

Industry insiders gather in Medical Valley

Virtual and real inspiration for medical machining engineers

AECC Chengdu Engine Co., Ltd.

Interview with Zeng Nianke, Minister of blade facilities support department

An order with many extras

Dörries CONTUMAT vertical turning lathe: Use in KSB pump production

The second machine cuts (even) better

FOGS 40 68 C in toolmaking

Heckert HEC 1000

PHS 3500

Four Heckert machining centres for burner housing production at Weishaupt



Content



11

Interview with Zeng Nianke,
Minister of blade facilities
support department



06

Industry insiders gather
in Medical Valley

05 Editorial

By Walter Börsch

CURRENT NEWS

06 Industry insiders gather in Medical Valley

Virtual and real inspiration for medical machining engineers

08 Aero Structures Technology Days 2018

New manufacturing solutions for structural components

CUSTOMER SERVICE

11 AECC Chengdu Engine Co., Ltd.

Interview with Zeng Nianke, Minister of blade
facilities support department

ENERGY

14 An order with many extras

Dörries CONTUMAT vertical turning lathe:
Use in KSB pump production



18

FOGS 40 68 C
in toolmaking

LEGAL NOTICE

**Star – The Starrag Group
magazine**

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Picture credits:

© Photographs and illustrations:
Starrag Group 2018
© Page 14–29, Ralf Baumgarten

Design:

Gastdesign.de

Printing:

Druckhaus Süd, Cologne

Reprinting:

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Star – the Starrag Group
magazine appears in German,
(official Swiss spelling rules),
English and French. Despite
careful editing, no guarantee
can be made. Star appears
biannually.

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22

Growth through automation and flexibility



26

Four Heckert machining centres for burner housing production at Weishaupt

INDUSTRIAL

18 The second machine cuts (even) better

FOGS 40 68 C in toolmaking

22 Growth through automation and flexibility

The Swiss machining firm Zwicker has geared itself up for the future with a five-axis Heckert 800 X5 MT machining centre and a supplementary linear pallet system

26 Four Heckert machining centres for burner housing production at Weishaupt

The Heckert large-scale machining centres were the answer to smooth interchangeability of pallets and fixtures for the two differently sized machining centres

30 A gateway to more growth

A turned parts contractor from Berlin is boldly setting out on a new path

34 First aid for cutting processes

Interview with Bassem Sudki, Project Engineer at Starrag Vuadens SA, Vuadens (Switzerland)



Starrag Group at trade shows

27.–30.03.2018
Industrie Paris
Paris (France)

09.–13.04.2018
MACH
Birmingham (UK)

09.–13.04.2018
CCMT
Shanghai (China)

17.–20.04.2018
SIAMS
Moutier (Switzerland)

01.–03.05.2018
Ceramics Expo
Cleveland (USA)

14.–18.05.2018
Metalloobrabotka
Moscow (Russia)

15.–18.05.2018
INTERTOOL
Vienna (Austria)

05.–08.06.2018
Mach-Tool
Poznań (Poland)

12.–15.06.2018
EPHJ
Geneva (Switzerland)

16.–22.07.2018
Airshow
Farnborough (UK)

10.–15.09.2018
IMTS
Chicago (USA)

18.–22.09.2018
AMB
Stuttgart (Germany)

25.–28.09.2018
Micronora
Besançon (France)

01.–05.10.2018
MSV
Brno (Czech)

09.–13.10.2018
BIMU
Milano (Italy)

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Walter Börsch
CEO of the Starrag Group

Dear reader,

By now, you are almost certainly familiar with our claim: "Engineering precisely what you value." But the word "value" is meant here in the very truest sense of the word: Our customers are always provided with precisely what they need and what is important to them: nothing more and nothing less.

But let's move on from the slogans and talk about what this actually means in practice – what do you, as our customer, particularly value? Every single day, Starrag occupies itself with this very question and the search for the right answers. And the results of our searches never cease to amaze me.

I took a look at the images and reports from the successful projects and events from recent weeks that we are covering in this issue. One of the most important values of new production equipment has already been touched upon in our cover story: It describes how Max Weishaupt GmbH from Schwendi, Upper Swabia, managed to make the manufacturing process for large, heavy burner housings around 10 % faster and more energy efficient than before thanks to four new Heckert machining centres. This new production process represents an investment in higher quality, greater flexibility and better efficiency, and is therefore an investment in the future.

Safeguarding the future seems to be one of the values that all Starrag customers are addressing, in a variety of ways: KSB AG in Pegnitz places value on tight production structures, through which the company can carry out processing very quickly and with very low dwell times. The company, located in Upper Franconia, is supported in its efforts by a highly productive Dörries CONTUMAT vertical turning lathe. At SWB Schmedthenke Werkzeugbau GmbH in Gütersloh, on the other hand, it was all about a quick changeover. The company's second milling machine with overhead gantry (Droop+Rein FOGS) began operation just as a 22-week retrofitting period began for an older FOG machine.

For many Starrag customers, safeguarding the future means achieving the highest levels of productivity and the utmost precision: At the "Aero Structures Technology Days 2018" event in Rorschacherberg, aircraft component experts from around the world saw how this could all be harmonised. They also paid a visit to Pilatus Aircraft in Stans. This Starrag customer proves that even in a country with high wages like Switzerland, successful production can still be achieved through intelligent, highly productive manufacturing solutions such as the Ecospeed machining centres.

The Saint Nicholas Tech Day in Immendingen rounds off the reporting on our events. Some 50 experts from Medical Valley attended the event, along with the owner of a small, highly specialised subcontracting business who recently ordered a vertical 5-axis machining centre: "The competition must not know that with a Bumotec s191 PRM, I will soon produce highly accurate medical technology components in a single clamping operation."

Discretion is also sometimes an important way of securing the future. Discretion is however not appropriate in another matter: As you probably already know, I am leaving Starrag for private reasons after more than ten exciting years. As of 1st June 2018, the company's future will be secured by the new CEO Christian Walti.

So for the last time, as CEO, I hope you enjoy reading these articles.

Sincerely, Walter Börsch

Industry insiders gather in Medical Valley



Virtual and real inspiration for medical machining engineers

Less than two years old and already a popular meeting place for the medical technology sector: Starrag's TechCenter for Medical Technology and Precision Engineering (TCI), where the events of the St Nicholas Tech Day took place. Up to 50 experts from Medical Valley came to the event, where they observed, listened and were amazed by demonstrations of the high-precision machining centre Bumotec s191H, for example.



Inspiration on Saint Nicholas Day: Professionals from 14 companies in Medical Valley were among the group of experts gathered at the TechCenter for Medical Technology and Precision Engineering (TCI) belonging to Swiss company Starrag.



There was a lot of interest: The first guests arrived shortly after the Saint Nicholas Tech Day began, to take part in small talk at the coffee bar, technical discussions at the stalls of Starrag's partners Horn, CGTech and SolidCAM, and to watch machine demonstrations of the Bumotec product range, manufactured in the Swiss canton of Fribourg. "For us, a customer day at the TCI is more than just a promotional event," said a regular guest from the region. "We enjoy meeting back here again and again to discuss new machining trends with representatives from Starrag and their partner companies, and with colleagues from the medical technology sector."

Even new customers are delighted

At the centre of the event were of course demonstrations of the high-precision machining centre Bumotec s191H, which

performed the precision processing of stainless steel micro-mechanical components to thousandths of a millimetre. Several industry specialists from a long-standing, loyal Starrag customer that already owns several Bumotec centres were not the only ones interested in the demonstrations. The owner of a small, highly specialised subcontracting business from the Tuttlingen district, who recently ordered a vertical 5-axis machining centre, also took part in the event. "I have been singing this machine's praises for a long time now," said the new customer. "The competition must not know that with a Bumotec s191 PRM, I will soon produce highly accurate medical technology components in a single clamping operation. It speaks volumes that with this machine, 80 % of my components can be completely machined in a single clamping operation."

These components are most likely to be highly complex parts made of high-strength materials, "because the s191 is much way good for standard products," says Oliver Lenhardt, Head of Application Technology at the TCI. Despite its compact design (space requirement: 4 m³) and relatively low weight (4.2 t), the machining centre features a high degree of system rigidity. In Immendingen there was also great interest in the fact that the machine is also suitable for simultaneous 5-axis machining of rods with a diameter of up to 65 mm.

Successful collaboration with partner companies

High-quality machining results are often better achieved in collaboration with partner companies, with tool manufacturers playing a major role in this. The high

At the centre of the event were of course demonstrations of the high-precision machining centre Bumotec s191H, which performed the precision processing of stainless steel micro-mechanical components to thousandths of a millimetre.



requirements of the medical technology sector were highlighted in a lecture by Matthias Polzin, Application Engineer at the Paul Horn carbide tool factory, with reference to typical materials and their particular characteristics. The workers in Tübingen have developed a variety of tailor-made solutions suitable for each of these raw materials: In Immendingen, Polzin presented various tools, including Horn's new "µ-Finish" tools, specifically developed for the machining of small parts made of stainless steel, for example.

