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Brought into shape

Horizontal machining centres HEC 630 Athletic by Heckert

Bumotec s181: EMO world première for the micromechanics sector

Linear machining centre for micro-mechanics, including watches and jewellery and medical devices

Retrofit five stars menu

Customer safety is the focus



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Linear machining centre for micromechanics, including watches and jewellery and medical devices



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Walter Börsch
Starrag Group CEO

Dear readers,

The term “versatility” is inextricably linked with the Starrag Group. We have been lending added value to our three target markets of Aerospace & Energy, Transportation & Industrial Components and Precision Engineering with our own ten brands for many years now. Despite this, versatility cannot be a goal in and of itself. What is far more important are the similarities that enable us to operate decisively and to work together to develop the best solutions for our customers.

For this reason, we have been working internally on finding such similarities over the past few months. The outcome of this work can be summarised in our new motto that expresses the self-image of the Starrag Group:

“Engineering precisely what you value”

We found it crucial not only for this statement to be a marketing message that sounded good, but also for it to be a statement that precisely expressed what our customers get out of a partnership with the Starrag Group. Allow me to explain these points in a little more detail.

I consider **value** to be one of the most important words, because as a noun it describes the added value (profitability, safety, growth) that customers receive, while as a verb (to value) it demonstrates that our range precisely meets

customers’ needs. Customers get from us exactly what they need and what is important to them – no more, no less.

Engineering precisely expresses our tradition and what we stand for with our range. Our customers do not want any compromises in terms of component manufacturing for sophisticated, long-life products. As the specialist in the manufacture of precision machine tools and a provider of associated services, we are exactly the right partner for when high levels of precision and performance are key.

You. This term allows us to express what really counts to us: Our customers are what matter. Our mission is to place customers at the heart of our philosophy and actions so that we can offer them a tailor-made solution that precisely meets the requirements of their market environment. In other words: “Engineering precisely what you value”.

In the second edition of our customer magazine, we offer you more in-depth insights into how the individual sectors within our Group manage to bring the new motto to life in their day-to-day work, and in doing so consistently create added value for customers. Examples of this are “Moments of customer added value” by Günther Eller from the Customer Service business unit, “Flexible all-rounders” by Dr. Eberhard Schoppe from the “Transportation & Industrial Components” business unit, and the introduction of a quiet yet highly productive solution in the Dutch city of Gouda, implemented by the “Aerospace & Energy” business unit. Finally, we will introduce our new technology centre in southern Germany, with which we will not only be showcasing production technology for prosthetics and surgical instruments – we also have a long-term plan to demonstrate our expertise on a general level as regards the hexagonal complete machining of small, high-precision workpieces (for the watchmaking and jewellery industries, for example).

I hope you enjoy reading this and other highly interesting contributions to the latest edition of Starrag’s “Star” and look forward to receiving your feedback.

Yours faithfully, Walter Börsch

Walter Börsch (CEO of the Starrag Group) welcomes the international customers

800

years of expertise
in every aspect of
machine tools

Call and response

Starrag/Walter: Turbine Technology Days (TTD) 2015

What prompts around 250 production experts from nearly 80 companies from around the world to take a two-day trip to Lake Constance? The answer is Turbine Technology Days (TTD), which enabled the German company Walter AG and the Swiss Starrag Group to lure experts from the aviation and power plant industry to the Starrag headquarters in Rorschacherberg. The main focus: Demonstrations and presentations on all important aspects of the production of turbine components.

Yang Hong, Vice General Manager of Aviation Industry Corporation of China (AVIC): "As a world-class machine tool manufacturer, the Starrag Group has been successfully cooperating with AVIC for nearly 20 years."



"Successful cooperation with AVIC as a world-class machine tool manufacturer for 20 years"



The guests were supplied with excellent catering over the two fascinating days



80 companies from across the whole world

The Turbine Technology Days (TTD)

The event was successfully premiered in 2013 and is now among the insider meetings attended by top managers from as far afield as the Far East. Among this year's special guests was Yang Hong, Vice General Manager of Aviation Industry Corporation of China (AVIC). China is due to give significant support to the state-owned aviation and defence group based in Beijing (400,000 employees) with a further expansion of the aviation sector. In addition, the group heavily invests in production technology in order to increase its share of in-house production: The group subsidiary AVICADE spends on average USD 400 million per year on machine tools alone. However, it

is not only production technology that is required from Europe, but also expertise. "The Chinese aviation industry is set for a considerable increase in investments in production technology in future," explains Yang Hong in Rorschacherberg. "Seize the development opportunities of the Chinese market yourselves!" The hosts have been contributing to the necessary expertise in relation to machining aircraft components for years. According to CEO Walter Börsch, the Starrag Group, with all its subsidiaries, is the product of around 800 years of expertise in the field of machine tools; according to CEO Mirko Merlo from Tübingen, Walter AG brings an additional 400 years of experience. Merlo's insight

into the partnership with Starrag: "The actual key to success lies in understanding the customer's production process."

Conclusion: Anyone who wants to gain a foothold in growing markets must offer holistic processes together with a number of partners such as Starrag or Walter. The holistic strategy seems to be paying off for the Starrag Group in China. Yang Hong, Vice General Manager of Aviation Industry Corporation of China (AVIC): "As a world-class machine tool manufacturer, the Starrag Group has been successfully cooperating with AVIC for nearly 20 years." ▀

»Granted: Customer Service«

Customer Service – Moments that offer added customer value

“Service is about seeing your entire business through the eyes of the customer.” This piece of management wisdom from Bavarian marketing guru Axel Haitzer is implemented on a daily basis by Günther Eller and his team. The head of the “Customer Service” business unit describes the highly unique path that the Starrag Group is following when it comes to service and added customer value.

Mr Eller, alongside the three operational business units of “Aerospace & Energy”, “Transportation & Industrial Components” and “Precision Engineering”, the “Customer Service” business unit takes responsibility for all after sales services across the group, such as the provision of spare parts, maintenance and retrofitting work, as well as the development of new service products. What makes the “Customer Service” business unit stand out?

Günther Eller: We ensure that our customers’ production processes are productive because our team makes sure that Starrag machines consistently deliver a high and stable level of availability. In addition, we offer service products that are tailored to customer requirements. This approach requires very close collaboration and regular contact with our customers. Given that “service” as a product is initially developed in direct co-operation with the customer, the success of the concept depends on this relationship. In other words, good service can only be successful long term if the customer and service provider cooperate openly and in partnership. We have 300 highly motivated and globally active employees with several

years of experience and a wealth of expertise who contribute to this relationship. In addition, our team is able to tap into the extremely in-depth expert knowledge offered by the plants that belong to the Starrag Group. A core component of our business unit is our highly effective local field service team, which is a group of 150 technicians who work on-site at customer premises. As an ideal scenario, we can base “embedded service teams” at the factories operated by our customers.

And what is the key theme of your work?

Günther Eller: Our strength is in our holistic concepts: Based on the idea of “lifecycle management”, we provide in-depth support to our customers for the entire product life. Our engineering teams for system modernisation and retrofit work represent one of our specialities.

How far do you go when it comes to service? Where are the limits? In what areas do customers need support from the Starrag Group? What are they able to do themselves, perhaps with a bit of help?

Günther Eller: The type of support varies greatly because our customer structure is so diverse. At the moment, a reactive

service is increasingly turning into a proactive service: For example, there is scope for strong growth in major preventive annual maintenance. Due to the experience and expertise required, this is something that our employees definitely need to do on behalf of our customers. We have already had some tangible success in this area: The amount of unscheduled downtime and major preventable damage has decreased, while reliability and productivity are increasing. Customer tasks include standard maintenance and machine operation. We support our customers by providing an ever more professional training programme for operators and programmers. Ideally, customers are responsible for ensuring that only certified specialists with Starrag qualifications operate a machine. We see great potential in this area, not only because of the obvious safety improvements, but also because the productivity of the Starrag machine increases too.

What is your spare parts strategy?

Günther Eller: We rely on a sophisticated stock management policy and a highly professional, globally implemented logistics process; we do this instead of expecting our customers to



Günther Eller (1960) is a chartered engineer in technical physics and has managed the Starrag Group's "Customer Service" business unit since 2007. Before joining the Starrag Group, he worked for more than two decades in various management positions at OC-Oerlikon, where he managed various business units including the "Customer Service" business unit for the "Data Storage" division from 2001 to 2006.

Günther Eller, Head of the "Customer Service" business unit at the Starrag Group: "Our strength is in our holistic concepts: Based on the idea of 'lifecycle management', we provide in-depth support to our customers for the entire product life."

stockpile parts, which is generally not very helpful and rather expensive for them.

What would you consider the best part of your work?

Günther Eller: We developed a special, exemplary service model for a customer with around 50 Starrag machines. The model includes a strong team that is permanently based on-site: Starrag deals with training, condition monitoring, preventive maintenance and repairs. During regular meetings, we discuss and plan all actions, from machine inspections to complete retrofits, which we implement together. Thanks to this partnership, we have been able to achieve extremely high and stable machine availability.

Can you give us some more details about this?

Günther Eller: The contractually agreed target was 95 % machine availability – according to our joint measurements, we have consistently achieved well over 98 %. This is pure added value for the

customer in the most tangible form. However, excellent results like this can only be achieved when the customer works closely with us.

What can other companies learn from this exemplary level of cooperation?

Günther Eller: A lot can be achieved if a customer is willing to spend around 1 % of the machine's value per year on preventive measures. An additional 2–3 % is required for expenses relating to parts, repairs and inspections.

Retrofit work plays an important role within the Starrag Group: What are the benefits of this special service? What is its particular unique selling point?

Günther Eller: Many of the machines manufactured by the Starrag Group have such a high value that a retrofit is worthwhile even after 20 or 30 years. One of the benefits of having retrofit work completed by the Starrag Group is the fact that, as the manufacturer, we have access to all of the design documentation

and we can integrate the very latest technology from our current portfolio into the machines because we also have all of the patents, design documentation and the corresponding expertise for the new technology. In addition, we have an assembly and engineering team that specialises in retrofit work. A machine that is modernised by us is then as good as a new machine, meaning that we can then offer the same lifecycle concept for it.

