

Machine, how are you?

Fingerprint online determines the condition of a machine within minutes

Aerospace: Mission accomplished

From pilot to reference customer – Starrag ensures precision without compromises with ZEISS solution

A breeze of optimism in production

Mechanical production in Chemnitz is currently being upgraded to the latest state of the art

Seyer Productivity levels set to take-off with Starrag

Heckert 800 X5: a machine for processing the hardest materials with high cutting performance

With the Heckert H50 a concentricity of 5 μm





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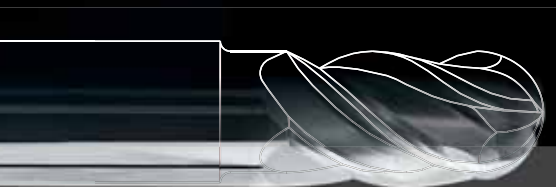
The Starrag logo consists of the word "starrag" in a white, lowercase, sans-serif font, positioned on a red, angular background element that resembles a stylized arrow or a corner of a square.

Engineering precisely what you value

A close-up photograph of several high-speed steel cutting tools, including end mills and drill bits, arranged in a cluster. The tools are highly reflective, showing bright highlights and deep shadows, emphasizing their precision and metallic texture. The background is dark and out of focus.

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Martin Buyle
Division CEO Starrag

Dear reader,

Technology and sustainability are often two sides of a coin. We develop innovative production concepts that combine economy and ecology. Again and again, I am amazed by how different our solutions are.

The launch of the new Dörries VT 28 vertical milling machine is a real success – a prime example of productivity and efficiency. In this interview, Sales Manager Heiko Quack explains why now is the ideal time for a new, versatile generation of machines, specially designed for precise and dynamic machining in the wind power and aircraft industries.

Visitors to the Aerospace & Turbine Technology Days in Rorschacherberg learned quite how high the demands on aerospace components are. This event showed how an intelligent combination of machine, tool and software can significantly increase productivity, and consequently also sustainability.

When developing new solutions, we like to work together. As a part of a pilot project with ZEISS, we are the first company in the world to work with a new high-precision coordinate measuring machine. With ZEISS PRISMO fortis, we were able to drastically reduce the measurement times for turbine blades – without any loss of measuring accuracy.

Precision and productivity alone are not enough for Seyer Industries; the components have to be produced with consistent accuracy. The Heckert and Starrag machining centers, on which the medium-sized family business from the USA manufactures complex structural components from hard materials such as titanium, have these characteristics.

The Tech Center in Immendingen developed the Fingerprint Online software, which uses measurement technology to analyse the condition of Bumotec machining centers in just a few minutes, and helps to improve overall equipment effectiveness (OEE) and quality. If errors occur in the actual production process or unclear damage situations arise, these must be analyzed as quickly as possible.

The quality requirements of medical technology are also extremely high, as even the smallest deviations can have serious consequences in this sector. The Tornos division, Starrag's new merger partner, also has a good reputation in the medical technology sector. From the outset, Bioscience Medical, a manufacturer of high-end implants and prostheses, chose Tornos as its sole partner for the production of pins, screws and plates. Thanks to this long-standing partnership with its machine supplier, Bioscience Medical is able to constantly develop innovative products and optimize its production processes.

I hope this brief insight into some of our highlights has piqued your curiosity about these items as well as others. Enjoy reading – and I hope it inspires you!

Yours,
Martin Buyle

Processes to take off

The aviation industry is pushing its productivity



The mood in the aircraft construction industry is extremely positive. Full order books are waiting to be processed. Production managers therefore expect the Aerospace & Turbine Technology Days at Starrag's headquarters in Rorschacherberg to provide some practical ideas for making their manufacturing processes even more efficient. And on 18th and 19th June, they received a wide variety of them in large numbers.

The Aerospace & Turbine Technology Days are not a "normal" in-house exhibition. "The focus here is not on our Starrag machines, but on technical solutions for problems that production managers in aircraft and turbine construction are dealing with intensively," emphasizes Martin Buyle, CEO of the StarragTornos Group. Together with highly qualified partner companies from the fields of automation, digitalization, metrology, tool presetting, etc., Starrag demonstrates

live how various processes can be improved. The results not only inspire the visitors, but also Martin Buyle: "I am always fascinated by how, even with a wide range of workpieces, an intelligent combination of machine, tool and software can increase productivity, sometimes by a percentage of two to three digits."

The process-orientated event concept has been extremely well received by

participants for many years. Martin Buyle welcomed over 200 participants in June 2024: "All well-known aircraft manufacturers, OEMs, first-tier suppliers and manufacturers of power plant turbines are represented here. They come from all over the world, from America, Europe and Asia, from a total of 18 nations."

His fellow board member Alexander Attenberger, responsible for Starrag sales, confirms this: "Our Technology



With “Blade in one go”, a turbine blade is manufactured off the shelf in a fully automated process.