Meanwhile, virtual solutions are now playing just as important a role as tools: Frank Zehnder, Application Engineer from SolidCAM, demonstrated how iMachining can be used for the virtual optimisation of processing. Hans Erkelenz from CGTech's Application Technology department demonstrated the Vericut simulation program using a virtual Bumotec s191H. Thanks to a number of interfaces, the user can reduce "the amount of manual input required to the minimum."

The Saint Nicholas Tech Day concept went down well. "It was a very successful event with around 50 guests from 14 companies," said TCI Head of Sales Marc Lehmann. "The feedback was more than positive: The total number of new projects that came about as a result of the event was in double figures." ▀

Inspired by the neighbours

Lothar Schutzbach was one of approximately 50 experts from Medical Valley to meet in December at the new TechCenter for Medical Technology and Precision Engineering (TCI) belonging to Swiss Company Starrag. The manager is delighted with his new neighbour, who is now able to provide support even more directly than before with the company's five Bumotec machining centres.

Mr. Schutzbach, when did Aesculap begin using Bumotec machining centres?

Schutzbach: We have been using them for more than ten years. We now have five multi-axis Bumotec machining centres that we use to manufacture surgical instruments from martensitic materials, stainless steels and titanium alloys.

What are the advantages of Bumotec production technology?

Schutzbach: It is particularly suitable for highly complex microsurgery and neurosurgery instruments that require an extremely precise manufacturing process, as well as for endoscopy and laparoscopy instruments. And, of course, it's also suitable for implants, for the spine for example, and the necessary associated instruments. I consider it a great advantage that components can be fully machined in a single clamping operation, which means that no processing or handling errors occur. Aesculap is also very satisfied with the quality of the surfaces: With production on a Bumotec, post processing is only very rarely required. We have largely been able to eliminate machining operations such as grinding and polishing.

What benefits have you seen from the newly founded TechCenter for Medical Technology and Precision Engineering (TCI), located just next door?

Schutzbach: The new site is very positive for us – we can now receive even better support because we are so close by. We receive very fast and professional assistance. And what is more: If a task becomes more complex, we can call for additional support from Switzerland through the TCI.



Lothar Schutzbach,
Manager of the Instrument Plant of Aesculap AG in Tuttlingen:
"With production on a Bumotec, post processing is only very rarely required. We have largely been able to eliminate machining operations such as grinding and polishing."

Aero Structures Technology Days 2018

New manufacturing solutions for structural components

Turnover in the aerospace industry has been increasing for several years now. In order to be able to meet the demand for aircraft components, manufacturers and suppliers are constantly required to put their production materials and strategies to the test and find new, even more efficient manufacturing solutions. The Aero Structures Technology Days 2018 on 23 and 24 January held by Starrag in collaboration with Kennametal were a rich source of inspiration.

160 participants from 45 different companies and a total of 16 countries travelled to Rorschacherberg on Lake Constance. Customers came from Asia, America and Europe, from aircraft manufacturers such as Boeing, Airbus and Pilatus, as well as numerous small and large suppliers. Their motivation: an update on state-of-the-art production possibilities for structural components. Their questions: How do we optimise unit costs? How can we ensure the high quality of components? How can we reduce our machining times?

Starrag and Kennametal already had practical answers to hand. Ultimately, the aerospace industry is one of the main markets for Starrag, who is a global technological leader in the manufacturing of precision machine tools. Aerospace companies also belong to the core target group for internationally renowned tool manufacturer Kennametal.

"We have been working together for a very long time and have gained numerous joint projects for structural components," emphasises Dr. Norbert Hennes, Head of Starrag business unit "Aerospace & Energy". "In this respect, Kennametal is an ideal partner to host our Aero Structures Technology Days"

After all, this was not only about showing Starrag machines, but also presenting functional solutions that make users more productive.

"Every machine tool requires a tool and likewise, no tool works without a machine," agrees Laurent Bigot, Vice President Sales & Marketing Industrial EMEA at Kennametal Europe, with: "The challenges of the aviation industry are best met in partnership with a company like Starrag. I am convinced that we offer the best tools for a variety of requirements, as Starrag's portfolio includes ideal machine solutions. Here, we demonstrate together how customers can benefit from our collaboration in numerous applications".

New ways of cutting

Demonstrations at seven stations take the huge variety in the production of structural components into consideration: different materials such as aluminium, titanium and super alloys, and small and large components and series. Starrag and Kennametal worked together to demonstrate the challenges of the respective task and announce their jointly developed solution – including all process data and

Trade meeting at Starrag in Rorschacherberg: Customers came from Asia, America and Europe for updates on state-of-the-art production possibilities for structural components.

a clear presentation of the potential for optimisation. In addition, lubricant supplier Blaser and tool clamping specialist Haimer GmbH presented their products at a partner stand.

There is no doubt that one of the highlights was the new path that Starrag and Kennametal are taking to save time in the machining of an Iconel engine mount. It begins with the selection of the LX 051 machining centre and the clamping operation on a swivel rotary table, which reduces the number of clamping operations from four to just one. Milling tools with ceramic cutters and made of solid carbide ensure effective cutting of the forging blank measuring 10 to 40 mm. The result is impressive: Instead of the previous processing time of around 50 hours, the component is now fully roughed and smoothed in 13.9 hours.

Demonstrations showed participants how efficient machining titanium can be. First of all, specially designed Kennametal tools impress in the performance section (for 2D roughing with a





The new 150 kW Ecospeed spindle promises repeatable cutting rates of over 12,000 cm³/min – in aluminium – that can replace the tried-and-tested 120 kW Ecospeed spindle (82 Nm, 30,000 rpm). It is used in both the new STC 800 X machining centre as well as the Sprint Z3 parallel kinematic machining head of the Ecospeed machines.

For example, the versatile five-axis STC 800 X machining centre rounds off the Ecospeed series – putting Starrag's claim "Engineering precisely what you value" into practice. At the Aero Structures Technology Days, the STC 800 X proved in live demonstrations exactly why it is a go-to solution for aluminium parts up to 1,400 mm. A design optimised for maximum dynamics and the shortest chip-to-chip times both ensure high productivity. The tool magazine designed for up to 465 tools ensures flexibility, among other things.

A step towards new production dimensions

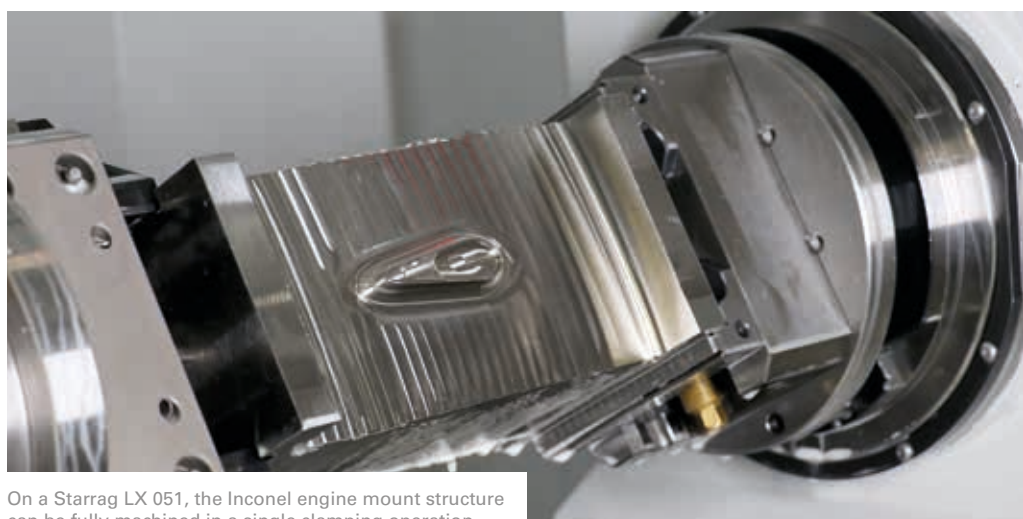
Flexible manufacturing systems are enjoying increasing popularity thanks to growing series sizes as well as the desire for automated production and assured quality. For over 25 years, Starrag has developed these so-called FMS (Flexible Manufacturing Systems) and assumed responsibility for all elements and the entire process – from machines, equipment and tools through to the automatic set-up and handling of workpieces by robots, and even the cell controller. In Rorschacherberg, an FMS demonstrated how complex the task definitions can be – after delivery it will machine more than 35,000 Inconel or titanium turbine blades right through to completion via a fully automated process.

Starrag also develops and installs customer-specific FMS globally for housings,

removal rate of 495 cm³/min and 5-axis roughing with 288 cm³/min). Next, efficient milling of a pocket with undercut attracted a lot of attention. The core element: the compact swivel milling head of an STC 1250, which enables processing with shorter and therefore more stable tools.

Considerable interest was generated by the new modular ECOFORCE Ti 9/13 machining centres, which are currently almost unrivalled in terms of performance and time. The choice of horizontal pallets (from 4,000 × 1,000 mm up to 8,000 × 2,500 mm for loads of 5,000 to 12,000 kg) enables large titanium structural components to be machined. The stiffer gear spindle – especially in comparison to motor spindles – with a maximum 8,000 rpm and 940 Nm S1 torque or 5,600 rpm and 1,300 rpm Nm S1 torque ensures efficient roughing and finishing. In conjunction with appropriate Kennametal tools, users benefit from tremendous machining rates of up to 750 cm³/min for titanium.