You are also responsible for service across all Starrag Group brands and for machine tools produced by other manufacturers. With the keyword being "retrofit" here: How do you ensure that the service you provide is in line with the respective brand?

Günther Eller: We only carry out retrofit work on machines from other manufacturers if we own the design documentation — so this is generally plants manufactured by Schiess or Wotan. It's also important to consider that the range of machines within the Starrag Group is



Effective and local: A core component of the business unit is the **field service team**, which is a group of **150 technicians** who often work on-site at customer premises

very broad: It includes small, high-precision machines for watch and medical technology to huge machining centres for XXL components. We complete retrofit work via our customer-oriented, local service network, which has direct access to the plant service team that specialises in the individual brand products at the respective development site of the series. In this regard, it is helpful that there are already a number of identical modules in many machine series. The task is made simpler by the fact that this feature is even more prevalent among new developments.

Do you also benefit from synergy effects?

Günther Eller: Of course; after all, every company within the Starrag Group has

its own best practices: This means that we are always exchanging approaches and ideas.

Does this mean that there is no need to be a flexible "jack-of-all-trades"?

Günther Eller: That's right: The secret for success is a team of specialists who cooperate perfectly. The on-site technicians work together a wide range of experts. It does not matter where they are based. The experts with the necessary expertise are not always just within the Starrag Group, but potentially also working for suppliers. Our service process also depends on the speed with which we can call on this knowledge.

How would you describe the ideal service employee?

Günther Eller: He or she is an expert who has received targeted and advanced training from us – we have invested a lot in our training programme in recent years. In our business unit, around 7 % of a technician's annual working hours are spent on training. These well-qualified employees must also be able to work as a team, have a good understanding of customers and be able to deal with customers confidently. In addition, service employees must ideally be in a position to be deployed globally and work to a highly flexible schedule: We support this flexibility with corresponding working time models.

And what characteristics and experience do you contribute as the head of this team of specialists and the "Customer Service" business unit?

Günther Eller: I am certainly not one of the specialists because I have never worked on services projects on-site at a customer's premises. I studied technical physics and started out selling components and machines. I have dealt with service in a management role for 20 years. The experience I gained from working for many years at an international level has been useful to me for virtually my entire career and still helps me today. ▀



Take three: Strategies for spindle failures

Motor spindles play a main role in the machining process. This is because workpiece quality, productivity and occupational safety all depend on the motor spindles' level of reliability and availability. The Starrag Group therefore not only develops and constructs tailored spindles, but offers a corresponding three-stage spindle overhauls tailored to customer requirements.

The "job description" actually sounds rather simple: The main task of the spindle is to provide speed with a perfectly coordinated torque. However, customers realise how important the performance of this task is when the spindle, which is the heart of all tool machines, does not function optimally or even at all. "We ensure the productivity of our customers' production processes, because our team makes sure that there is a high and stable availability of Starrag machines," says Günther Eller, Manager of the Starrag Group's Customer Service business unit. "Particular importance is placed on our repairs and logistics solutions, which ensure a rapid replacement in the event of a spindle failure"

Online it is possible for a machine tools customer to find hundreds of overhaul service providers within a fraction of a second. So why the Starrag Group? As a manufacturer of motor spindles, the Swiss-based Group has a significant amount of experience and expertise in overhauls. The fact that competence and responsibility are provided from a single source and that there is a contact partner for all aspects of the machine is testament to service with highly qualified personnel and manufacturer quality. Since the use of spindles is as varied as the areas of application of the Starrag Group's machine tools, the company also focuses on variety when over-

hauling spindles: In the event of a failure, an express overhaul or a spindle replacement can be offered.

Furthermore, three overhaul concepts that are tailored to customer requirements have been developed: Under the term **ESSENTIAL**, a repair is offered where the Starrag Group replaces bearings, seals, the rotary transmission and the clamping set. Eller: "This option offers you the possibility of having your motor spindle overhauled by our qualified specialist at minimal expense." Four plus points speak in favour of **ESSENTIAL**: cost-effective spindle repairs, overhaul by qualified specialist personnel, exclusively original replacement parts are used and a long manufacturer warranty (spindle service life: 6,000 hours) for the replaced components.

PRIME is the name of the second type of overhaul, in which the Starrag Group offers between 36 months (18,000 operating hours) and 12 months (6,000 operating hours) for a spindle with a full manufacturers warranty, on a sliding cost scale. In this case, the customer pays a price that is dependent upon the actual service life. The availability guarantee for a replacement spindle ensures that companies no longer have to purchase a second spindle as a precaution. Eller: "We now rely more on a well-conceived

and reliable, globally pre-installed logistics process – rather than part stocking by customers, which in most parts is not very successful and expensive."

Equally well-conceived is the **FLAT RATE** with its predictable fixed costs: The customer is given the option of an immediate, guaranteed replacement of faulty spindles for a fixed, flat rate annual fee. Within 24 hours, the exchange pool will send a replacement spindle that is like new.

In addition, **COLLISION PROTECTION** is also offered: Collision protection systems protect machine tools against machine collisions and significantly reduce the number of unscheduled spindle failures. Collision protection is also suitable for retrofitting on machine tools. However, if a spindle fails within 24 months (or 14,000 spindle operating hours) despite the collision protection, the Starrag Group will offer a crash discount of 20 % on an as-new replacement spindle.

But which type of overhaul should our company choose? Offer from Günther Eller, Manager of the Customer Service business unit: "We are happy to provide you with advice regarding which maintenance measures are most appropriate for your motor spindles" ▀



Cost certainty due to the FLAT RATE for spindle replacements



Maximum productivity for the customer due to the quickest possible replacement in the event of a spindle failure



Specialists for the big jobs: The Maintenance & Engineering Centre of RWE AG has made a name for itself not only with major internal projects (image: a bucket-wheel excavator), but also with maintenance services for external customers

Customer safety is the focus

Imagine you are a professional chef who needs to prepare a menu for a celebrity chef who, with his insider knowledge, adamantly demands from you the best of the best. The demands on your skills would be very high. Experts from Dörries Scharmann, who have been working for 20 years with the maintenance and service department of energy company RWE Power AG, feel similarly. Their retrofit menus seem to be “tasty” to the specialists at the RWE Maintenance & Engineering Centre. Comprehensive modernisation of the fourth machine tool starts at the end of 2015.

“Because the product service initially develops directly at the customer, the level of success rises and falls with their participation,” says Günther Eller, head of “Customer Service”, describing the ideal situation (see the interview with Günther Eller on page 8). The result of a long-lasting and successful business relationship is demonstrated the close cooperation of RWE Power AG in Frechen (near Cologne) with Dörries Scharmann Technologie GmbH (DST) from Mönchengladbach, a company of the Starrag Group.

The RWE Maintenance & Engineering Centre possesses four DST boring mills: two Scharmann WFT units, a Scharmann

FB 100 from the 1970s, and a Scharmann Heavycut manufactured in 1983. “We began the first complete overhaul and modernisation together with DST in 1996” says Willi Spelter, long-time employee within mechanical production and current project manager for machine tool maintenance. “A major retrofit was then lined up in 2013 for both WFTs, due to serious damage to the guideways. For them to be replaced, the columns and headstocks had to be removed.” The experts at the RWE Maintenance & Engineering Centre brought in DST, due to previous good experiences. “It was clear to us that we would only be able to execute this project with the machine manufacturer,” reckons

Spelter in retrospect. “We had to dig deep into the substance of the machines” adds Thomas Pfeiffer, head of the department for product-oriented maintenance. “Another factor was the fact that we could not do without the machines for long and that we had to complete the project with total reliability. And that is not possible without the manufacturer, who has all the necessary documentation at their disposal.”

Dörries Scharmann helped develop an initial maintenance strategy, the first step of which grouped the boring mills into assemblies. “We depicted the 100-plus assemblies in a mind map and colour-coded them,” explains the project manager.



www.rwe-technikzentrum.de

Profitable: A current benchmark analysis of the services of the entire location revealed that the boring mills for mechanical production are currently working very competitively

“Accuracy and availability increased from two stars previously to **five stars.**”

Green stood for “error-free”, yellow for “status still unclear” and red for “repair or replace”. Using this analysis, DST prepared an implementation plan with cost estimates. “RWE expected a detailed analysis, which was already a challenge for our project manager,” recalls Hans Jeschke, Director of Service for Dörries Scharmann Technologie. “We had to assess, explain, and justify each prospective retrofit step – up to the point of future risks. However, it was the correct approach.” Based on this shared detailed analysis it was possible for both sides to draft a commercial contract with low risk, which accelerated the assignment. “We also considered purchasing new machines,” says Spelter. “In



Teamwork at its finest: Willi Spelter (RWE) and Norbert Ophüls (DST) work closely together during a retrofit

the end, the arguments in favour of a retrofit were not only the price, but also the fact that we wanted to continue using the basic machine substance.”

Uwe Herrmann interacts with the machines on a daily basis; the division engineer won’t let a bad word be said about the sturdy construction of the older Scharmann machines. “My experiences with both the completely overhauled production systems and those repaired previously have been very good,” emphasizes Herrmann. “I am certain that another retrofit will be worthwhile, extending the machine life by another 15 or 20 years.” On average, the mechanical workshop simultaneously processes around 2500 RWE maintenance orders; in addition, it processes an increasing number of components for outside customers. The experts in Frechen are therefore reluctant to change to new

machines, as processing ever-changing components in mostly small batches works best on proven production systems with known parameters and application options.

“All of us here in the Maintenance & Engineering Centre are maintenance personnel for the conveyor technology that RWE operates in the opencast lignite mines of the Rhineland,” explains department head Pfeiffer. “It is what defines our work from beginning to end.” Repair and maintenance operations are therefore very dynamic. “It is often not until Thursday that we decide what will be manufactured on a machine over the weekend,” says Pfeiffer. “Therefore, we expect respectively fast and flexible responses from external maintenance personnel.” Due to these difficult constraints, the Maintenance & Engineering Centre – in cases of boring mill retrofits – relies on a meticulously planned procedure in which it plays through many technical variants.