Days, which we are organizing for the 25th time, have become one of the most important forums for the aerospace industry. This is where production specialists can find out about the latest developments and exchange experiences with each other.” This is particularly interesting at the moment. The aviation industry is in a state of upheaval; Energy efficiency, lightweight construction and carbon footprint are becoming increasingly important and completely new drive concepts are being debated.

What really matters

“Unit costs and reduced processing time – these are the general factors for success in the aircraft industry,” says Alexander Attenberger. “But that’s not enough. The goal is to save more energy and CO₂ as early as in the component manufacturing stage. Ultimately, the aircraft must become lighter in order to reduce fuel consumption. This is why titanium, for

example, is conquering more and more fields of application. Machining the lightweight material requires special approaches, for which we provide assistance here, among other things.”

The aviation industry currently processes 100,000 tonnes of titanium every year, reports Sebastian Recke, Senior Key Account Manager at Gefertec GmbH, which was founded in 2015, in his keynote speech. With 3DMP® technology, his company produces components such as turbine blades made of titanium and other demanding metallic materials using metal 3D printing in the Wire Arc Additive Manufacturing (WAAM) process. “This allows us to save almost 90 percent of

the materials when producing turbine blades,” emphasizes Sebastian Recke. “Titanium is expensive and its production is associated with considerable CO₂ emissions. Our process can contribute significant savings.”

One of the stations that Starrag has set up in its Aerospace and Turbine Competence Center showed what this might look like in practice: A Gefertec system prints turbine blades onto a disc-shaped carrier to produce a titanium blisk. As the component requires high-precision post-processing, it is digitized by the Starrag subsidiary TTL. The UK-based specialist for CAD/CAM and CNC machining uses this data to generate an



“We want to break new ground together and advance the aerospace industry.”

Alexander Attenberger, CSO

NC program, which is then processed on a Starrag NB 151 machining Center. “A coherent process chain that saves time and money,” says Sebastian Recke.

Breaking new ground

Digitalization and automation are the common thread running through the 13 stations, which were visited by the participants in small groups. Every single one deals with processes that promise to increase productivity. Live demonstrations, presentations with concrete figures and subsequent discussions create an atmosphere characterized by a spirit of optimism.

“We want to break new ground together and advance the aerospace industry,” summarizes Sales Director Attenberger.

The “Blade in one go” station is a guide to where we should be heading. Here, a turbine blade is manufactured off the shelf in a fully automated process. Blank handling, machining and reclamping, as well as depositing the finished part in a cassette, all take place without the need for manual intervention by an employee. The Starrag LX 021 5-axis shovel machining center is at the center of the production facility. Partner Blum Novotest contributes to the high process reliability with its technologically leading measuring components.

Right next door is another highlight of the 2024 Technology Days – an automated LX 051 shovel machining center, in which a Fanuc cobot including parts storage was integrated without increasing the footprint of the machine. “The plant can now be operated in night and weekend shifts with fewer or no operators. In addition, the productivity per square meter has increased significantly,” explains Alexander Attenberger.

He points out another station where a world première will be presented: The Berthiez VT 16 vertical turning machine has been completely redesigned. The developers replaced the geared motor used in previous machines with a



high-speed direct drive. The hydrostatic machine concept also ensures maximum rigidity and efficiency. A new approach to high-pressure coolant supply makes the VT 16 ideal for machining aircraft engine components such as casings. The new development also has a lower overall carbon footprint.

Participants can also experience what a hydrostatic bearing can achieve with the Starrag STC 1250 HD. Thanks to maximum damping and rigidity, the machining center designed for heavy-duty machining of titanium, iniconel and other high-strength alloys achieves a removal rate of a completely new dimension. The Siemens Smart Machining software, which was

80 to 90 percent of all landing legs used in civil aviation are machined on Starrag machines.

presented for the first time at the Technology Days, ensures reliable, collision-free machining. This term refers to an assistance system in the machine that uses 3D models to recognize potential collisions with a lead time of 800 msec and stops the machine if necessary.

The other stations also hit the mark. "It was worth travelling all the way to Rorschacherberg for the Aerospace & Turbine Technology Days," said many visitors. "We are now up to date again when it comes to efficient production processes." ▀



Precision at 186 miles/hr (300 km/h) – from the man and the machine

For a premium claim, everything has to fit.



It takes real precision to push motorbikes with 1000 cc and just over 200 hp weighing around 353 lbs (160 kg) to their limit. Precision from not only the rider but also the mechanics who work on these rockets. Starrag athlete Toni Finsterbusch pushes one such superbike, his “BMW M 1000 RR”, to the limit at the International German Motorcycling Championships (IDM). And the competition is tough: 29 international racers, some with world championship experience.

Trust is
everything!

