaint or malfunction messages, the ticket system is also used to handle spare parts inquiries, technical queries (support during problems), CAX-related issues, and repairs. Internally, it also covers supplier complaints and internal error reports. In this way, the Otto Bihler Maschinenfabrik complaint and quality management system ensures that a structured approach is used to resolve all types of problem-related issue. It guarantees that all customers benefit from the outstanding efficiency and reliability that they need if they are to get the maximum value added from their production operations. ■

**...FRANZ JOSEF PSCHIERER,
STATE SECRETARY IN THE BAVARIAN STATE MINISTRY FOR
THE ECONOMY, MEDIA, ENERGY AND TECHNOLOGY**

INDUSTRY 4.0: THE PATH TO THE FUTURE ...



The slogan that characterizes the current mandate of the Bavarian State Government is "DIGITAL BAVARIA". Of particular importance is the task of bringing the fourth industrial revolution – Industry 4.0 – to the State. Franz Josef Pschierer, State Secretary in the Bavarian State Ministry for the Economy, Media, Energy and Technology met with Mathias Bihler to discuss the political and economic importance of Industry 4.0, look at the current constraints and show how business and government can work together to clear the path for the digital age.



b on top: Was bedeutet Industrie 4.0 für Sie?

Franz Josef Pschierer: We

b on top: What does Industry 4.0 mean for you?

Franz Josef Pschierer: If you walk across a factory floor today, you will see people and machines communicating with one another. In Industry 4.0, it is even more important that machines can work independently with other machines, interact with them, monitor them and communicate with them. This will change all the process and value added chains. Our challenge is to make sure that mid-sized businesses are part of this and that Industry 4.0 is rolled out into the regions. Our aim is to make things better and we work toward this with our words and deeds – including with a new "digital bonus" worth approximately 20 million euros. With this, we making it possible even for mid-sized

companies to examine and analyze their existing processes. In particular with regard to IT security issues. This is an area that we take very seriously and one in which there is considerable room for improvement.

Mathias Bihler: In the 60 years since our company was founded, we have built up an excellent position for ourselves. Every day, everyone will come across many components manufactured using Bihler technology, starting with the button on the radio-alarm clock, on to the switch contacts in the light switch, electrical sockets, spark plugs and windshield wiper motors, belt tensioners, ABS, car airbags, as well as medical engineering applications. This shows just how versatile our technology is, in particular in terms of the innovations that our customers create with it. As a result, for us Industry 4.0 means

providing the technology that makes innovation possible and offering intelligent solutions for new ideas. That is exactly what we express in our motto: "No more Limits". This means that with the wealth of ideas generated by our customers, coupled with our technology, there are no limits to what can be achieved.

b on top: How can intelligent Industry 4.0 solutions be implemented, in particular in the field of stamping and forming technology?

Mathias Bihler: For the purposes of digitization and networking, it will be necessary to integrate other technologies with stamping and forming technology, for example laser welding or robotic production,



Mathias Bihler, Partner and Managing Director of Otto Bihler Maschinenfabrik:

“People and machines, as well as the individual process steps, must be synchronized with one another via a central control station.”

as a whole. We are devoting a lot of money to the digitization of the key sectors of the economy. For example, no other German state is planning to invest as heavily in full broadband coverage as Bavaria, which will spend 1.5 billion euros in this area by the end of 2018. And in the coming years, we will spend another 500 million euros to drive digitization forward.

b on top: What concrete support is being provided to business in terms of Industry 4.0?

Franz Josef Pschierer: In this area, we are providing help in a number of different ways. One example is the strengthening of the overseas market. I know that Otto Bihler Maschinenfabrik is positioned excellently at the international level, with some 30 agencies in the USA and elsewhere around the globe. At the same time, I must add: Wherever it is necessary, we help our mid-sized companies to establish themselves in overseas markets. And in the longer term, this also applies to Russia as an economic area. While complying strictly with unfortunately still necessary embargo, the Bavarian Economic Ministry will therefore continue to maintain its contacts with the Russian Federation to the best of its ability.

We are also reinforcing our activities in the Near East. As a result, we will open an agency in Riyadh in Saudi Arabia and in Doha in Qatar this year. Undoubtedly there is a need here to discuss certain well-known issues. But turning your back on the world is not an option and that is why we will also expand our presence in these regions in the future. This is important because otherwise our global competitors will take our place with their own products.