Dr. Norbert Hennes, Starrag:
"Our Aero Structures Technology Days are not only about demonstrating Starrag machines, but also presenting functional solutions that make users more productive."



On a Starrag LX 051, the Inconel engine mount structure can be fully machined in a single clamping operation.



Teamwork between Starrag and Kennametal: Participants received detailed information about processes, machines and tools – in this case efficient titanium machining.



The theme of Aero Structures Technology Days 2018 organised by Starrag and Kennametal: How can structural components be manufactured in an even more productive way?



Dr. Bernhard Bringmann, Starrag: "More and more customers ask us for intelligent FMS systems"

wing profiles and structural components. The second technology day provided a live example, in which Pilatus Aircraft Ltd gave participants a glimpse of state-of-the-art aircraft construction. Pilatus develops and builds aircraft in Stans (a canton of Nidwalden) that are delivered all over the world: from the best-selling single-engine turboprop aircraft PC-12 right up to the PC-24 – the world's first business jet that is able to operate on short, unprepared runways.

With the commercial viability of the PC-24, production capacity has reached a new highpoint, but this has also consequences. Because the new business jet, as with all other Pilatus aircraft, consists of numerous aluminium structural components from the nose to the tail fin and wingtips, those responsible made the decision to move in a new direction for a large part of the machining. Pilatus installed a Starrag FMS with two identically equipped Ecospeed F 2040 machining centres for aluminium structural components between 750 mm and 4,000 mm in length and significantly increased production capacity in comparison to the previous solution.

As part of the scope of supply, Starrag provides the project planning and engineering of the whole FMS, which includes a pallet handling system with 16 pallets of 2,000 × 4,000 mm in addition to the machining centres. Furthermore, the system also features two set-up stations with a tilting table to allow horizontal loading. The highly-automated production is supported by another product developed and supplied by the Starrag: a production cell controller. This manages the interaction of the machine duo with pallet and set-up stations. In addition, all turnkey foundation work is carried out by Starrag.

Dr. Bernhard Bringmann, Managing Director at the Starrag Rorschacherberg site, explains: "More and more customers are asking for these intelligent FMS systems". A new customer, who is convinced by the Starrag concept, is the keynote speaker of the event – Charlie Newell, CEO of Orizon Aerostructures. His company produces and supplies large, complex metal structural components and main components to leading airframe manufacturers.


He ordered an FMS for a new production facility with a total of seven interlinked Ecospeed F 2060 machining centres. The F stands for fixed columns and 2060 indicates a pallet size of 2,000 × 6,000 mm. "The manufacturing system was fully planned by us and is equipped with our cell computer architecture," stated Bernhard Bringmann. "It took only 18 months from receipt of order to delivery of the last machine in December 2017". Charlie Newell not only confirmed the technical competence of Starrag in his speech, he also highlighted a further important factor for him: "The concept of teamwork plays a significant role in our company's philosophy. Therefore, we are delighted to have found a business partner in Starrag that not only supplies machines but also supports us in close collaboration with regard to application technology and programming". ▀



AECC Chengdu Engine Co., Ltd.

> THE INTRODUCTION OF CHENGDU ENGINE HISTORY

AECC Chengdu Engine Co., Ltd., founded in 1958, is a large state-owned enterprise mainly focusing on high-end manufacturing industry, as well as is a world-class outstanding supplier of aero engine and gas turbine components. The company has 5 wholly-owned subsidiaries, 1 share-controlling listed company and 5 shareholding companies. The company covers an area of 620,000 square meters with a registered capital of 754.96 million yuan and the total assets of 6.3 billion yuan. There are more than 4,500 process equipments and more than 5,200 employees.



AECC Chengdu Engine has passed the quality system certifications of ISO 9001, GJB 9001A and AS 9100-B.

The company has been engaged in the development of aero engines for a long time. Through the cooperation with famous international aero companies, the company has mastered the advanced international manufacturing technology of key parts and components for aero engine, established four professional advantaged platforms, such as casings, sheet metals, blades and bearings, formed three innovation centers such as technology, heat table and loading test with complete test capability for the development and production of aero engines and has the national defense level two regional metering station and the physical and chemical testing center with the national laboratory qualification. The company has passed the quality system certifications of ISO 9001, GJB 9001A and AS 9100-B. Besides, the special processes such as heat treatment, welding process, non-destructive detection, chemical treatment, coating

“Finally, the future value-added service like long-term maintenance is a favorable guarantee for the enterprise to build the maintenance team, and it’s the essential condition for the enterprise development to learn advanced maintenance concept.”

and non-conventional machining have been certified by the international space agency NADCAP.

Through the long-term cooperation with well-known international enterprises such as GE, HP and UK RR, the strategic cooperative relationship has been gradually promoted to the risk cooperative partnership. Industrial civil goods and modern service industry are rapidly integrated into the regional economic

development circle. Starrag LX151/251 are mainly used in the machining of complex airfoils and blades made of stainless steel, titanium alloy, inconel and aero aluminium in the blade branch of Chengdu Engine. Starrag and Chengdu Engine **achieved a Serviceplus agreement – Guaranteed availability at a fixed price.** It features a customized and optimized maintenance, which secures productivity with cost transparency of the current and foreseeable maintenance costs. ▀

In order to adapt to the demand of quick satisfaction of the customer's order, Chengdu Engine must face the customer's choice with a good state at the aspect of the production resources, such as personnel, equipment, etc.



Interview with Zeng Nianke, Minister of blade facilities support department

What kind of effect does Chengdu Engine expect to achieve for a long-term maintenance agreement with Starrag?

Nianke: It is hoped that the production task will not cause delayed delivery of customers' products due to the equipment failure, which will lead to a decrease in customer satisfaction. Meanwhile, the long-term maintenance agreement can help Chengdu Engine improve the equipment maintenance skills and reduce the downtime rate of equipments.

Why is it increasingly important for Chengdu Engine to have a predictive maintenance strategy like this?

Nianke: In order to adapt to the demand of quick satisfaction of the customer's order, Chengdu Engine must face the customer's choice with a good state at the aspect of the production resources, such as personnel, equipment, etc. In order to ensure that the equipment devote to the production for the customer

in good condition at any time, the predictive maintenance strategy of equipment will become more and more important.

What kind of change has maintenance service provided by Starrag brought to your company's production? Such as percentage of increase in productivity, percentage of decrease in downtime rate, etc.

Nianke: Maintenance service provided by Starrag has brought a new maintenance philosophy to Chengdu Engine blade, which mainly reflects in the repair service concept of rapid response that avoids the downtime caused by the process management of the enterprise, the early warning replacement of the vulnerable parts (there was no downtime occurring due to the spare parts problem in 2017), regular inspection and maintenance and adequate spare parts. The above mentioned maintenance concepts guarantee the increase in productivity and decrease in downtime rate.

What do you think about the importance of the future value-added services such as long-term maintenance for Chengdu Engine?

Nianke: First of all, it is necessary to recognize and affirm the importance of value-added services of long-term maintenance for enterprises, and the service concept of thinking for customers is needed for each enterprise. Secondly, the professional maintenance which can maintain the equipment precision will help to ensure the product quality and is favorable safeguard for the quality reputation of enterprises and the interests of customers. Finally, the future value-added service like long-term maintenance is a favorable guarantee for the enterprise to build the maintenance team, and it's the essential condition for the enterprise development to learn advanced maintenance concept. ▀

An order with **many extras**

Dörries CONTUMAT vertical turning lathe: Use in KSB pump production

High expectations from regular customers are part of everyday life for Starrag. This order was no different: The KSB factory in Pegnitz ordered a high-performance vertical turning lathe which allows very fast, precise and efficient machining of pump housings weighing up to 3 tonnes in one clamping operation, even when the materials are difficult to work.



Success: Production Technician Fritz Suttner and Machine Operator Matthias Bauer are impressed with the extremely precise machining of difficult-to-work pump materials.

In one clamping operation: Production Technician Fritz Suttner and Machine Operator Matthias Bauer are both pleased, in particular with the complete processing that is now possible for many typical pump components (housings).



Motivation: Machine operator Matthias Bauer enjoys working on the new CONTUMAT vertical turning lathe from Starrag, because it makes his work easier.



“Our business is characterised by very short delivery times”, explains Fritz Suttner, a member of the Production Technology department at KSB AG in Pegnitz (near Nuremberg). “We place value on tight production structures, through which we can carry out processing very quickly and with very low dwell times.” This concerns the production of large pump housings up to 3 tonnes in weight created for the power and chemical industries among others. These are custom-made in batch sizes 1 to 2 from materials including corrosion- and acid-proof stainless steel as well as heat-resistant special ferrous alloys. Pegnitz plays a special role within the KSB Group because the plant has its own foundry for producing special alloys. This makes it possible to produce tailor-made materials, used for example when deploying pumps for smoke desulphurisation, which are resistant to corrosion, aggressive media and abrasion.