“This was a difficult period for us as suddenly only one of the three large boring

Good and safe: The intensive dialogue with Dörries Scharmann led to a tailor-made, complete enclosure for three boring mills, which was also well-received by the responsible regulatory authority and the employees

mills was available,” says production engineer Herrmann. In order to make life easier for himself and his production team, the plan allowed for a progressive retrofit. “The X-bed is shared by both machines, so to repair the linear guides, both moving columns had to be completely disassembled,” explains Pfeiffer. “We had the first WFT partially repaired, so that it could be put back into use quickly.” The final work on the partially repaired machine was done after the final retrofit of the other WFT. “The basic order was expanded several times and lasted approximately 16 months in total,” recalls Norbert Ophüls, Service Team leader for DST. “Nonetheless, the concurrent downtime of both boring mills was only six months.”

After the final acceptance of both WFTs at the end of 2014, the mechanical overhaul of the Scharmann FB 100 (manufactured in 1972) began. The boring mill now features, among other things, the new direct-driven X-, Z-, B- and U-axes, which allow for reduced axial play and more precise positioning. Spelter: “As in the case of the WFT retrofit, it proved

beneficial to proceed with maintenance in accordance with a well defined plan.”

The retrofit was followed by a modernization of the safety plan of both WFTs and the nearby Heavycut. “We also needed to reliably prevent any unnoticed access to the working area,” says production engineer Herrmann. “It was also important here to take into account that very large components sometimes protrude out over the working area.” The task was therefore also very challenging, as both of the WFTs are located on the same machine bed. Pfeiffer: “The intensive dialogue with DST then led to a tailor-made solution, which was also received well by the responsible regulatory authority and the employees.” One feature is the relatively low fence bordering the central corridor; with a height of one meter, it is only half as high as standard fences and allows for the protrusion of XXL components. “We fenced in all three ram boring mills completely,” explains Ophüls. “What’s more, there are pluggable partitions between the machines, which can be removed when handling very large components.” Finally,

„The intensive dialogue led to **tailor-made solutions**“





The experts in Frechen (pictured, Günter Naumann, Operator) are loath to change to new machines, because the machining of variable workpieces of small batch sizes on approved production facilities with well-known and understood characteristics is most efficient



Thomas Pfeiffer, (head of the department for product-oriented maintenance), RWE Power: "We could not do without the boring mills for long and had to complete the project with total reliability. And that is not possible without the manufacturer, who has all the necessary documentation at their disposal."

Uwe Hermann, division engineer for RWE Power: "My experiences with both the completely overhauled production systems and those repaired previously have been very good. I am certain that another retrofit will be worthwhile, even in 15 or 20 years."



encrypted access control system with selective intervention in the emergency stop levels of the three machines safeguards against the unauthorised or unnoticed entry into danger areas.

But what, in the opinion of the RWE Maintenance & Engineering Centre, is the particular added value contributed by DST service providers – increasing efficiency, revenue growth, enhancing safety? Pfeiffer did not want to estimate exact numbers – not least because of the small batch sizes and typical emergency repair operations. "For us, the technical availability of the system is the top priority," replies the department head. "It has to be very high, so that the mechanical workshop can provide its service reliably. In order to keep the opencast mining conveyor technology available at all times for the coal supply, we are familiar with deploying a high level of effort and creativity that may be uncommon elsewhere in order to operate key production centres, such as our large boring mills, at maximum capacity at all times. That is why our skilled per-

„Particular added value for the RWE Maintenance & Engineering Centre: **Increased efficiency, revenue growth, enhanced safety**“

sonnel, service providers and especially our technology must never leave us in the lurch." With regard to orders that are not time-critical, the workshop must pay strict attention to efficiency, i.e. to the lowest possible machine-hour rate, in order to secure the assignment. A recently performed benchmark analysis of the services of the entire location revealed that the boring mills for mechanical production are currently working very competitively.

All in all, the assessment of the boring mills retrofit in Frechen can be represented on a scale ranging from one star (adequate) to a maximum of five stars (excellent). Spelter: "Accuracy and availability increased from two stars previously to five stars."

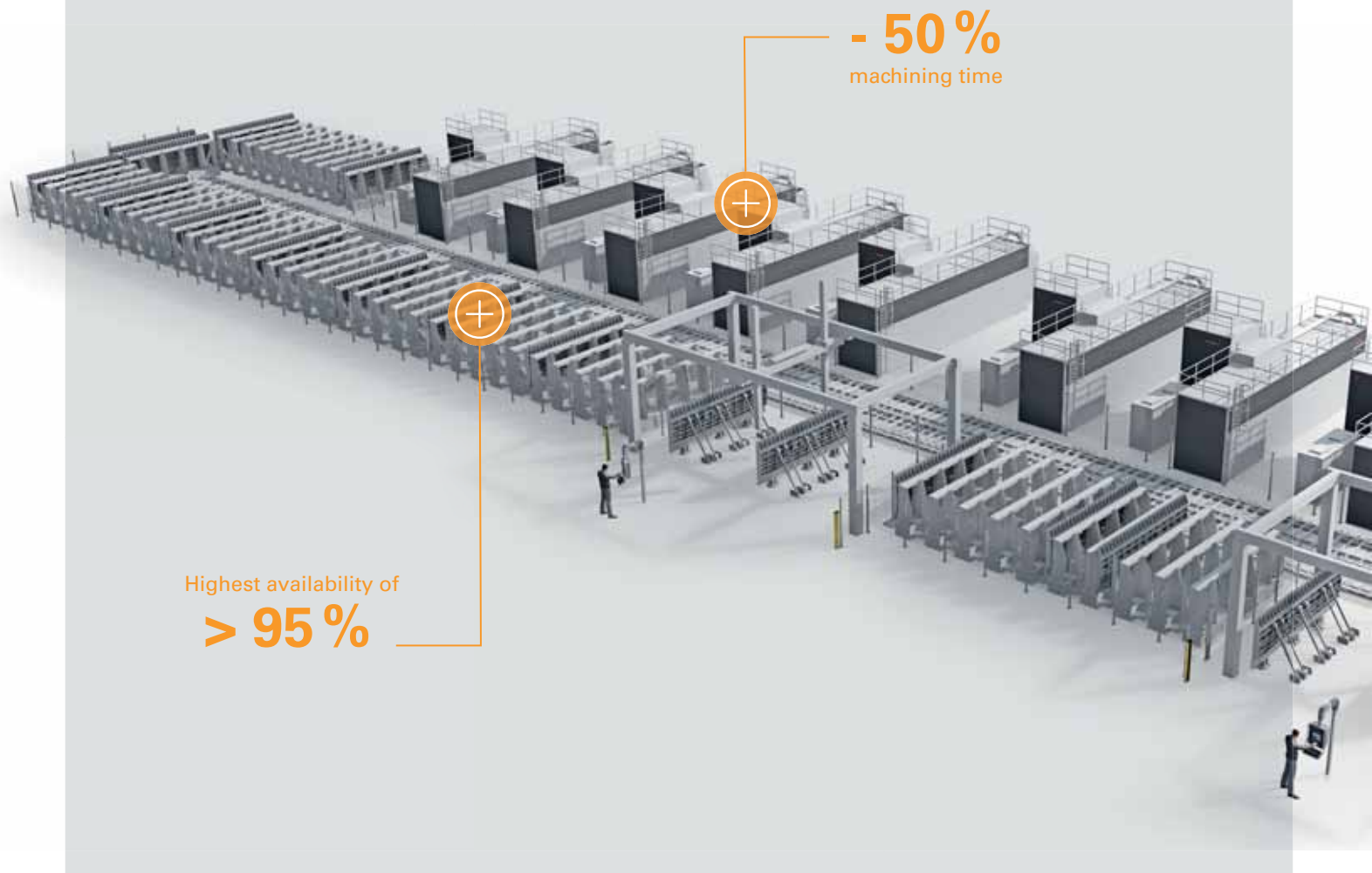
Due to the satisfaction with the DST retrofit of the three machines, the retrofit of the Scharmann Heavycut will start in November 2015, a further development of the WFT series of ram boring mills. Ophüls: "The task will involve a comprehensive package including the overhaul of mechanical parts and the modernisation of electronics." The Heavycut will receive – due in part to the discontinuation of components by sub-suppliers – a new Siemens Sinumerik 840D sl, switching system and wiring system, as well as new motors and measuring systems. Ophüls: "We will not proceed step by step with this assignment, but rather continuously with a basic order. In addition, RWE already budgeted for all possible options that may exist after disassembly."

This elegant approach also enables RWE to avoid time delays resulting from renegotiations for extra tasks. After all, even if the product service is initially developed directly at the customer's site, the level of success depends not only on their participation but also on prior exact planning. ▀

WING RIBS DEMAND ADDITIONAL SCHARMANN ECOSPEEDS

KAI's successful machines of a Scharmann ECOSPEED FMS

The success of a seven-machine Scharmann ECOSPEED F flexible manufacturing system (FMS) at Korea Aerospace Industries (KAI) has led to an order for two additional ECOSPEED F machining centres to be integrated into the system by June 2016 to enable KAI keep pace with its growing Airbus order book.



- 50 %
machining time

Highest availability of
> 95 %

Supplied progressively the FMS order was placed in 2009; the sixth and seventh machines for the system were installed and started cutting metal at the beginning of 2015 at KAI's site in Sacheon, South Korea.

The FMS has been used by KAI as part of its successful ramp up of the manufacture of complex structural components for the Airbus A350 XWB international joint development programme, for which KAI is a 'Top 20 Supplier'.

Each individual wing rib starts life as a billet, weighing up to 4,123 kg with dimensions of up to 5,700 mm in length, 1,700 mm in width and up to 200 mm thick. Finish machined components weigh as little as 112.7 kg. It is not unusual to remove 90% of the original stock material. Machining operations include surfacing, pocketing and drilling. The ribs are made from Aluminium and Aluminium/Lithium alloys.

KAI initially made production studies on existing 20-year-old gantry-type machines before evaluating all available machining options and alternatives with a number of machine builders/suppliers, before placing the ECOSPEED F order with Scharmann.

A shortlist of four suppliers was tasked with machining an appropriate test part. Only two companies could produce the part complete, and the Scharmann ECOSPEED F far outweighed the competitor in terms of cycle time and finished quality. Indeed, the ECOSPEED F proved between 30 and 50 per cent faster! The ECOSPEED's main spindle motor performance plays a key role in such machining performances – rated at 120 kW it can run non-stop at 30,000 revs/min in S1 mode – coupled with the machine's high dynamics in acceleration of 1 g in all five axes and jerk up to 200 m/s³. Indeed, an ECOSPEED F machining centres can transform a four-tonne aluminium billet into a 120 kgs complex structural part in less than 20 hours when the machine is running at a maximum cutting volume of up to 10,000 cm³/min.