▶ and to make these available for short-run and mass manufacturing applications alike. It is also important to offer the corresponding flexibility to ensure that different articles can be manufactured without the need for time-consuming retooling. However, another characteristic of intelligent Industry 4.0-type solutions will be the networking of all the factors and parameters. This applies to the people and machines, but also to the individual process steps, which will be synchronized with one another via a central control station. Ultimately, it is necessary to produce good parts without wasting energy and raw materials. In this context, it is important to provide highly standardized tools which customers can use to manufacture all their products. Then it will be possible to produce anywhere in the world depending on where capacity happens to be available. This will be made possible by a connection to the central control room, for example in the form of an MES system, which will also measure productivity and quality. All the data it contains will be available for consultation in real time from any site anywhere in the world. The result will be

standardized production systems and optimized capacity utilization at the global level. In this way, it will also be possible to react particularly quickly to customer requirements.

b on top: What role are enterprises like Otto Bihler Maschinenfabrik playing in the digitization of the Bavarian economy?

Franz Josef Pschierer: When people talk about the Bavarian economy, they often refer to sectors such as aviation, aerospace and the automotive industry. However, we should not forget companies in other areas that are of crucial importance for value added creation. These are not just to be found in the heavily populated regions around Munich or Nurnberg but are scattered throughout the whole of Bavaria. One very good example is Otto Bihler Maschinenfabrik, which has more than 900 employees worldwide and annual sales of 100 million euros. It is not for nothing that Bihler counts as one of the leading system suppliers in the field of punching, welding and assembly technology. The mechanical engineering sector is of vital importance for Bavaria

Mathias Bihler: If you want to compete at a global level, you have to be present in the market. The speed with which you can launch product manufacture is then another key factor. When designing stamping and forming machines, our developers benefit from the data and experience that we have gathered during the 60 years of our company history. Using the tools at our disposal, we make this information available to our developers in exactly the form they require it and, in this way, create an end-to-end, uniform system without interfaces. This reduces time-to-market to a minimum. It also ensures optimized travel profiles that can be adapted to changing manufacturing constraints easily at the touch of a button.

The use of interacting, networked, self-correcting tools is another hallmark of Industry 4.0 processes and their success in the global market. Because the machine, the sensor system, the controller and the actuators can all communicate with one another, almost all parts are manufactured error-free and in a way that guarantees outstandingly efficient material utilization coupled with integrated quality assurance.

b on top: Another important point about Industry 4.0 relates to energy.

Mathias Bihler: When it comes to energy, issues relating to resource efficiency and sustainability play a crucial role. And the roll-out of Industry 4.0 holds enormous potential in these fields. One example of this is the replacement of a high-waste deep drawing process with an innovative narrow strip forming technique which we have introduced for one of our customers. Our award-winning process for manufacturing sealing rings saves approximately 1,800 tonnes of steel and reduces carbon dioxide emissions by 2,700 tonnes every year. This represents a huge gain not only for the customer but also for the environment. At the same time, our new, high-performance technologies allow us to save resources in-house and adopt sustainable approaches. For example, thanks to our solar power system and cogeneration plant, we can meet approximately half of our

entire energy requirements from environmentally friendly sources. And this is of course of great economic benefit to us.

Franz Josef Pschierer: The first consideration in terms of power consumption in industry and the economy is the price, for example of electricity. However, the issue of the reliability of supply is just as important. Here, the question relates not only to the quantity of available electricity but also to its quality, which is a determining factor for certain production sectors. And of course it also involves the discussion of the issue of overhead power lines. The question here relates less to whether we should have these lines and much more to the course they should follow. The burden should be shared equally. And here everyone involved must make a contribution, whether they are politicians, citizens or entrepreneurs. It is important that people are ready for the extension of our infrastructure. If we reject everything new then we will not be able to guarantee our well-being in the long term. ■



Franz Josef Pschierer, State Secretary of the Bavarian Ministry for the Economy, Media, Energy and Technology:

“In Industry 4.0, it is even more important that machines can work independently with other machines, interact with them, monitor them and communicate with them. This will change all the process and value added chains.”

FRANZ JOSEF PSCHIERER

born in 1956 in Haunstetten near Augsburg. From 1978 to 1983, studied political and social sciences at Augsburg University before becoming editor of the *Deutsche Handwerks Zeitung*. From 2003 to 2008, he chaired the Committee for the Economy, Infrastructure, Transport and Technology in the Bavarian state parliament. Pschierer then became State Secretary in the Bavarian Finance Ministry and, since October 2013, has been State Secretary of the Bavarian Ministry for the Economy, Media, Energy and Technology.