Increased
productivity due
to workpiece
machining in
one clamping
operation



The previous production method had been difficult for the firm from Upper Franconia. “We used to turn first the front and then the rear side in two clamping operations, then the drilling was carried out using another machine”, explains Suttner. “This naturally led to long throughput times with many interruptions and dwell periods.” Now everything takes place in one process on a compact Dörries CONTUMAT VCE 2800/220 MC single column vertical lathe (swing diameter: 2,800 mm). The vertical turning lathe performs turning, drilling and cutting in a single clamping operation.

In addition to the complete machining, being able to program on the machine was important to KSB. Until now, a programming office has been writing around 4,000 programs a year in Exapt, which can be inserted directly into the machines after post-processing with DNC.

The machine is also used to process cast raw parts with a wide variety of stock contours. "We don't need to go back to the NC programs being created by the programming office. Instead they are created on site because of the variety of contours," explains the production technician. "The operator inserts the component, aligns it, inserts the appropriate tool and enters the machining cycles directly into the Siemens 840 D sl controller." Machine operators receive the necessary training in a custom advanced programming course "P2" at the Starrag site in Mönchengladbach.

The new option for workshop-oriented programming with Siemens Operate, which represented a new direction for KSB with Starrag, has also proven its worth in post processing. This isn't the only reason why the production expert calls the Dörries CONTUMAT a multi-functional machine concept that can machine



Fritz Suttner from Production Technology at KSB AG in Pegnitz: "We got exactly what we needed and what is important to us – for example a significant increase in productivity."



Always in the picture: Most of the machining work is done on the inner contour. Without the vision system, a worker such as Matthias Bauer would have little opportunity to observe the machining process in a completely enclosed machine.

even large, hard-to-work components with low vibration through its rigid cast construction and hydrostatic guides. The low vibration has proven itself in particular with the process-secure manufacturing of very precise workpieces, made to the exacting IT6 tolerance standards.

Suttner and his team are especially satisfied with the complete processing of many typical pump components (housings), since even the machining process of these workpieces can be monitored by the machine operator thanks to investment in an integrated image processing system. "The camera was expensive, but the investment has paid off," he comments on the extra feature. "On our components, most of the machining work is done on the inner contour. There would have been little opportunity to observe the machining process in a completely enclosed machine otherwise."



A meaningful "extra": KSB considers complete enclosures important on all new machines, such as the CONTUMAT vertical turning lathe, in order to protect workers from aerosols and to prevent contamination of the factory.

With built-in process reliability: Heavy pump housings are created in Pegnitz, in batch sizes 1 to 2 from materials including corrosion- and acid-proof stainless steel as well as heat-resistant special ferrous alloys. These are used in the power and chemical industries, among others.



The alignment enables another special feature: The machine can also be run in operating mode 5, which for example allows the workpiece to be aligned with the door open when the table is turning at a low speed, guaranteeing safety of work. To improve ergonomics and employee motivation, KSB also had power chuck cylinders installed, which make life easier for workers. Now the clamping plates can be opened and closed easily with a small torque spanner. KSB also integrated a special suction cup whose high suction power allows even heavy chips, damp with coolant, to be reliably removed.

So there are many equipment details which KSB value in a vertical turning lathe. But, all in all, does the machine reflect the Starrag claim "Engineering precisely what you value"? Has the customer, KSB, received exactly what they need and what is important to them?

Single
machine concept means
less space is
required

"Yes, as in our investment planning we defined a marked increase in productivity," says the production technician. "It is becoming clear that this requirement has been met." The vertical turning lathe has also met another demand from the specification: It has a far smaller footprint, since it replaces two to three conventional machines. He also praises the commissioning competence in particular. Suttner: "Starrag impress with their meticulous approach." ▀



Special application: KSB Pegnitz uses special rotary flange tools for machining the high-strength special alloys manufactured in their own foundry.

The second machine cuts **(even)** better

The real prowess of a machine tool manufacturer is only revealed in truly difficult jobs, such as a “flying” change: Schmedthenke Werkzeugbau ordered a second Droop+Rein milling machine with overhead gantry (Droop+Rein FOGS), which began operation at the same time as the other FOG machine shut down for retrofitting.



Effective smoothing: The Droop+Rein FOGS 40 68 C is a five-axis machine tool designed for smoothing and is equipped with a Heidenhain control system that is tried and tested in toolmaking (iTNC 530 HSCI).

“Shortly after commissioning, availability was already at over 95 %.”

Jörg Schmedthenke, Managing Director of SWB Schmedthenke Werkzeugbau GmbH in Gütersloh: “We have been able to expand our range to include very large structural and exterior body parts, thanks to the new Droop+Rein FOGS 40 68 C. Today we take on a lot of smoothing work not only for our own products but also for external clients.”

FOGS 40 68 C in toolmaking

It was an investment they haven't regretted, according to Jörg and Carsten Schmedthenke, Managing Directors of SWB Schmedthenke Werkzeugbau GmbH in Gütersloh. Having begun to smooth large tools, the workshop has become a highly sought-after specialist in large sophisticated tools for automotive bodywork. Jörg Schmedthenke looks back: “We weren't able to smooth large components in the past, because we didn't have the right machines.” In 2012, the family operation therefore took on a

second-hand Droop+Rein FOG 2500 from the BMW toolmaking facility in Eisenach (pallet: 6,000 mm × 2,500 mm, three-way pallet changer, changer for 60 tools, fork head with three motor spindles, maximum 24,000 rpm), which BMW had already comprehensively retrofitted.

“We have been able to expand our range to include very large structural and exterior body parts” says Schmedthenke. “Today we take on a lot of smoothing



Versatile application: With the second FOGS 40 68 C, Schmedthenke is smoothing all of the components for the automotive sector.

work not only for our own products but also for external clients. This means the investment we made in the Droop+Rein FOG 2500 has more than paid for itself." In 2017, the machine underwent another retrofit, in which the golden oldie (built in 1994) was given new drive technology and a new control system, meaning it can now machine parts from high-alloy castings. According to Schmedthenke, the machine has smoothed "sensationally" since the retrofits.

In 2016 – thanks to the enormous success of the old Droop+Rein machine – the East Westphalia-based company

ordered a second one: The Droop+Rein FOGS 40 68 C is also a five-axis machine tool designed for smoothing (X axis: 6,800 mm; Y axis: 4,000 mm, Z axis: 1,500 mm, C axis: $\pm 200^\circ$, B axis: $\pm 115^\circ$; pallet: 6,000 mm \times 3,000 mm, changer for 51 tools, fork head with two motor spindles, 10,000 rpm or 20,000 rpm) with a Heidenhain control system that is tried and tested in toolmaking (iTNC 530 HSCI). "With the second machine, we're smoothing all of the components for the automotive sector," explains the Managing Director. "The investment in a second FOGS machine also provides more security in the event that one machine

fails." Indeed, the new Droop+Rein FOGS took over the work of the first machine when it underwent 22 weeks of planned downtime for retrofitting.

"It was very important for us to have a supplier on whom we could rely completely in terms of meeting deadlines and commitments," says the Managing Director. "We agreed on a nine-month delivery time, and Starrag met this 100 %." Equally important to the East Westphalia-based company was a very high level of availability, which was at over 95 % shortly after commissioning. This reliability was not only thanks to



In waiting: Schmedthenke allows tools to cool off and relax for two to three days after roughing, before they move to one of the two FOGs for smoothing.



Carsten Schmedthenke, Managing Director of SWB Schmedthenke Werkzeugbau GmbH in Gütersloh, has never regretted the purchase of the first, second-hand FOG. Together with brother Jörg, he therefore ordered a second, new Droop+Rein FOGS 40 68 C milling machine with overhead gantry.

"The investment in a second FOGS machine also provides more security in the event that one machine fails."

the FOG series but also, according to Schmedthenke, down to the Starrag staff, who "were extremely knowledgeable and paid close attention to detail, down to the last 100th of a millimetre" during assembly. In line with the Starrag claim "Engineering precisely what you value", Schmedthenke thus received a machine with all the features they wanted exactly when they needed it.