The system's ECOSPEEDs are linked by a rail conveyor system with 55 loading, unloading and storage stations for the machines' 60 pallets, each one measuring 2,000 mm by 6,000 mm. The conveyor

system was installed by MSB, a Starrag partner, and all process criteria, tooling, fixtures, programming routines and tests were completed by Scharmann engineers.

Each of the ECOSPEED F machining centres features a Sprint Z3 parallel kinematic machining head, which boosts the machine's ability for highly-dynamic, simultaneous five-axis/five-sided milling. The head uses three parallel linear axes drives mounted radially equi-spaced in the headstock. The spindle platform is connected to each drive via rigid levers with a pivot at one end and a ball joint at the other.

When all three axes move simultaneously, the spindle is moved in a straight line in Z; synchronised motion of the three Z axes allows the spindle to follow any path within a spherical cone of +/- 45 deg at a maximum of 80 deg/sec. If the three axes move differentially, the spindle platform will be tilted in the A/B kinematic.

Each machine has an integral C axis to allow the use of automatic interchangeable angular milling heads which operate at every spatial angle between -135 deg to 135 deg.

Each ECOSPEED F also features Siemens Sinumerik 840D CNC control, a 129-position Regal tool magazine, vacuum workpiece clamping and video monitoring of the work area. ▀



Competence in titanium

Starrag provides machines, tools and process expertise in economical titanium machining – all from a single source

Aircraft are constantly further developed and improved in order to meet requirements in terms of lower fuel consumption and reduced noise emissions. A clear trend here is increasingly complex and lightweight aircraft components, whether large structural components for the fuselage or turbine elements such as blades, blisks and casings.

Turnkey planning and installation of production facilities

A competence centre for titanium machining is located at the headquarters of the Starrag Group of companies in Rorschacherberg (Switzerland), which is also the home of the Starrag product brand. The first machine tools were already being built there in the early 20th century; the aviation industry is one of the municipality's core markets.

- 50 %

**shorter machining time
(single- vs. double-spindle
machine)**

The current Starrag product line includes machine types in the STC and BTP series for titanium machining, as well as the NB centres that specialise in blisks (also titanium), and the LX series, which was developed for the simultaneous 5-axis machining of turbine blades. However, Rainer Hungerbühler, Sales Director of the Starrag Group, points out that

Starrag's competence cannot be seen simply in terms of machines, but also applies to the whole machining process: "We have various specialist teams who deal with all facets of machining and components associated with machining". On request, Starrag produces its own VHM milling tools and carefully selects the appropriate tool holders. Even special CAM software is being developed in Rorschacherberg to enable efficient programming for users. "Ultimately, the customer does not only need a good machine", stresses Rainer Hungerbühler. "All these components must be in harmony with one another to achieve truly effective, reliable production. In the end, feed rates and spindle figures are not so important; what really count are the unit costs that can be achieved."

Two metre to five metre long structural components can be milled with the BTP 5000/2

“In the end, feed rates and spindle figures are not all that important; what really count are the unit costs that can be achieved”



The highlight of the last customer event on the topic of titanium was, without doubt, the double-spindle BTP 5000/2 profiler

The reliable, cost-efficient machining of titanium alloy components, such as those used in aircraft construction, requires specially adapted machines and tools as well as a great deal of experience. The Starrag Group has been involved in machining such high-strength materials for a number of years now. On request, the titanium specialists will put together an application specific turnkey package, consisting of special Starrag STC, BTP machines or others, and also containing adapted tools, software and process expertise.



The double-spindle BTP series is twice as productive as the single-spindle variant

Stable basis for heavy-duty machining

The highlight of the last customer event on the topic of titanium was, without doubt, the double-spindle BTP 5000/2 profiler – already the third machine of this type, which was built on behalf of a British aircraft manufacturer. They gave their permission to show this 240 ton Big Titanium Profiler to interested parties. The BTP series was developed for the high-quality machining of particularly long and complex titanium components. Accordingly, the machine beds, guides and spindles ensure optimal stiffness and damping. The double-spindle BTP 5000/2 is almost twice as productive as the single-spindle variant that is also offered. This is because it enables two titanium structural components, up to five metres long, to be machined simultaneously. The machine has a vertical pallet of

- 20 %

lower tool costs due to best possible damping and stable processes

4,5 m × 1,8 m and two 37 kW geared spindles with a maximum torque of 940 Nm to 1,300 Nm and a maximum speed of 5,600 rpm or 8,000 rpm. Reinhard Fitz, Sales Consultant for the Starrag Group explains: “With an insert mill, we can demonstrate massive cuts on such a BTP, with a volume of up to 760 cm³ per minute in TiAl6V4, with no

unstable conditions arising. However, these are not values for a production facility where the profitability analysis would not warrant it. This is because the tool wear is enormous with high cutting parameters.”

Experience titanium machining live

Watching, listening to and feeling the double-spindle BTP rough machining and finishing customised titanium components is remarkable. Nevertheless, there is also a complete process devised by Starrag that ensures the highest possible machine availability and precision. Only in this way can demonstrable benefits be achieved for the customer over a long production period, and customers appreciate that. This also explains the great interest in the event. ▀

Painstaking work: HACO produces large parts with precision in the range of hundredths of a millimetre

The **XXL sub-contractor** from Jutland



7,500 DIAMETER OF mm

The Danish company keeping machine tools in the family

In Barrit in Denmark, a small typical rural area in Jutland, extremely large, rotationally symmetrical components are produced at HACO A/S, one of the Starrag Group's largest regular customers, for companies such as Siemens Wind Power, Vestas, Valmont SM, LM Windpower, KHS and MAN Turbo. HACO processes around 10,000 tonnes of steel per year into XXL parts at a high level of vertical integration (including welding) on very large Dörries vertical turning lathes.

- 20 %

lower unit
costs

+ 15 %

Improvement
of quality



Graduate engineer and Starrag Group sales director Hubert Erz in conversation with HACO managing director Henning Albrechtsen: "You really are an expert in pushing the technical limits of a machine."



HACO: Irene and Henning Albrechtsen manage the "job shop," which was founded almost 50 years ago by their father, who is still working there



Human capital: The high-precision work performed at the family-run HACO relies on skilled workers such as machine operator Tage Friss

The family company HACO is a leading sub-contractor for very large, relatively flat and round workpieces that also develops its own components high up in the north of the country. This service is very popular with regular customers from the wind power sector and offshore industry who commission the Barrit-based company to produce impellers or moulds for wind vanes and components for ship engines or bottle filling systems.

A glance at the machinery shows that, above all, size is sought after in Jutland. "Our latest Dörries vertical lathe was designed for components with a swing diameter of 6,500 mm," says HACO managing director Henning Albrechtsen. "We have expanded it to 7,500 mm." The actual leap into the world of XXL machines was taken in 2000: Albrechtsen bought a large, used lathe manufactured by Schiess and immediately received his first major order. At the same time, Dörries Scharmann took on

the retrofitting of these production facilities and then also two further Schiess lathes.

In Barrit there are now eleven vertical lathes of varying sizes (swing diameter: 1,600 mm to 7,500 mm), of which nearly half are from Dörries: One of these machines is a used machine and four are new (Dörries VC 2500, 3500, 4500, 6000 and 6500). HACO produces almost everything on these machines in a single clamping position.

What are the general advantages of purchasing machines from Dörries? "We have had a very good experience with DST machines when it comes to quality, precision and service," says Albrechtsen. However, he believes the good reputation of the Dörries Scharmann brand also plays a crucial role – for instance, when the company is being audited by inspectors from potential customers, or certified by German TÜV auditors.

For the Starrag Group, sub-contractors are a particular challenge. "It is a matter of investment volumes and, therefore, keeping the machine hour rate low so that the job shop can sell its services successfully. The price of the machine is not crucial, rather the unit costs that can be achieved," explains graduate engineer and Starrag Group sales director, Hubert Erz. "A very high level of flexibility is also required so that the sub-contractor is able to adapt to a wide range of orders. It's a very difficult balancing act."

Thanks to its machinery, the family business is able to produce components with a maximum diameter of 7,500 mm and a height of over 3,000 mm, with a precision in the range of hundredths of millimetres, in a single clamping position. The eleven machines are now not only used to produce individual parts, but also series in batches of 100 (machine parts). ▀

Precision work: Operator Frank de Bruin checks the quality of a complete machining process

Tall, quiet and productive

Dörries **CONTUMAT VCE 2000** lathe in valve production

Gourmets think of Gouda as a cheese paradise, but specialists from the oil and gas industry value this city for the special valves that are produced there: There is much talk in the industry of the high-pressure control and stop valves from Mokveld that are manufactured on special machine tools. The Dutch specialists are particularly proud of their new "quiet tower".



+20%
higher
productivity

Tall, quiet and productive: The manufacturing experts at Mokveld Valves in Gouda are proud of their new Dörries Contumat VCE 2000 vertical turning lathe

“Our valves work at high pressures of **20 to 900 bar**”

“**Normally**, the hydraulics make a terrible amount of noise. We didn’t want our employees to have to put up with that anymore”, says Bart van den Bosch, Manager of Production Engineering at Mokveld Valves BV in Gouda. “But now there’s almost no noise.” The ergonomic answer to this problem was a Dörries Contumat VCE 2000/200 MC FC So vertical turning lathe.

The ergonomic machine has been in use since 2013. The unusual tower structure is noticeable upon first glance: The

machine table (60 kW drive capacity; 19,300 Nm torque) can be used to process workpieces that weigh up to 12 tonnes, with a maximum height of 2,450 mm and a diameter of up to 2,000 mm. “This design is very unusual for a vertical turning lathe”, says van den Bosch. “The machine is also very special in other ways: The pallet system with its motor driven set up is extremely important to us.” This extra feature on the VCE 2000 makes the setup process for the next workpiece more ergonomic and productive, allowing

it to be completed while another workpiece is still being processed.