INDUSTRY 4.0: THE PATH TO THE FUTURE

SHAPING THE CHANGES

How can Industry 4.0 be implemented in practice? What are the factors determining the digitization of the sector? At a round-table session at Otto Bihler Maschinenfabrik, representatives from a wide range of companies discussed the current status and future developments relating to the topic of Industry 4.0.

Klaus Kärcher, Director at Otto Bihler Maschinenfabrik:

“Today, we stand on the threshold of the fourth industrial revolution. It is a sign of just how much our world has changed. And Bihler’s world has



Klaus Kärcher, Director at Otto Bihler Maschinenfabrik

changed enormously, too. With the BIMERIC production and assembly system and the GRM-N punching/bending machines, we now offer two end-to-end solutions that are entirely based on NC technology. What is more, using our VC1 controller it is possible to fully network all the systems with one another. In this way, we are already laying the foundations for the roll-out of Industry 4.0. This allows us to offer faster, more transparent and more efficient solutions which our customers can use to increase the value added and economic efficiency they get from all their processes in extremely practical and profitable ways.”

Professor Christian Donhauser, Kempten University of Applied Science

“At the University, we also pay great attention to the increased value added offered by Industry 4.0, even though the subject is still in its early days and not fully ready to enter the curriculum. Indeed our first thoughts on the subject saw the light exactly four years ago. Despite this, we are currently planning a masters course for industrial engineers in which Industry 4.0 will play a central role. The topic is exciting and very wide-ranging. In addition to the digitization of manufacturing technology and the use of intelligent methods, one im-



Professor Christian Donhauser, Kempten University of Applied Science

portant aspect is their interaction and the transfer of information between them – in the B2B and B2C environment as much as in the me-

chanical engineering, IT, e-technology and business administration sectors. This interaction is a vital factor and a very good reflection of the ideas behind Industry 4.0.”

Jürgen Leicht, Managing Director of Leicht Stanzautomation GmbH:

“Training is a very important issue in Industry 4.0. Ultimately, the employees who operate the systems also contribute to value added creation. However, when it comes to



Jürgen Leicht, Managing Director of Leicht Stanzautomation GmbH

interactions between the systems, Bihler already supplies us with the technology that enables us to network our punching, bending and plastics processing operations. At the same time, the data has to be analyzed and integrated in the overall production process. This provides us with important information on the operating and production statuses of current orders as well as on machine

operating hours, maintenance intervals and spare parts management. In my opinion, the trend is heading toward modular machine technology and this will make it possible to successfully open up new markets. Industry 4.0 is an exciting process, but one that will take its time.”

Peter Fink, Managing Director Ceratizit Austria:

“Despite that, we mustn’t spend too long simply talking about Industry 4.0. Instead, we have to act quickly as otherwise the rewards will go to others in the field. The task is to differentiate ourselves, while at the same time building up the necessary experience in Industry 4.0. Even today, of course, data transfer is essential and we are already networked



Peter Fink, Managing Director Ceratizit Austria

with some of our major customers. This permits, for example, optimized handling of article logistics and allows us to compensate quickly for fluctuations. At the same time, we can also analyze all our processes in detail and optimize them. This is particularly important for us because we process extremely expensive ores to produce hard metal powder, semi-finished products and customer-specific solutions.”

Bernhard Rohe, Managing Director View Systems:

“Businesses can already start rolling out Industry 4.0. The basis for the network of things and services for process optimization lies in the data delivered by the systems themselves. The task here is to harmonize the various systems to permit comprehensive communication and networking. In Bihler’s systems, this is already en-



Bernhard Rohe, Managing Director View Systems

sured as standard thanks to the use of integrated communication components from View Systems and the corresponding interfaces in the VC1 controller. As a result, all the data can be recorded in near-real-time – for enhanced process reliability or internal order management. In my view, Industry 4.0 can be implemented in a series of phases. First of all come the internal networking, which is an area of current interest, and the efficiency analysis. Next comes the automated planning phase followed, finally, by comprehensive networking with external partners, service providers, and systems.”