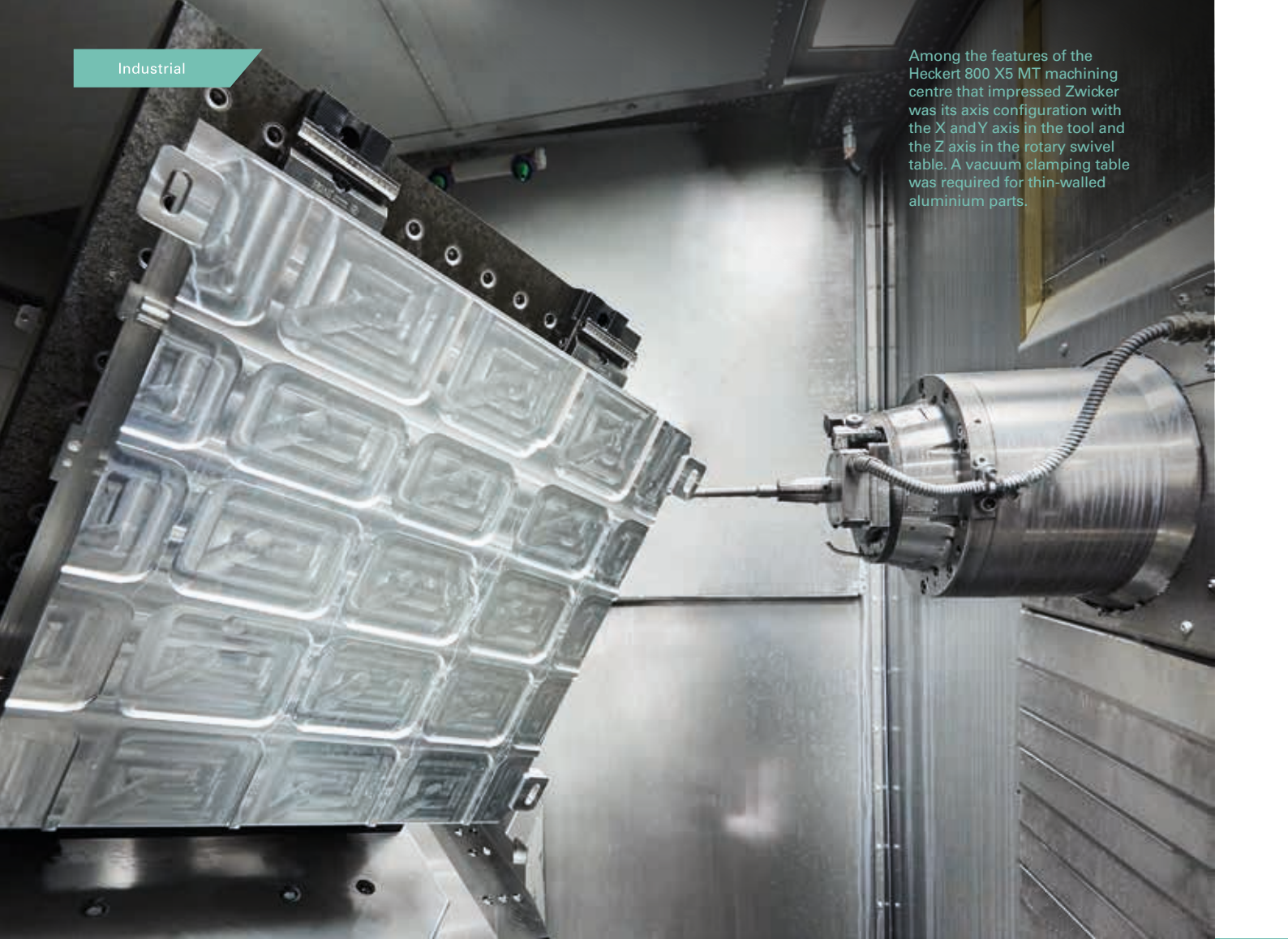
This meant it went into reliable operation four weeks after setup, precisely when the Droop+Rein FOG 2500 was due to be shut down. The machine wasn't pre-assembled at the Starrag factory in Bielefeld, but built from the ground up in Gütersloh and put into operation. The mechanical structure was so accurate that only the smallest of optimisations to the geometry was

necessary. "The machine geometry was almost faultless immediately after setup", says Schmedthenke happily. "And with a lot of other manufacturers, the geometry can't really be assessed, because their machines have to be significantly adjusted straight away."

The East Westphalia-based company is now using the second machine purely for smoothing. "With an additional drive, we could also use it for roughing", emphasises the qualified engineer. "But because of our two-machine strategy, we've decided to employ a machine just for smoothing. The precision needed in toolmaking can only be achieved by roughing on one machine and smoothing on another." For quality reasons, the company from Gütersloh does not conduct all of the machining in one clamping operation.

During roughing, so much heat is transferred into the component that its geometry changes. Schmedthenke: "If I were to start smoothing immediately, the dimensions would 'run away' from me as the component cooled."

In order for tools – for example for the outer shell of vehicles – to achieve milled perfection, Schmedthenke allows large components to cool off and "relax" for two to three days after roughing before they move on to smoothing. "It means we have to work quickly today, but it's only if we allow the tool a couple of days' rest that we will achieve the desired level of precision" explains the specialist. "And the benefit of this precision can be seen in the short training period needed for the press." ▀



Among the features of the Heckert 800 X5 MT machining centre that impressed Zwicker was its axis configuration with the X and Y axis in the tool and the Z axis in the rotary swivel table. A vacuum clamping table was required for thin-walled aluminium parts.

Growth through automation and flexibility

The Swiss machining firm Zwicker has geared itself up for the future with a five-axis Heckert 800 X5 MT machining centre and a supplementary linear pallet system. This fully automated production unit allows the company to be highly flexible and productive, and to use that new flexibility to tap into new markets.



When choosing the machine, the top priorities were quality, flexibility and process reliability, properties that the Heckert 800 X5 MT offers in abundance. Markus Zwicker (background, left) and Starrag Area Sales Manager Erwin Fässler were unanimous on this point.

"This plant has not only allowed us to expand our range of products, but also take profitability to a new level"

Since being founded in 1994 in Engen, near St. Gallen in Switzerland, Zwicker Präzisionsmechanik AG has maintained an upward curve of success. With 25 employees, the service provider focuses on machining challenging precision parts made of metallic materials, predominantly aluminium and steel. Markus Zwicker, who took over the management of the firm from his father Othmar in 2015, reveals the recipe for success: "We deliver the quality our customers demand and can be relied on to hit deadlines – all at competitive prices"


Markus Zwicker has no doubt that specialisation is required to survive in the highly competitive market in the long term: "We need to set ourselves apart from other providers with our services. We achieve this with precision machining." Around

one year ago, the company added another performance feature to its services. As part of its building expansion, Zwicker invested in a large machining centre with 800-mm pallets. "This means we can now also machine large parts with a diameter and height of up to one metre cost-effectively. At our site, that's really something special," states the master mechanic.

In choosing the machine, the key factors were quality, flexibility and process reliability, with the firm eventually deciding on a horizontal Heckert 800 X5 MT machining centre. Markus Zwicker was in no way prepared to compromise on these points. He explains: "With this machining centre, we need to be able to produce high-precision results and offer very flexible services. For cost-efficiency reasons, the machine also needs to

work around the clock. As such, a linear system for pallet handling and maximum reliability throughout the entire process are indispensable."

Those responsible for the machine determined that they required a horizontal, five-axis milling centre with a fast-rotating table for effective turning. A pallet storage system was also made a prerequisite so that the machining centre could be operated fully automatically during unmanned shifts. The specifications also included a large tool magazine. The machine also needed to have an angular head and a replaceable, CNC-controlled U axis to handle demanding contours such as valve seats. Another requirement was a vacuum clamping table in order to clamp thin-walled aluminium parts without warping them.



Some components have deep cooling ribs. So that they can be produced in one run, side milling cutters with diameters of up to 350 mm are used.

“The combination of highly-dynamic 5-axis machining and turning operations means we can efficiently handle the complete machining of large and complex workpieces.”

The search for an all-rounder

Most of the machine manufacturers

who were approached failed to meet these specifications in their entirety – but not Starrag! The Heckert 800 X5 MT impressed with its axis configuration with the X and Y axis in the tool and the Z axis in the rotary swivel table. Thanks to its thermally symmetrical design, the machining centre operates with the ultimate rigidity, resulting in excellent surface quality and reducing clamping positions. Together with the digital AC feed drives and the profile rail guides and ball screw spindles that are mounted with the highest precision, this ensures a solid basis for rotary machining and milling on all linear axes with a high level of process reliability. “These features mean that the machine is perfect for the automation processes we want to achieve,” states Markus Zwicker, who also highlights the design of the work space: “The chips can fall freely into the central swarf conveyor. This prevents chips from piling up in the work space, which would also endanger process reliability”.

With its 240 slots, the tool magazine also meets Zwicker’s requirements. “Having this capacity allows us to be very flexible and means we don’t have to constantly re-tool, even for the smallest series runs,” says the CEO. The magazine can hold tools with diameters of up to 350 mm and a length of up to 800 mm and automatically change them. Markus Zwicker uses an example to explain why this is so important: “One of the things we machine is aluminium housings for communication technology, which have deep cooling ribs. To allow us to produce these in one run, we use side milling cutters with diameters of up to 350 mm. If these couldn’t be changed automatically, an unmanned night shift would be impossible.”

Economic benefits

These thin-walled aluminium housing parts with dimensions measuring 600 × 600 × 100 mm impressively demonstrate the increased cost-effectiveness achieved thanks to the Heckert 800 X5 MT. In the past, Zwicker had to re-clamp the

workpiece five times on the old machines during the machining process (totalling 90 % of its volume), whereas the housings can now be processed on the Heckert using just two clamping operations.

And it’s not just with the aluminium parts that Zwicker has seen good results. The precision manufacturer processes steel cylinders with a diameter of 750 mm and length of 800 mm for another customer. Spinning at speeds of up to 500 rpm, the rotary table reveals its strengths during turning processes (inside and out). The connecting holes are milled. All the required precision qualities regarding position, diameter and angularity are easily achieved by the machine. The surface quality with a roughness class of N6 is also achieved without any problems.