The Dutch company uses the VCE 2000 predominantly to machine cast steel, chrome steel, duplex, super duplex, Inconel and occasionally titanium. Two round valves, each weighing around 5.5 tonnes with 80 mm flange holes, were produced from Inconel in a complete machining process. The integrated tool magazine with 90 pockets also plays an important role in the complete machining process. As around 80% of the machining operations



Space: The integrated tool magazine with 90 pockets plays an important role in the complete machining process

-25 %
energy
consumption



Bart van den Bosch, Production Engineering Manager at Mokveld says "this structure is very unusual for a vertical lathe"

www.mokveld.com

are allotted to turning, the magazine contains 50 lathe tools that Mokveld has transformed into 300 lathe tools using a technological trick with special holders. However, the percentage of milling and drilling operations also plays a crucial role: The Dutch valve specialists appreciate the fact that bores can now also be manufactured on the machine in a single clamping position. This reduces the long machining times, as well as costs and energy consumption.

The importance of measuring devices is remarkably high: Both the aligning station and the machine are equipped with a Renishaw probe and automatic calibration device. This function is important in a turning and machining centre that roughs down, finishes, mills and drills in a single clamping position. The machine achieves finish tolerances down to 30 µm on these large components, which has eliminated the need for subsequent grinding. "For safety reasons, precision and quality are

very important to us," says the expert. "Our valves work at high pressures up to 900 bar." "Our customers expect a high level of performance from us in every respect," adds Marketing Manager Chris van Assem. "The requirements have increased in the standards that we need to observe." ▀

A challenge with a T&I expert

Interview with Dr.-Ing. Eberhard Schoppe, Managing Director of Heckert GmbH, Chemnitz, Germany (member of the Swiss Starrag Group)
This interview was conducted by Nikolaus Fecht, technical journalist from Gelsenkirchen

Customer requirement: A flexible all-round machine Customers in the machine tool industry want flexible, all-round machines that produce complex parts in a single setup at the lowest possible level of energy consumption – and that will form part of the factory of the future: Dr.-Ing. Eberhard Schoppe, Managing Director of Heckert GmbH based in Chemnitz, Germany, explains what effect this trend is having on the “Transportation & Industrial Components” (T&I) operational business unit that he manages.

Dr. Schoppe, what are the characteristics of typical customers in the “Transportation & Industrial Components” business unit and what do they manufacture?

Dr. Schoppe: “Transportation” covers every application area of components whose end products travel on and off road, as well as on rails and on water. The typical workpieces include engines and gearbox components for the private and commercial vehicle industry. Meanwhile, “Industrial Components” includes cubic components and assemblies for complex technical products. The reference parts include gearbox housings for wind turbines, compressor housings, housing parts for machine tools or textile machines and housings for precision engineering. The variety of parts for the various end users is virtually limitless.

Which member companies of the Starrag Group operate in this business unit? What are the strengths of each company?

Dr. Schoppe: The T&I business unit includes the Heckert factory in Chemnitz and the Starrag plant in Bangalore, India, which provides complete services for applications in the respective market segments. We not only supply the machines, but also offer comprehensive technological solutions, from developing customer-specific production technology to planning individual production stages.



Dr. Eberhard Schoppe (born 1955) has been responsible for the Transportation & Industrial Components business unit since 1 January 2015. With the Heckert and WMW brands, the business unit carries out machining work for Heavy Duty Vehicles & Engines, On-Road Vehicles and Industrial Components market segments.

Schoppe was previously responsible for the former business unit 2 in Chemnitz from 2004. In this business unit, he was a member of the management board from 1999 as Head of Technology and Production and previously worked in production planning and foreign sales from 1994.

Before that, he worked for another international machine tool manufacturer as technical manager. Dr. Eberhard Schoppe holds a degree in mechanical engineering from the Chemnitz University of Technology, Germany.

Dr. Eberhard Schoppe: “Demand in future will be for customised and cost-optimised solutions that are characterised by one thing: being only as comprehensive as required, rather than as comprehensive as possible”

The focus is on the integration of system components. These include workpiece storage and handling, washers, measuring stations, assembly technology, tool selection and provision of equipment. Heckert offers a comprehensive product range, from small machines with a pallet size of 400 mm × 400 mm to large machining centres with pallet dimensions

of 2,500 mm. This makes it a premium supplier with an increasing number of complete turnkey solutions, all from a single source. Its focus is on productivity and long-term accuracy with maximum precision. In addition to 4-axis machining, the demand for complete machining with a 5-axis machine design is increasing. Starrag India primarily focuses its product



Precision with a 3D profile: The “Transportation & Industrial Components” (T&I) business unit focuses on machining cubic workpieces

range on the Indian market in the relevant area of application. Productivity is also paramount here, but this is combined with a strong price orientation.

What similarities and differences are there between the transport industry and manufacturers of industrial components?

Dr. Schoppe: Our focus is on machining cubic workpieces. The actual usage case of “Transport” or “Industrial Components” is not one of the crucial distinguishing criteria. In both cases, the aim is to achieve the lowest manufacturing costs, as well as maximum reliability and precision. Any differences between applications in Transport and Industrial Components can be found in the nature of series production. The quantities produced in Transport are generally much higher. This sector is also showing an increasing demand for automation solutions, peripheral equipment, measurement technology and assembly facilities. Requirements are also growing because of the turnkey business.

What is with situation like in Industrial Components?

Dr. Schoppe: This generally involves smaller quantities per customer workpiece, which means there is a demand for machines with custom designs. We meet these requirements with our modular HEC machine series, which can be expanded with customer-specific solutions. By contrast, the IWK series from Starrag India is characterised by strict standardisation and is, above all, suitable for the typical reference parts in this sector. These are 4-axis machines that are designed for the requirements of the Indian market and represent, to a large extent, a completely new development.

The transport sector is characterised by new drive concepts (with electric drives a focus area) and by the trend towards lightweight construction using new materials and composite materials. What effect are these trends having on the machine tools produced by your business unit?

Dr. Schoppe: In terms of customer workpieces, there is a clear trend towards

component integration. Manufacturers used to combine individual components to form a single assembly. Nowadays, series components in Transport are becoming considerably more complex. Our response to this trend is the 5-axis design of the HEC series, which enables five sides of a workpiece to be machined in a single setup. In addition, there is the U5 version of the HEC series with a fifth axis in the spindle head area, as well as an X5 version with a swivel table on the workpiece side. The additional integration of turning functions ultimately converts a typical Heckert drilling and milling machine tool into a complete machining centre. The lower number of clamping positions significantly reduces manufacturing costs and increases workpiece accuracy with no additional alignment required. I should also mention that the Starrag Group has extensive technology offers in the Transport and Industrial Components sectors. That means this market segment includes complete rotational machining of components, such as machining wheels for use on railways, in addition to machining cubic parts.

“In 2020, we will be the preferred partner for customers in our market segments and application groups”

Industry 4.0 is a hot topic in all sectors. Is your business unit also affected by the fourth industrial revolution?

Dr. Schoppe: Industry 4.0 is a really hot topic. I see it less as an industrial revolution, and more as a rapid evolution involving a dynamic process of innovation. Hardware and software are being developed at a rapid pace of innovation, and the integrated intelligence of our machining centres and associated production systems is increasing at this rate too. Designing the interfaces is a significant challenge: Above all, there must be effective communication between machining and handling units – not just within them. It is also important to integrate production planning and control systems. Networking the entire production system therefore requires a comprehensive approach that is currently very difficult to achieve because of the variety of systems. The ongoing trend towards increasingly comprehensive specifications on the customer side is having an unfavourable effect. More complex production systems and the multitude of possible solutions make a rapid and, above all, cost-effective implementation of Industry 4.0. difficult. It will be a long time before the relevant standards have been developed – but this must happen because of the cost pressure.

What is the state of standardisation within your business unit?

Dr. Schoppe: There is talk that Heckert, Scharmann and Starrag want to introduce a modular kit for large machining centres

in the near future. That is true. We have a whole host of different variants, such as for spindle and milling heads, which play to their strengths in the various market segments. By introducing a standardised modular kit, we want to offer a range of combination options. Many of our assemblies – such as beds and columns – are similar, so it makes sense to achieve modularity by aligning them. There are adaptive systems in development like our tower magazine, which is used as an additional component at both Starrag and Scharmann. Our modular kit goes one step further by standardising similar assemblies. However, there will also be a particular gradation within this modularity. So there will not be a standard bed – instead, there will be a whole host of bed variants within the modular kit. However, the identity of our different brands will be maintained because the objective is not to create standard machines as that would entail compromises. Machines will continue to be tailored to the respective market segment and we will be able to use a defined kit in an approach that favours variety. In fact, I believe there will be even greater variety because we are opening up new possibilities.

In your customer magazine, there is talk of breaking new ground in the production of machines?

Dr. Schoppe: We have analysed our production process from multiple perspectives. A clear definition of the process steps within our production chain was made on the basis of “bottom up” shop floor management. The introduction of the 5S method represented a further step towards production excellence. In addition, we will implement “lean management” criteria in each process step – particularly in the assembly process – so that we can achieve our goals of optimizing productivity and efficiency. We will then be looking at “production excellence”. This will always be done in the context of customer requirements and comparisons with our competitors.

Let's take a look into the future. What will be the state of your business unit in five years' time?

Dr. Schoppe: In 2020, we will be the preferred partner for customers in our market segments and application groups. We will offer individual machines and system that are configured precisely so that the customer can achieve its objectives in terms of profitability, safety and growth. ▀

Brought into shape

Horizontal machining centres **HEC 630 Athletic** by Heckert

It is not usual that a foundry finishes workpieces up to the assembly state. However, this is exactly the core competence of CSA Herzogenburg GmbH. In order to supply value added components from casting to the finished component, the company relies for the mechanical finishing on two horizontal machining centres **HEC 630 Athletic** by Heckert, that are specially tailored to its requirements.

+ 30 %
higher productivity



The loading station is completely opened to the top and allows an easy loading of the machine during primary processing time

It seems that the ingot mold casters of the CSA Herzogenburg GmbH have a heart made of aluminium. About 6,500 t of this light material is processed each year in the low pressure and gravity permanent mold casting facility of the casting experts in Lower Austria. The emphasis is on chassis components and large components for commercial vehicles. A view into the production quickly reveals: CSA has specialized in sophisticated castings. "The complexity of the parts is not only due to the often complicated geometry of the parts. Particularly large castings are a challenge, especially when one works with multiple casts, like we do," explains Markus Kieberger, the managing director of CSA.