Thomas Bernauer, Head of Central Parts Production ABB STOTZ-KONTAKT GmbH:

“And the potential resulting just from networking and efficiency analyses on their own is huge. About three years ago, we migrated our operating data system to the View Systems solution IndustryView MES, with the aim of increasing productivity by two percent – and were ac-



Thomas Bernauer, Head of Central Parts Production ABB STOTZ-KONTAKT GmbH

tually able to increase it by eight percent. And if we help optimize other production sites through the implementation of Industry 4.0, we can expect to see even greater boosts to efficiency. Ultimately, the analysis of the data clearly reveals all productivity losses. However, it is vital to evaluate the results and react quickly because, in practical operation, seconds can be vital – for example, when a machine’s shutdown time prior to an impending die failure has to be taken into account.”

Tobias Gschwend, Customer Support, Otto Bihler Maschinenfabrik:

“However, in the future, intelligent sensor technology will ensure that situations like this become clear and can be analyzed long before the critical point is reached so that the corresponding countermeasures can be taken in good time. This is because the current status of each individual system can be viewed in



Tobias Gschwend, Customer Support, Otto Bihler Maschinenfabrik

a central control room or can be called up on a smart phone. With Bihler’s remote maintenance service and bASSIST, we already offer ways of ensuring efficient communication between humans and technology. Data security is naturally also very important. At Bihler, the interaction passes over direct, individually encrypted connections and is always initiated by the customer. The question of the standards that will establish themselves at the global level here is an exciting one, in particular because it is becoming ever more important to have real-time access to all the information relating to a system or process.” ■

BIMERIC SP

NEW IDEAS FOR PROGRESSIVE TOOLS

The BIMERIC SP is opening up a whole range of new possibilities in the field of progressive tooling operations, while also improving productivity and helping to achieve significant cost savings.

To do this, the world's most intelligent press combines two types of solution in a single system: progressive production technology in the SP servo press and Bihler technology on the modular BIMERIC platform. Irrespective of whether users want to machine their parts immediately or simply want to make their processes more accessible – the BIMERIC SP has the right solution for every application. This is because the stamped parts manufactured in the progressive tool are now further processed immediately on the

BIMERIC platform without the need for any intermediate logistical steps. "In this way, large numbers of parts can be machined to create hybrid assemblies," explains Bernd Haussmann, Head of Technical Sales / Mechanical Engineering.

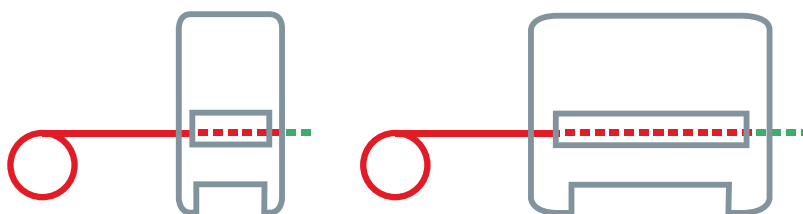
Simple process migration

"Processes such as punching, bending, cutting and stamping are still performed at the press. Processes such as forming, thread cutting, screw insertion, welding or assembly are simply migrated from

the press to the BIMERIC platform." This greatly reduces the overall tool length below the press and makes it possible to use a smaller press. The space available at the modular BIMERIC platform can be extended flexibly and easily at any time.

Flexible integration of operating steps

"At the same time, a range of processes can be integrated quickly and easily at the BIMERIC SP and these can be extended without limitation, while always ensuring



Complex process integration in a purely progressive tool solution
In a progressive tool solution, complex parts geometries and additional processes take up a lot of space in the press. This results in a large installation space for the press coupled with often unnecessarily high press forces.

TRAINING/ENGINEERING

TAILOR-MADE FULL-RANGE OFFER

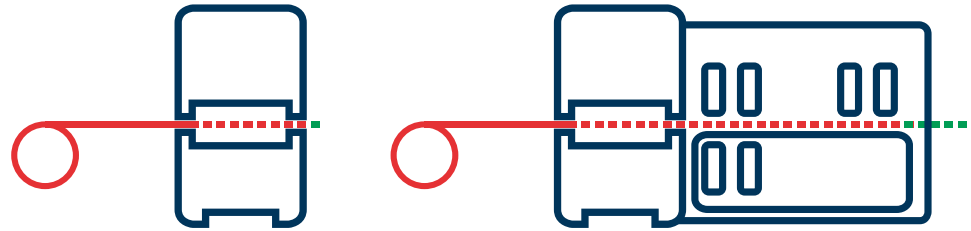
Innovative manufacturing solutions and highly qualified personnel are crucial factors for business success. Permanent training and further training are vital nowadays if companies are to keep up with the breathtaking pace of automation. "With our full-range 'Training/Engineering' package, we offer our customers tailor-made support covering every aspect of their activities," explains Head

of Training Peter Thieme. "The individually combinable full-range package is perfectly designed for each manufacturing solution and meets our customers' specific requirements."