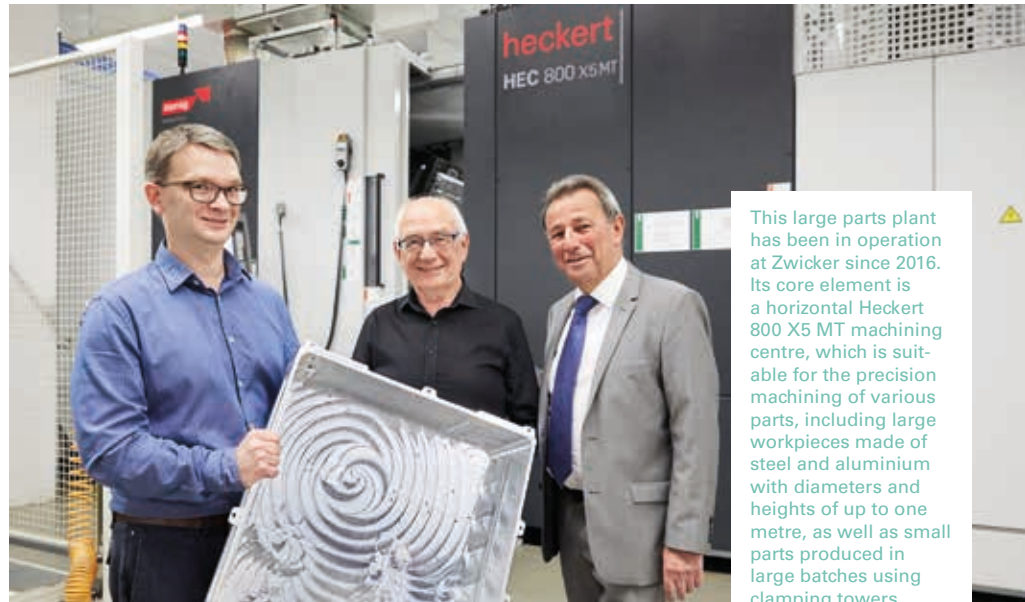
Markus Zwicker concludes: “The combination of highly-dynamic 5-axis machining and turning operations means we can efficiently handle the complete machining of large and complex workpieces.”



Thanks to its thermally symmetrical design, the machining centre operates with the ultimate rigidity. Together with the digital AC feed drives and the profile rail guides and ball screw spindles, a solid basis is created for rotary machining and milling on all linear axes with a high level of process reliability.



Reducing the required clamping positions and eliminating additional machining work on other machines saves time while also improving manufacturing precision.



This large parts plant has been in operation at Zwicker since 2016. Its core element is a horizontal Heckert 800 X5 MT machining centre, which is suitable for the precision machining of various parts, including large workpieces made of steel and aluminium with diameters and heights of up to one metre, as well as small parts produced in large batches using clamping towers.

Linear pallet system for automated 24-hour operation

For Zwicker, there is no doubt that such a high-end machining centre must be able to deliver three-shift operation, which is why it was stipulated from the outset that it should be equipped with an automated pallet system. Erwin Fässler, Starrag Area Sales Manager for Switzerland and Austria, recommended the Schuler Loadmaster loading system, which adapted very flexibly to demanding installation requirements.

It did not take long for the customer to decide on this system. Schuler developed a suitable system layout for the narrow space conditions restricted by columns. To make the best possible use of the available space, 15 storage slots were installed over a total of three levels. If necessary, another machine can even be connected.

Flexible, even for workpiece clamping

The level of detail that the Zwicker project managers put into their investment is also revealed by the workpiece clamping devices. Their long-standing partner for such components is Triag AG, whose clamping systems are suitable for a variety of clamping situations thanks to their modular design. Zwicker also uses Triag clamping towers with Power Clamp elements, which are suitable for multiple clamping of small parts. "We use these for large-scale machining on the Heckert 800, which preferably takes place on overnight shifts," says Markus Zwicker. To reduce the load on the rotary swivel table, he decided to use new Triag Tripoxy clamping towers. These are made of mineral casting, which reduces the weight compared to previous models. The vibration damping is also so high that it is possible to work very precisely even

in the upper range of the towers, meaning excellent surface results can be achieved. The slow heat cycle and the minimal expansion of the Triag clamping towers are also key aspects of reliable production.

Markus Zwicker sums up: "The new large parts plant has been running for a year now, and we are very satisfied with it. The Starrag machining centre has proven itself capable of the precision machining of a wide variety of parts, for large workpieces made of steel and aluminium, as well as for small parts that we produce in large batches using clamping towers. The pallet system supplies the 5-axis machining centre reliably, even during completely unmanned shifts. This plant has not only allowed us to expand our range of products, but also take profitability to a new level." ■

Four Heckert machining centres for burner housing production at Weishaupt





Excellent machining environment: The optimised supply of coolant plays a decisive role by ensuring a consistent temperature even at high speeds of up to 7,500 rpm and significantly improving the removal of chips.

Ergonomic: At the request of the customer, Starrag built the Heckert machining centres 750 mm into the ground in order to simplify handling through ground-level accessibility, which increases productivity.

At first glance, the new production system at Weishaupt's main plant jars somewhat: The four Heckert machining centres seem somehow smaller and more compact. At the request of the customer, Starrag built the machines 750 mm into the ground in order to simplify the ergonomics and handling through ground-level accessibility, which increases productivity. This lower-level installation is just one example of the many details that can be optimised.

The skilled art of good industrial planning is evident not only in the construction of new plants (Greenfield), but above all in the modernisation of an existing plant (Brownfield). This task is made all the more difficult when the transition must take place with no downtime for ongoing operations. In 2015, this was exactly the mammoth task facing Max Weishaupt GmbH, based in Schwendi, Upper Swabia (south of Ulm): The task at hand was to upgrade the existing plant from 1992 with its five machining centres. The new production technology needed to be capable of machining the very large, 1.5-tonne housing of the new WKmono 80 large burner; the old systems were not able to handle a burner of this size.

Visiting Heckert reference customers

Instead of simply replacing individual components of the old plant, Weishaupt decided to design a completely new plant to machine components for industrial burners of all sizes. Before deciding on the Heckert product range from Swiss company Starrag, Weishaupt also considered reference customers from Southern Germany such as Fendt, Vögele and Liebherr, who all specialise in comparable production tasks with similar machining centres.

In order to prevent production downtime, the conversion was carried out in two stages: The first stage, which took until 2016, involved constructing

the first plant with a Heckert HEC 1600 and a Heckert HEC 1000. The second plant followed between 2016 and 2017, with two Heckert HEC 1000s. The new production system can machine components up to a maximum weight of 4 t, a maximum diameter of 2,800 mm and a maximum height of 2,200 mm (on the Heckert HEC 1600). A total of more than 100 storage areas – from which two large pallet handling systems supply the four machining centres with components and fixtures – serve as buffers for machining the approximately 450 different components (batch sizes 1 to 250) in two-shift operation. Thanks to this generously proportioned handling and storage system, around 90 clamping devices are available at all times. Each production



A handle on downtime: A total of more than 100 storage areas—from which two large pallet handling systems supply the four machining centres with components and fixtures—serve as buffers for machining the approximately 450 different components (batch sizes 1 to 250) in two-shift operation.

system has three set-up points, which are adjustable in height between 50 mm and 650 mm. This ensures that the new plant delivers a high degree of flexibility and is extremely ergonomic. As each machining centre has 240 tool slots, each tool is available for machining at any time and can be immediately inserted into the spindle – from the 5-mm deep-hole drill to the milling cutter with carbide indexable insert.

The Heckert large-scale machining centres were the answer to smooth interchangeability of pallets and fixtures for the two differently sized machining centres. They allow Weishaupt to switch easily from one machine to another. Starrag was able to make interchangeability a reality.

Burners for heating and process energy worldwide

Precision is the be all and end all when it comes to producing Weishaupt's burner components, which are generally made from high-quality aluminium die-casting using two clamping operations and six-sided complete machining. The optimised supply of coolant plays a decisive role by ensuring a consistent temperature even at high speeds of up to 7,500 rpm and significantly improving the removal of chips. The use of coolant has already proved its worth with the WKmono 80 housing, for example, for which Weishaupt is for the first time using a very long milling tool for shaping (interpolation) of the reverse of a surface.



Flexible: The new plant with four Heckert machining centres produces using a total of 960 tools each day.





“Starrag made smooth interchangeability of pallets and fixtures a reality.”

Ergonomic: The specialists from Weishaupt enjoy working on both of the new, lower-level production cells.



These industrial burners are used in heating plants and in industrial processing plants all over the world, for example.

Weishaupt was helped with the introduction of the new shaping technique by the tool manufacturer and by Heckert technologists, who created the NC code for this machining. In addition, the Starrag site in Chemnitz helped Weishaupt with the transition from the old production process to the new. The use of a new controller (Siemens 840D sl) meant that the approximately 600 NC programs could not simply be transferred without modifications. With support from Chemnitz, a post-processor was first created to adapt the old NC programs to the new machining centres. The time required to

convert the components from the old plant to the new, right up to the start of production, was significantly reduced thanks to this support. Heckert also assisted in the adaptation of the fixtures to the new machine/pallet interface.