The high complexity of the components also has implications on subsequent processes, such as the post-machining of the parts. "Originally, an outsourcing was in discussion for the post-machining of large castings", the managing director explains. "Then, however, we have decided to manage this work step in our company, in order to have under control the entire value-added process and also to be able to keep the logistics tight."

So, in February 2014, the first Heckert HEC 630 Athletic has been purchased. The essential decision criteria in favor for the horizontal machining centre were the large working area and the high stability. At a clamping surface of

800 mm × 630 mm, the HEC 630 Athletic allows an interference diameter of 1,250 mm (maximum length up to 1,550 mm) and a maximum workpiece height of 1,250 mm. "Heckert could prevail also because of the possibility to adapt the machine exactly to our demands. For example, column modifications have been made for a better machining of large parts with high process reliability," says a pleased Mr. Kieberger. The NC rotary table can carry a workpiece weight of up to 1,500 kg. The rotational speed of 70 rpm can be optionally increased to up to 500 rpm and thus, it can even be used for turning operations. The traverse paths of (X/Y/Z) 1,200 mm × 950 mm × 1,200 mm offer sufficient space for the



+ 15 %
higher process reliability

The large interference diameter allows the complete machining of very large workpieces

machining of large parts. The spindle with its rotational speed of up to 15,000 rpm transmits the drive power of 82 kW without a gearbox via a HSK-A 100 tool interface. The tool magazine offers 80 storage spaces with a maximum tool length of 800 mm. The tools may have a weight of up to 35 kg. In January 2015, another HEC 630 Athletic was purchased. This one is, except for an adapted spindle, identical in construction to the first machine. "Our main aim has been a capacity expansion," Kieberger explains. "With the first machine, we perform 19 weekly shifts with almost always the same parts. On one hand, the new sister machine allows us to increase the throughput for this part, on the other

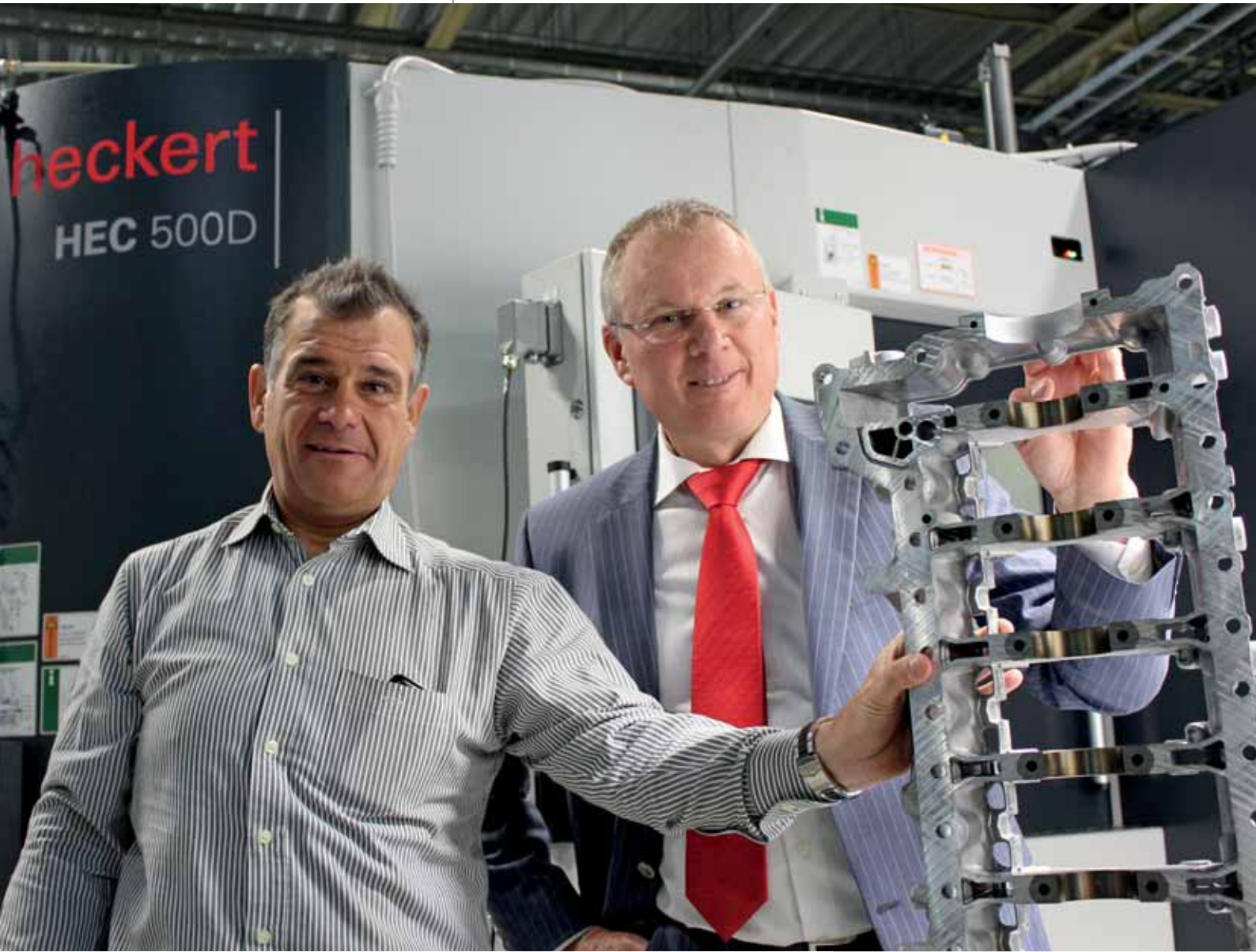
"The tool magazine offers 80 storage spaces with a maximum tool length of 800 mm"

hand it also allows to additionally produce other parts in alternating operation". The machines are arranged in a machining cell shifted by 90° to one another and can be loaded and unloaded from the same workplace with crane support.

Especially in machining of large and heavy work pieces, the Athletic fully brings its performance ability to bear. The axes X/Y/Z of the machining centre move with a speed of up to 65 m/min. In doing so, the acceleration rates can be adapted to the respective work

piece and so, the machining times can be optimized. The robust construction of the HEC 630 allows acceleration and brake value in the range of 7 m/s² in X- and Y-axis. "For us, the two HEC 630 Athletic are the perfect "workhorses". Exactly adapted to the requirements of the parts to be machined, they offer a maximum level of productivity at a constantly high machining quality. Hence, it offers exactly the process reliability that we guarantee to our clients," Kieberger summarizes pleased. ▀

Christiano Sala (left) from Brabant Alucast, along with Benny Van Haver from the Starrag Group, is pleased with the performance of the HEC 500 D



20%
faster machining time

40%
higher overall productivity

The new **Heckert 500 D machining centre** delivers impressive levels of profitability, safety and growth at Brabant Alucast

Speed, precision and long-term process reliability

Companies that supply pre-finished parts to the automotive industry need a high-performance, machining-driven production facility. One such company is Brabant Alucast, a specialist in light-weight die casting. A facility of this type can be found at the company's headquarters in Oss in the Netherlands. It is equipped with eight Heckert horizontal machining centres that, because of their dynamics and sophisticated design, ensure high quality and short cycle times. The two new HEC 500 D machining centres achieved particularly impressive results in benchmark testing.

Brabant Alucast specialises in the design, development and production of high-pressure aluminium and magnesium die cast parts for the automotive industry. It is one of Europe's top companies in this sector in terms of quality ranking and annual sales. The company is headquartered in Oss in the Netherlands and has four other branches in the Netherlands, Germany, Italy and the Czech Republic. It employs a wide variety of production methods in order to manufacture high-quality parts for its customers. These methods include the Exactfit Casting™ and Vacural® Casting technologies, both of which were developed in-house. But Brabant Alucast offers more than just its die casting capability of 300 to 4,000 tons. What really makes the company stand out is its complete range of solutions, which include CNC machining and assembly of automotive components. Quality and customer focus are particularly important in this regard. Brabant Alucast obtained ISO/TS 16949 (2009) Automotive Certification for its QM system and has been awarded the European Aluminium Award (automotive) six times for its customer-oriented approach.

Brabant Alucast employs around 300 people at its location in Oss, which focuses on die casting and machining of large parts made from various magnesium and aluminium alloys. The parts produced are mostly engine and gearbox components or structural components that are delivered pre-finished to BMW, GM/Opel, PSA, DAF, VW/Audi, Toyota, ZF and others.

Dynamic Heckert machines for machining die cast aluminium and magnesium parts

As Development Engineer for parts and processes, Christiano Sala is responsible for CNC machining in Oss. The machines in this area include eight from Heckert: six CWK 500 D and, as of recently, two HEC 500 D. "I have known Heckert for quite some time as a global leader in machining centres that are suitable for milling, drilling and turning complex workpieces. It was a stroke of luck for us when Benny Van Haver from the Heckert sales department came to us in 1999 to recommend the CWK 500 D machining centre for machining a flywheel housing. That's because this

machine, with a rapid traverse of 82 m/min and 1 g acceleration, allowed us to achieve the shortest production time by some distance." The robust machine design, the size of the collision circle and the hydraulic clamping options met the expectations of Christiano Sala and his colleagues. Benny Van Haver, responsible for Brabant Alucast in the Netherlands as Head of Sales for the Benelux countries at the Starrag Group, confirms that this successful partnership has expanded in the subsequent years: "We worked together to build a robot loading system for the CWK, then there were another five CWK 500 D orders for machining oil pans, valve housings, ladder frames, crankcases and gearbox housings. All machines are designed with a robot automation interface, and some feature fire protection equipment for magnesium machining." The six Heckert CWK systems still work in three-shift operation, with no notable decline in precision or performance. "The long-term quality of these machines makes the investment particularly worthwhile," believes Christiano Sala.