Know-how transfer in the real world

The Training/Engineering offer brings together the modules from

the Bihler training program that the customer needs: from goal-oriented concept and process development, via further-reaching consultation on tool design, training courses in bNX, control systems, system programming and welding technology, and on to support during tool construction, as well as system maintenance and repair. "Our experienced team trains participants in our own Training Center and directly at the



Simple process migration with the BIMERIC SP

Migrating the processes greatly reduces the overall tool length below the press and makes it possible to use smaller presses. The space available at the modular BIMERIC platform can be extended flexibly at any time.

perfect accessibility,” says Bernd Haussmann. “To achieve this, we offer our customers a wide portfolio of process modules for all their forming, assembly, handling and joining applications – as well as a central controller in the form of the Bihler VariControl. Using this standardized modular system, users save time and cut costs when integrating their processes and interface problems are eliminated.” Consequently, the system has the flexibility to be re-used for many different products. On a change of product or variant, it is usually only necessary to replace the part-specific active tool components. “The BIMERIC SP replaces multiple production systems and therefore considerably reduces the machine investment and overall manufacturing costs. Transport and logistics costs are eliminated, as are costs for additional quality controls, machines and feed equipment.” ■

In contrast to conventional manufacturing processes, the BIMERIC SP is a single-source solution that covers the entire production flow – for the efficient manufacture of assemblies without intermediate steps.



customer’s system,” explains Peter Thieme. “Customers benefit from a requirements-oriented know-how transfer that addresses their practical needs, fast project ramp-up and, ultimately, more cost-efficient production.”

Value added in practice

One of the first customers to decide to take advantage of this full-range package was Schnöring GmbH from Schalksmühle, Germany. According to Jörg Conrad, Head of Development/Technology at Schnöring:

“Thanks to this tailor-made solution, we were able to successfully complete our very complex project without any noteworthy delays. The extra qualifications and experience we have acquired are not just limited to the project. They also boost our capabilities in terms of our further-reaching and existing technical solutions and will continue to give us a vital competitive edge in the future.” ■



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B. ON TOP HIKING TIP

CONQUERING THE AGGENSTEIN

It is a striking mountain with many faces. From many viewpoints, the Aggenstein appears to have three summits, giving it its special significance as a “trinity of peaks”. And this 1,986 meter-high mountain on the border between the German Allgäu and the Austrian Tirol has indeed inspired many legends. But most of all, the view from the top out over the Tannheim valley, the Ammergau mountains as far as the Zugspitze, the foothills of the Alps, and on especially clear days, the high Alps themselves is ample reward for the ascent.

For experienced mountain walkers, the climb up the Aggenstein is a popular route, which can be extended to take in the Füssener Jöchle if desired. Anyone seeking an easier option can take the cable car from Pfronten to the Breitenberg (top station at 1,677 meters) and then walk from there directly to the Aggenstein. However, we have chosen a southern approach over the Tannheim valley. The walk starts from the hikers’ car park in the Austrian town of Grän along easy forest paths up to an altitude of 1,150 meters. Shortly afterwards,

a hiking path branches off and take us steeply upwards. The views of the Tannheim mountains are rich reward for any walker. Just before the Bad Kissinger hut, and after walking for an hour and a half, we reach a saddle from which we get our first views out toward the Ammergauer mountains and Alpine foothills and see the Forggensee lake shimmering in the sunlight. After a good ten minutes walking, we reach the Bad Kissinger hut at an altitude of 1,792 meters. Perched boldly above the mountain landscape like an eagle’s nest, the hut offers a

fabulous panoramic view from its terrace. The summit now seems to be almost within touching distance. However, for the coming section of path it is necessary to tread with care and to have no fear of heights. An iron chain in the rock face, similar to the cables found on via ferrata tours, helps hikers on their way. Although no real climbing is required, some skill is nevertheless essential. And the extensive view from the summit is a fitting reward. Starting from Grän, the ascent and descent take approximately 4 ½ hours. ■



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