So taking all the specifics of the order for Weishaupt into account, Starrag has put in a strong performance: The four new Heckert centres are around 10 % faster than the five previous machines and, thanks to power regeneration from motor braking operations, they are also significantly more energy efficient. And, in keeping with the claim “Engineering precisely what you value”, this is exactly one of the goals that Starrag customers can achieve. ▀

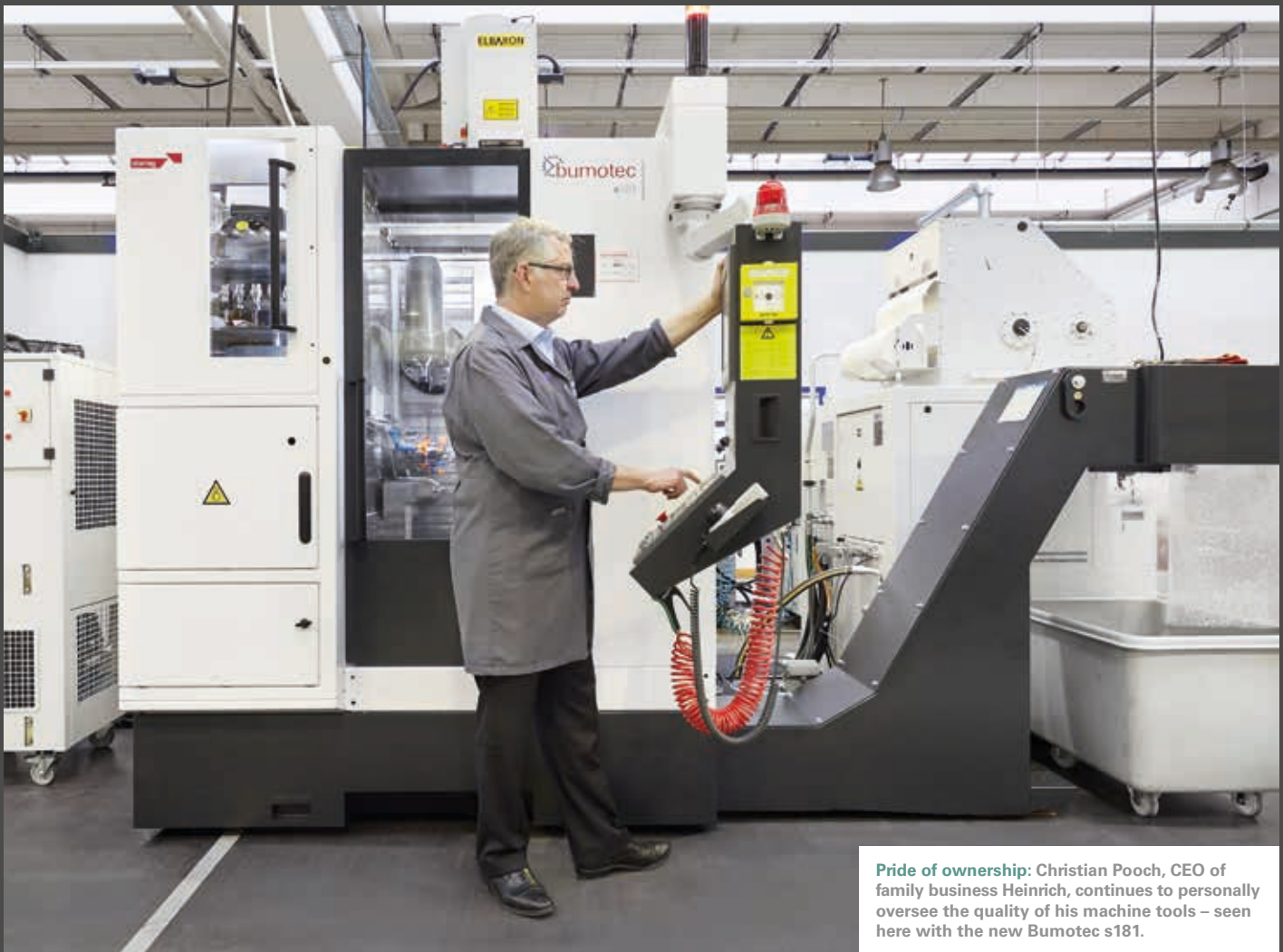
A gateway to more growth

A turned parts contractor from Berlin is boldly setting out on a new path: With the purchase of a Bumotec s181 machining centre from Swiss Starrag, Heinrich GmbH entered into the field of high-precision complete processing of components for respiratory protective devices.



THE FINISHING PROCESS: The new component is the centrepiece that connects the oxygen bottle to the respirator mask. The initial material is a forging blank made from a special aluminium alloy that contains silicon (AlSi05). Heinrich even allows itself the manufacturing luxury of completely deburring the component not only on the inside but also on the outside, and then anodising it.





Pride of ownership: Christian Pooch, CEO of family business Heinrich, continues to personally oversee the quality of his machine tools – seen here with the new Bumotec s181.

“Welcome to the Swiss corner,” says Christian Pooch, managing partner of Heinrich GmbH from Berlin, and takes us to his latest investment: a Bumotec s181 5-axis CNC turn-mill centre with a total of nine CNC axes, which now stands next to five automatic lathes that are also from the Swiss manufacturer.

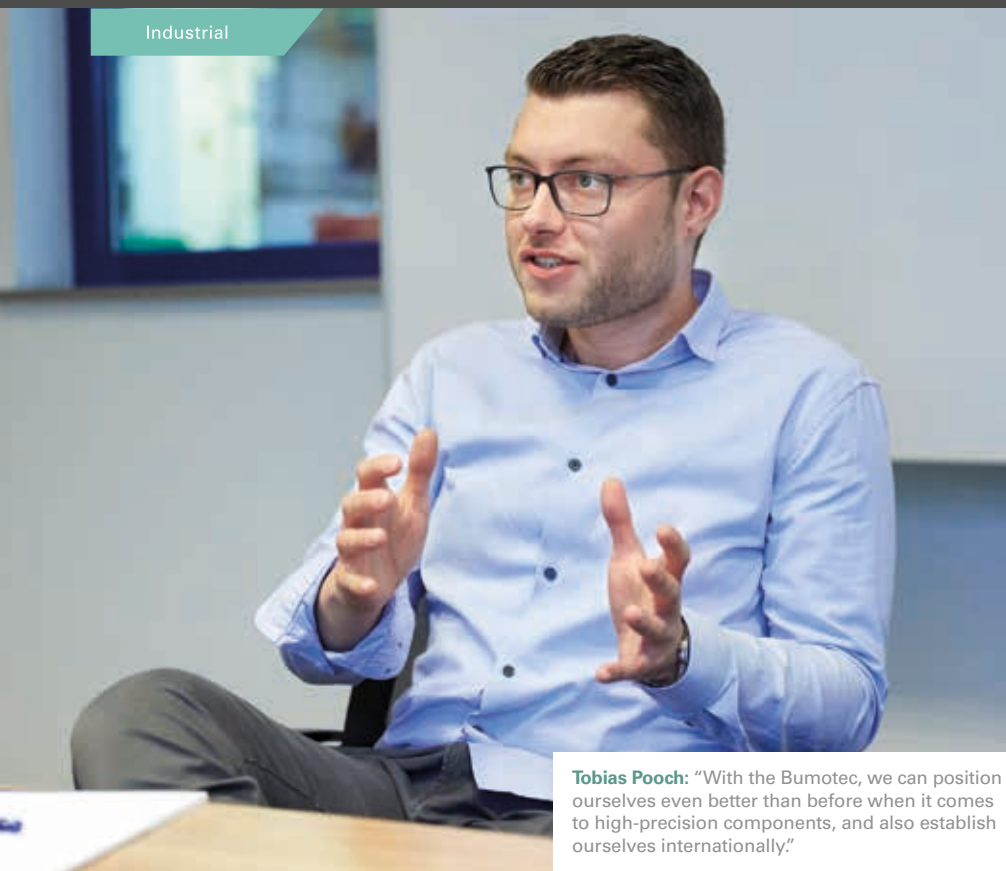
The large machine park allows for order diversity

More machines than people work at Heinrich, because the sheer variety of different orders – from batch size one to large series with several million parts – requires a very large machine park with more than 30 systems. Pooch: “Whenever the process and the product allow it, we also let some of the machines run overnight in a ghost shift.”

The Berliners want to use the new machines, the company’s largest investment to date, to break new ground. A regular customer asked the Berliners, after a competitor had already decided not to bid, if they would be willing to produce a distributor for a respiratory protective device. “It is a component that has extremely high demands with regard to tolerances and the absence of burrs,” Pooch explains. “Because it is not acceptable for a fireman to inhale small pieces of burrs during use.”

Although much lower-priced machine tools are available, precision was not the only reason Pooch chose the Bumotec s181, a 5-axis simultaneous turn-mill centre with a CNC FANUC 31i panel and retaking unit, for the complete machining of complex and high-precision workpieces.