In the funnel-shaped HEC 500 D workspace, the chips fall directly on the centrally positioned chip conveyor, thereby avoiding chip packing



Future plans for the two HEC 500 D centres include automation involving articulated robots, similar to the automation of all CWK machines

Much faster than comparable machines

As Christiano Sala explains, “We of course conducted extensive research into which machines would be best for this application in the long term before purchasing the two new HEC 500 D machines. After all, we are talking about quantities of 100,000 parts per year, probably over a period of several years.” Using the exact same programme, Sala and his colleagues compared the production time per part on a Heckert CWK 500 D built in 2005 (402.0 s) with that of a Japanese machining centre built in 2013 (388.4 s) and the new Heckert HEC 500 D built in 2015 (321.2 s). The results (see values in brackets) were clear: The HEC 500 D was 20 % faster than the previous CWK 500 D model and 17.3 % faster than the Japanese machining centre, which is only two years younger. For Benny Van Haver, this is confirmation of the successful development work at Heckert: “The R&D division has retained proven qualities such as the

robust, durable machine construction, but upgraded essential details to the latest technological standard, for example with highly dynamic feed drives and extremely precise profile rail roller guides in all linear axes.” Christiano Sala is also very satisfied with the result: “It is nice to see that Heckert takes our suggestions and those of other users seriously and incorporates improvements accordingly.” For him, this success is paying off in hard cash, as the shorter cycle times ensure the capacity of the two HEC machines is sufficient for the volume of the latest order. With the previous machines, it would have been necessary to invest in a third machining centre.

Motor spindle: From 0 rpm to 20,000 rpm in one second

The shorter production time is due in no small part to the rapid traverse of 100 m/min and accelerations of 1 g in the linear axes. And the motor spindle also delivers impressive performance

data: Its speed range is between 50 rpm and 20,000 rpm, its power (40/100 % duty cycle) is 50/48 kW and its torque (40/100% duty cycle) is 85/60 Nm. It accelerates (in accordance with VDI 2852) from 0 rpm to 20,000 rpm in just one second. With the same NC programme, setup and tools, this significantly reduced the non-productive time. “If the programme is optimised in terms of machining data, the cycle time could probably be shortened by another 10 %”, estimates Head of Sales for the Benelux countries at the Starrag Group, Benny Van Haver. Development Engineer Sala also understands the potential that the spindle has: “The oil pan, for example, contains numerous M6 threads. It took us 109 seconds to produce these on the CWK. On the HEC, we only need 77.5 seconds. These numbers do not take any optimisation of the spindle speed into account either. We can probably use PCD tools to achieve even higher cutting speeds and shorten the main time.” However, the new components are



The tool change process is reliable as the chain magazine of the HEC 500 D is kept free of cooling lubricant and chips

SUMMARY

The new **HEC 500 D** machining centres allow Brabant to increase its profitability over the long term. The machines achieve **17.3% faster machining** times for the expanded product range. Only two machines are needed to handle production tasks, with no third machine required. Maximum process reliability was already assured with the predecessor machines, with no losses in quality in demanding three-shift production.

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still in the initial phase. This means that, in addition to the upper oil pan parts, cylinder head covers and possibly another product will run on the HEC machines in future in order to ensure round-the-clock utilization. Accordingly, production is still alternating between HEC and CWK machines, and the NC programs must be geared to the “weaker” machine. Machining cannot be optimised until the machining managers have agreed on a fixed assignment.

Greater process reliability with the new Heckert HEC machines

The highly dynamic HEC horizontal machining centres replaced their predecessor, the CWK series, in 2011. They are so flexible in their configuration that a wide range of materials can be machined for all sectors of the metal-working industry. Heckert offers HEC centres with a dynamic package specially for machining light alloys. They are characterised by the high values mentioned above for speed, rapid traverse and

acceleration. As they have a (thermally) stable structure, extensive control and monitoring devices and a state-of-the-art service and diagnostic system, Heckert guarantees users long-term machining accuracy in tolerance class IT5. For Christiano Sala, this is an important benefit as his components generally run in automated three-shift operation for many years — robot loading is also planned for the HEC 500 D. That means a high level of process reliability is essential. “We must achieve regular dimensions with a process capability index CpK of 1 and critical characteristics with CpK 1.67”, says the Development Engineer. The upper oil pan parts contain numerous H7 fits, such as OCV holes, which must hold high-precision valves for camshaft adjustments. Accordingly, precision is important with regard to diameter and concentricity, as well as surface quality, which is Ra = 0.8 µm.

Quality down to the last detail

Starrag Group representative Benny Van

Haver mentions some key improvements to the details of the HEC 500 D in comparison with the predecessor model: “The telescopic covers of the previous model have been completely replaced with fixed sheet metal in the machine. This makes greater acceleration and rapid traverse possible as the sheet metal does not have to be carried along with the linear axes. The working space also now has a funnel shape in the cross-section, meaning that chips fall in the middle onto a chip conveyor. That means there are no more piles of chips, as these endanger process reliability”. In addition, the new tool magazines offer excellent cleanliness. To achieve this, all hydraulic assemblies were removed from the surrounding area, and chips and cooling water are kept away from the changer. Christiano Sala is convinced that the Heckert HEC 500 D will prove to be just as durable as the CWK centres, which have maintained their high quality level in three-shift operation at Brabant Alucast for ten to fifteen years. ▀

Ask and you shall receive!

BUMOTEC customer dialogue in Chemnitz Synergy between Heckert GmbH and Bumotec SA

Bumotec took a somewhat different approach to customer contact with the "Invitation to dialogue on the watch industry and micromechanics" event, which took place from 29/06 to 03/07/2015 in the training centre of Heckert GmbH in Chemnitz.



A sustainable increase in productivity by means of customer-specific technology solutions

Innovative process solutions from a single source

Loading/unloading unit with a **Bumotec s191 V** pallet magazine – an effective solution for 24-hour production for a relatively small additional investment



Interested parties from a wide range of sectors find things in common and establish new contacts thanks to Bumotec. The production management team of a job shop in conversation with the development team of a microphone manufacturer





The live demonstration initiates intense discussions amongst experts. Bumotec application technology gives an insight into Bumotec's capabilities and expertise

-30%
 manufacturing time due to
 complete machining in
 a single clamping
 position

The idea was not to hold an open house where visitors are shown which great, new LEDs are now installed in a designer hood. Rather, the interested parties were targeted as a result of detailed preparatory work and were sent exclusive invitations. The main emphasis was on the watch industry in the world renowned Glashütte region, along with a mixture of medical technology and precision mechanics from Saxony and Thuringia. The interested parties were asked about their current and special requirements, and Bumotec was able to present corresponding solutions. This is because Bumotec is a supplier of customer solutions relating to machine systems. The conversations of a technical, economic and strategic nature ensured a very engaging few days. The visitors particularly appreciated gaining an insight into the experiences of an application technician.

The actual presentation featured a combination of a live demonstration of the Bumotec s191 V turning and milling centre, extensive video presentations on alternative machine systems and a

display of around 100 machining patterns. Because of their small size, the 100 workpieces were housed in a single display case. The workpiece that was produced live during the presentation was a watch plate created by Bumotec that contained a wide range of complexities: Tight height and diameter tolerances, centre distances in the μ range, S 0.4 threads, surface decoration and circumferential machining. In line with Bumotec's philosophy, the workpiece was turned from a blank into a finished plate, including front and rear side machining, circumferential machining and outer turning, with no manual intervention whatsoever. After the plate was also stacked in the unmachined and finished part magazine fully automatically, it could be presented immediately to the respective visitor as a giveaway.

This served as an impressive display of competence. This process raised the question of why these machines are not yet distributed in Glashütte, for example. The answer was clear and honest: The capacities for service and application

technology, and, of course, sales and support must first be developed. The Chemnitz location is especially important in this regard. This is because, with Bumotec's presence in this region in combination with the new BumoTech Centre, which is currently being constructed near Tuttlingen, Bumotec is in an exceptionally good position to guarantee competitive advantages for customers in the long term.

The visitors to the dialogue with Bumotec also showed great interest in the development of Heckert GmbH. The tour of the company, which was incorporated into the visitor program, was met with enthusiasm and great appreciation all round.

At the end of the week numerous watch making companies from Glashütte and Dresden, as well as market giants from the trauma medical technology and job shops, evaluated the event very positively. The „Dialogue with Bumotec in Chemnitz“ could therefore become a fixed event in the calendar. ▀

Starrag Group: Think tank for medical technology



Experts have long been calling it “Medical Valley”, and some are already even talking of the “global capital of medical technology”: We are talking about the Swabian district of Tuttlingen with its more than 500 medical technology companies. This was reason enough for the Swiss Starrag Group to open a tech centre in the district of Tuttlingen in October 2015. This tech centre will present the machines and expertise of the traditional brand Bumotec, which is based in the Swiss canton of Fribourg.



Jean-Daniel Isoz, Manager of the Starrag Group's Precision Engineering business unit: “The aim of the new Starrag tech centre is to increase the name recognition of Bumotec amongst the medical technology companies within the region and within the German-speaking part of Europe.”

“In the field of medical technology

Tuttlingen is the clear number one in Europe”, explains Jean-Daniel Isoz, Manager of the Starrag Group's “Precision Engineering” business unit. “With our Starrag tech centre in neighbouring Immendingen, we first and foremost want to increase the name recognition of the Bumotec company in the region and in the German-speaking part of Europe.” Bumotec SA from the Swiss canton of Fribourg produces machines for manufacturing high-quality, highly precise components such as those used in the watch and jewellery industry as well as for medical technology. “We already have customers in the Tuttlingen district”, states Isoz. “However, I expect to see considerable growth if we are able to expand by not only offering on-site service to existing and potential customers, but also demonstrating our machines for them – especially given the strong local competition.”