“I think the main spindle is very smart,” Pooch explains. “It makes it easier for our operators to switch from a standalone lathe to the machining centre.” With its HSK-40 tool spindle (30,000 rpm), very small components can be machined precisely to 1.5 µm either bespoke or off the shelf (maximum diameter: 32 mm). Pooch has two sons who work alongside him, one of whom speaks very enthusiastically about the new possibilities. “On its own, our former core business of lathing nuts and screws has not been enough to sustain us for a long time,” says production engineer and general manager Tobias Pooch. “But now, with the Bumotec, we can position ourselves even better than before with high-precision components, and also establish ourselves internationally.” There is great resonance with the customer base, because the Bumotec has allowed



Tobias Pooch: "With the Bumotec, we can position ourselves even better than before when it comes to high-precision components, and also establish ourselves internationally."

Heinrich to open the gateway to completely new worlds, meaning growth.

The Pooches have put particular emphasis on a high degree of automation so that they can use the s181 around the clock if necessary. For this purpose, it has been equipped with an automatic tool and workpiece change system: the tool changer has 60 places, which can be freely equipped with lathe or milling tools. The workpiece changer is a palletizing system for five pallets, each of which offers space for 30 blanks. Both systems can be expanded in case of increased demand to a maximum of 90 tools and 300 workpieces. The workpieces, which are completely processed on all sides, are unloaded on a conveyor belt and collected in a container filled with oil (capacity: 300 workpieces). Another factor in favour of this system is that handling occurs without adversely affecting the primary processing time. The user can operate, equip and handle all of the automation components without stopping production.

Together with a Starrag expert, the Berliners adjusted the process for the

new component in the late autumn of 2017. "It's unbelievable but true," says Tobias Pooch happily. "We have been producing since the commissioning and we have not had to make any corrections since then." "We also deliberately purchased the machine with set-up included, because we are entering new territory here," his father adds.

Burr-free corners and edges

The new component is the centre-piece of the final product, connecting the oxygen cylinder with the respirator. The initial material is a forging blank from a special aluminium alloy that contains silicon (AlSi10Mg). "It is extremely unpleasant to process on a lathe, because it results in extremely long chips," Christian Pooch reports. "In contrast, cutting on the Bumotec is much easier, with shorter chips." The s181 has a system that provides the tool with coolant under high pressure (90 bar) that not only removes the chips but also cools the tools. The internal coolant supply through the tool is particularly effective. "It saves time in the order of seconds when working with aluminium, ensuring higher productivity,"



Highly effective: The internal coolant supply through the tool plus external cooling shaves off seconds when working with aluminium at Heinrich, thus ensuring greater productivity.

"With this process reliability we can capture a new customer base."

says Christian Pooch. One example of the precision offered is the H7 opening, which is cut to exactly 14 µm. Christian Pooch: "It's astonishing that a drilled hole be cut so precisely – with absolutely no burrs on any of the corners or edges."

Specially developed clamping system for imprecise blanks

"The biggest challenge lies in ensuring that there are no burrs in the many inter-connecting channels," adds Michael Paulus, Product Sales Manager at the Starrag TechCenter for Medical Technology and Precision Mechanics, Oberhausen office (Upper Bavaria). Heinrich even allows itself the manufacturing luxury of completely deburring the component not only on the inside but also on the outside,



Maximum precision: One example of the precision offered is the H7 opening, which is cut to exactly 14 µm.

and then anodising it. "What's special about this is that the machine cuts not only bar parts but also inserts," Paulus explains. "The Bumotec inserts the blank automatically, processes all six sides and then automatically transports it onward." An exacerbating factor here was that the initial part is a pressed piece with very high tolerances; these parts can be cut precisely, not least thanks to a specifically designed clamping system adapted to the machine. Paulus: "We developed and ran-in the clamping system specifically for this component and this machine."

"Because this was something new to us, it was important for us to receive German-language support from an industry expert," his son adds. Paulus and the TechCenter for Medical Technology and

Precision Mechanics, which is part of the "Precision Engineering" business unit, provide this support in Immendingen, near Tuttlingen, in southern Germany. Paulus: "I have been involved in high-precision microparts processing for 28 years, including in the watch and medical technology industry, and can therefore support customers with expertise based on years of experience from numerous projects."

All in all, the new Swiss addition lives up to the Starrag claim "Engineering precisely what you value" in many different ways. Heinrich has put a special emphasis on profitability, reliability and growth. The Berliners have already achieved one of their goals: since its first hour of operation, the s181 has run reliably and without any tolerance deviations. "With this



Ready for the ghost shift: Turned parts contractor Heinrich has put particular emphasis on a high degree of automation so that it can use the Bumotec s181 around the clock if necessary. For this purpose, the machine has been equipped with an automatic tool and workpiece change system.

process reliability we can capture a new customer base," says the senior partner.

Furthermore, it has already become clear – a few months after the commissioning of the new machine – that the goals of profitability and growth will soon be achieved. Thanks to the first order, we are already in a good position in terms of recouping the investment in the s181. And we have already received some very interested enquiries from customers, although we have had to tell them that we don't intend to start any new orders until the middle of 2018."

And potential customers are not the only ones who have reacted positively to the investment. "The valuation department of our financing company essentially told us that the Bumotec puts us in the Champions League," the managing partner says happily. "The machine performs extremely well in terms of resale value and longevity." ▀

First aid

for cutting processes



What makes the Bumotec s181 stand out so much that Berlin-based turned parts contractor Heinrich chose it when they began cutting critical components, with the level of quality being essential to the safety of emergency service personnel? Bassem Sudki, Project Engineer at Starrag Vuadens SA, Vuadens (Switzerland) has been delivering a very specific kind of first aid.

“The s181 is especially well suited to the production of watch components, surgical instruments, medical implants and complex micro-mechanics.”

Mr. Sudki, in general, what is special about the Bumotec s181 – which parts is it best suited for machining?

Sudki: The Bumotec s181 can be used for machining complex components made from bar stock with a diameter of up to 32 mm. The machine features a mineral casting bed, the latest CNC technology and linear motor drives to guarantee uncompromising thermal stability and performance. The s181 is especially well suited to the production of watch components, surgical instruments, medical implants and complex micro-mechanics.

What were the key considerations when the machine was used to produce the first component, given that this item was the centrepiece that connects an oxygen tank to a respirator mask?

Sudki: The initial material is a forging blank made from a special aluminium alloy that contains silicon. Due to its shape, size and the type of machining, this forging blank cannot be fed conventionally to the main spindle. For this reason, we recommended that the customer used a palletising system with ten pallets that would allow a total of 300 parts to be stored. After loading, the machine automatically feeds the unmachined parts to the main station. The palletising system transports a pallet into the machining area. The unmachined part is moved from the pallet into the clamping system of the main spindle by a specialised gripping tool in the milling spindle. This gripping tool is operated in the same way as a standard milling tool:

INTERVIEW

**with Bassem Sudki,
Project Engineer at
Starrag Vuadens SA,
Vuadens (Switzerland)**

It is actuated pneumatically and loaded as a milling tool in the tool magazine.

No doubt the clamping system plays an important role in relation to the shape of the respiratory protection component.

Sudki: Yes. We have developed and introduced a specific pneumatic clamping system for this component and this machine. The system simultaneously fulfils several functions: It clamps the component during machining whilst also providing enough space for the cutting tools. The pneumatic gripper also enables automatic yet precise feeding of the unmachined parts, as well as safe access to the re-clamping system. The process of transferring the components from machining station 1 to machining station 2 also runs automatically.

What happens when other components need to be machined on this machine? What does the operator need to modify on the clamping system?

Sudki: In this case, the operator uses some specially shaped clamping plates, which offer great flexibility. Thanks to this design concept, there is no need to modify the clamping system completely when the unmachined part or the machining process changes. The customer need only change the clamping plates.

How does component handling function?

Sudki: After machining, the finished part is automatically deposited into a movable drawer. The drawer is transported out of the machine to a collection container via a conveyor belt.

When working with aluminium, the machining process creates a lot of swarf that combines with the coolant to form a sticky mass: How does Starrag deliver a reliable, efficient and environmentally sensitive cutting process?

Sudki: Two cutting tools working simultaneously lead to high material removal rate. Therefore we recommended that the customer used a compact complete solution directly at the machine featuring integrated filtering, cooling, pumping, pressure generation and swarf conveying processes that would also deal with treatment of the coolant. In conjunction with the directly coupled swarf conveyor, this system facilitates an autonomous, closed process. ▀

Industrie 4.0

IPS already a reality at Starrag.

IPS Integrated
Production
System



Cell
Controller



Internet
of Things



Process
Quality Control



Human
Machine Interface



Machine
Qualification System



Machine
Protection System



Efficiency
Control



You can talk about Industrie 4.0, or just go ahead and implement it. This is what we have already been doing for many years at Starrag! At this year's international trade fairs, we will showcase our specific solutions for networking and automating production processes with our «Integrated Production System» (IPS).



Learn more about IPS at:
www.starrag.com/ips



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AMB Stuttgart
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IMTS2018

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