The location has been chosen well, as first class medical devices and products

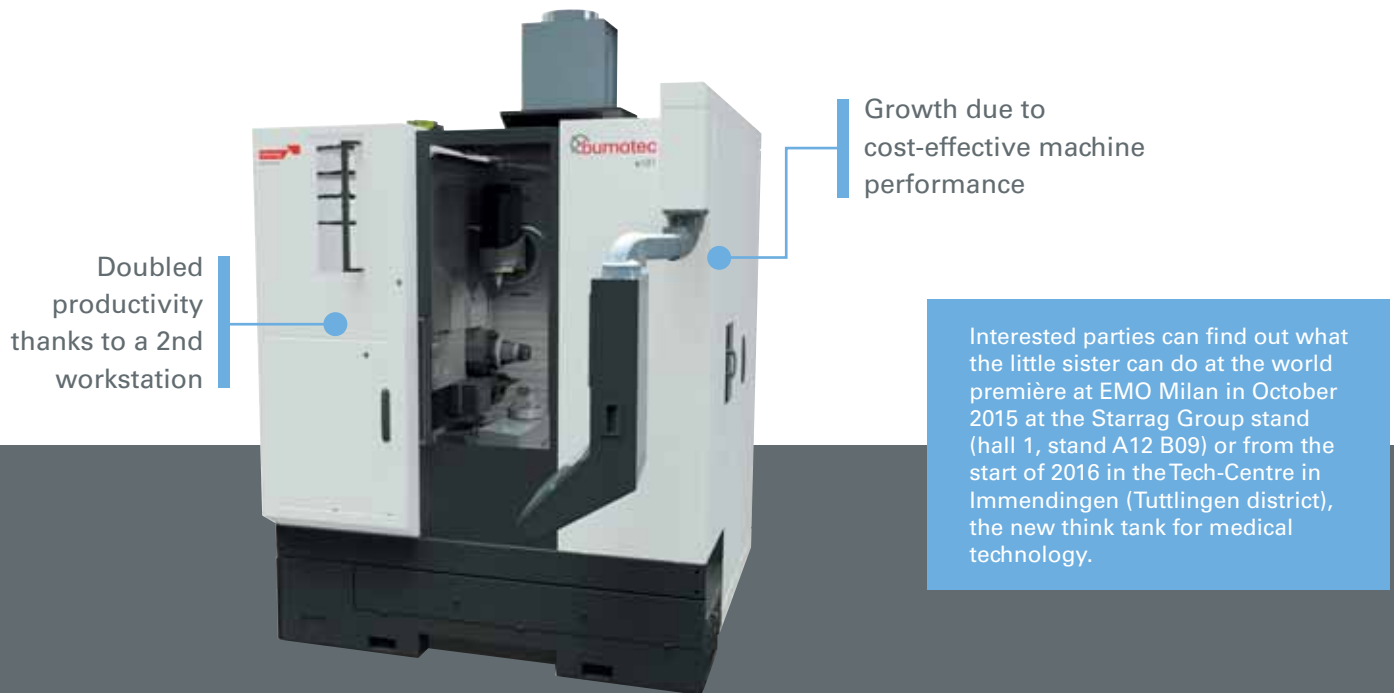
have been developed in this region at the edge of the Black Forest, for numerous generations. The new Starrag tech centre aims to directly appeal to manufacturers of prostheses and surgical instruments – both of which are specialties of the “Medical Valley”. Furthermore, located within a close distance of the tech centre are many manufacturers of cutting tools for medical technology, with whom the Starrag Group has worked closely in the development of tailored applications.

A competent team of sales managers as well as application and service technicians will selectively demonstrate medical technology applications on Bumotec machines in a rented building from October 2015. “We will start with demonstrations on the high-precision, multi-functional machine tools from the s191 Linear series, which is suitable for the complete six-sided machining of small workpieces”, reveals the manager of the Precision Engineering business unit. “I have high expectations based on the excellent reputation that the s191

already has in the sector, mainly due to its flexible modular structure and the possibility of complete machining in a single clamping position”. By the start of 2016 at the latest, a new machine that is being specially developed for medical technology will be introduced. Known as the “little sister of the s191”, the machine, which has the designation s181, will be officially presented by Bumotec for the first time at the EMO in Milan.

In the long term, the Starrag tech centre in Immendingen (Tuttlingen district) will not only house Bumotec machines. “We generally want to increase our presence in southern Germany” says Isoz. “I can easily imagine that we will also be presenting other machines from the Starrag Group in the medium term. In order to approach these interesting and challenging tasks in an even more targeted manner in future, we are putting great effort into searching for experts in sales, marketing, service and application technology for the new Starrag location.”

Bumotec s181: EMO world première for the micromechanics sector



Linear machining centre for micromechanics, including watches and jewellery and medical devices

Very high demands are placed on machine tools by all Bumotec customers, however the micromechanics sector poses particular challenges for the company. Bumotec has therefore developed a new machine that will clearly display its advantages for medical and surgical instruments in particular, as well as in other sectors. "The new development is packed with all of the know-how and experience we have gathered over ten years with the s191", states Development Manager Dr. Patric Pham. "This makes it more compact and cost-efficient – with comparable performance. Our customers become more productive and gain more space for additional production equipment, a prerequisite for growth." The concept of the Bumotec s181 series is based on unit costs and clearly closes a gap in the Bumotec series.

The s191 Linear CNC turning and milling centre has proved its worth with six-sided complete machining (of watch components for example) with backlash-free, repeatable precision in the μm range. Because of this positive response and based on the experience gained the s181, a 5-axis turning and milling centre with a retraction unit for the complete machining of complex and high-precision workpieces was developed using the successful s191 model as a technical basis. The focus is on workpieces from the micromechanics sector, which the Starrag Group divides into the application groups orthopaedics, instruments and dental. In contrast to the s191, the new machine, with its HSK-40 tool spindle (30,000 U/min), is designed to machine very small components either individually or from bar (maximum diameter: 32 mm). It also

Growth due to cost-effective machine performance

Interested parties can find out what the little sister can do at the world première at EMO Milan in October 2015 at the Starrag Group stand (hall 1, stand A12 B09) or from the start of 2016 in the Tech-Centre in Immendingen (Tuttlingen district), the new think tank for medical technology.

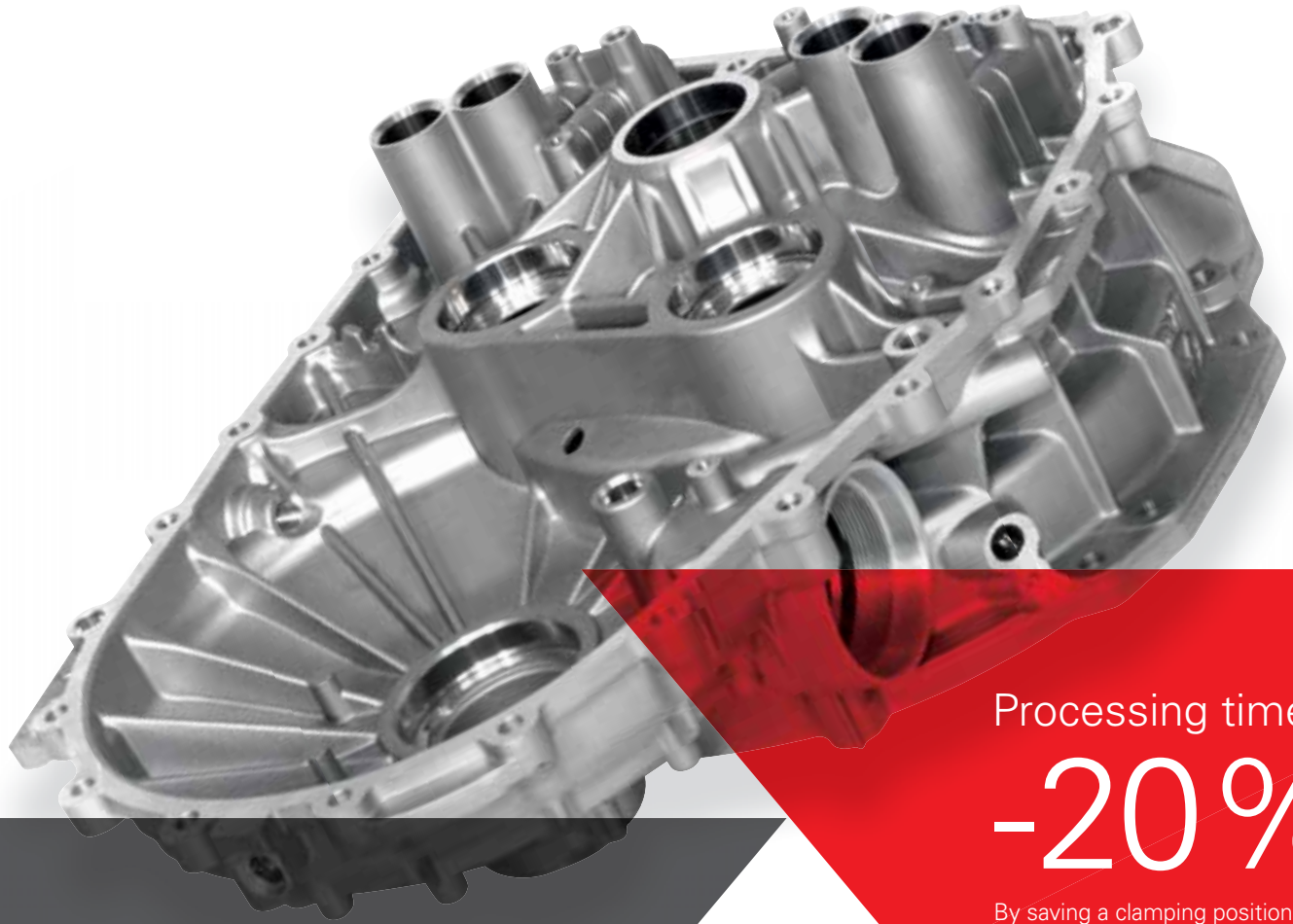
has an approximately 30 % smaller floor space of 3.5 m² – with a comparable performance and an optimised price. Despite the small floor space, the tool magazine can accommodate up to 90 tools.

However the new machine, according to Dr. Pham, not only offers the advantage of a "very good price-performance ratio", but also the possibility of being tailored. "Because of the numerous options, customers can configure their s181 in a way that corresponds exactly to their machining tasks", says the Development Manager. The new machine has a very modular design and can assimilate numerous options, some of which are still in planning. An example of one of the options that is already available is a second workstation, which will ideally double productivity: Optionally, up to five powered tools can be used to machine a workpiece on the retraction unit while the tool spindle machines on the main spindle. Dr. Pham: "It definitely does not replace the s191 because the s191 can turn, mill and grind significantly larger components with a bar diameter of 65 mm." ▀

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