The stage is set in the city of Most in the Czech Republic. It is the third stage of the IDM season and the first race in the superbike class. Toni Finsterbusch is among the front runners and wants to win or at least finish on the podium. Third lap, second-to-last bend. No brake pressure. Finsterbusch has to catch up. An earlier wobble of the front wheel had pushed the brake pistons into the calliper, and when Toni first went to pull the lever, nothing happened.

He takes control of the situation at 260 km/h, ploughs through the gravel, keeps the BMW M 1000 RR on both its wheels and rejoins the race.

Technology.

Finsterbusch’s equipment is prepared in Pirna, Saxony. Not only is his “GERT56” team based there, but also tuner and chief technician Ronny Schlieder from RS Speedbikes. Schlieder’s motivation

has always been to push motorbikes to their technical limits and to make full use of their potential within the existing regulations. But it’s about more than just engine power. Everything has to be just so, especially when it comes to the chassis and brakes. “When you’re riding down the Seng in Schleiz [editor’s note, a natural race track and otherwise a normal country road] at 149 miles/hr (240 km/h), you need to have complete faith,” says Finsterbusch. “You place your

trust in everything and everyone: In your mechanics, in the fact that all the bolts are tight, that the brakes work, that the suspension fits, that the tyres will tell you everything you need to know about the asphalt for handling." If this doesn't all work in harmony, there will be no lap times. Or sometimes it can quickly end painfully.

"Unfortunately, I've already sustained a few serious injuries in my career," says Finsterbusch. But he always fought to get back on his feet and back on his bike – and, what's more, back to the top of the respective classes. Where does he always find the drive to do this? "One factor is that with most injuries, the crash wasn't even my fault which allows you to deal with it very differently than you would if you knew it was you who had messed up." But apart from that, it is also in his nature. As well as being a passionate motorbike racer, Finsterbusch is also a young entrepreneur and runs the family-owned company Pumpentechnik Finsterbusch GmbH



with a total of eight employees. There, too, the racer has to make quick decisions – just like on the racetrack – and there, too, it's all about precision – just like on a racing motorbike.

The 1000 cc racing bikes from BMW are approved for road use, but built for the race track. "In my opinion, the BMW gives you the best basis for racing," says chief technician Schlieder. And yet there are still some parts that get the chop – or aren't even supplied in the first place.



We start with a rolling chassis and then completely rebuild our motorbike





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It's all about precision: if everything works out, then you are at the front – if not, you slip right back very quickly.

“We start with a rolling chassis and then completely rebuild our motorbike,” he explains. Rolling chassis means: Frame, engine, wheels. Everything else no longer has much to do with the series, even if the external appearance must be retained, as is the case with the panelling.

Oschersleben/Sachsenring

If everything works out, then you are at the front. If it doesn't, you slip right back very quickly. Finsterbusch experienced this in particular at the second stage of the

season in Oschersleben near Magdeburg. “I finished second and fifth in the season opener at the Sachsenring,” said the Krostitz-based rider, looking back. And things also went well in Oschersleben to begin with. “I managed to lead the field for a few laps,” he says, looking at the positives. “But then I had serious problems with the tyres and couldn't keep up with the pace of the others.” The results from the first race highlight just how unforgiving a sport it really is: Finsterbusch was relegated from the top positions and only finished in tenth place.

Arguably still a strong performance, but “in this case, nothing more than damage limitation,” he says. The weekend in Most mentioned at the beginning ended in similar fashion. Finsterbusch finished tenth in the first race after his brief excursion through the gravel. Things looked better in the second race – although still not quite as good as he'd like. “I was in contention for victory until the halfway point, but then fell victim to my own conservative tyre choice,” he says. Which means: The tyres are finished, which means no more grip, especially no cornering grip. Finsterbusch falls back – and narrowly misses out a podium place, finishing fourth. And yet he has showcased his reputation and his talent: He continues to rack up the points and climbs to fourth place in the overall rankings. ▾

Once again, the wheels are turning ...

Introduction to the new Dörries VT 28 vertical turning lathe

Many industries value these machines because they have been running smoothly for over 20 years: We are talking about the Dörries Contumat VCE vertical turning lathes, which have proven themselves, for example, in the high-precision complete machining of components in many industries. The VT series is now set to continue this tradition.

Mr Quack, you are Head of Sales at Starrag's Large Parts Machining Systems (LPMS) business unit and have a background in large-scale machine construction, which has been your passion for decades. What characterizes the Dörries VCE series in particular, and what do customers especially appreciate about them?

Heiko Quack: It's a very robust machine with a stable design and generously dimensioned structural components for heavy and ultra-heavy machining, which is very durable and reliable. Many of our customers have been using the machine for many decades and are still using it today. Added to this is the hydrostatic guide concept with its outstanding damping properties. We'll be retaining these features.

As a machine manufacturer, Starrag is characterized by its resilience. What were the reasons for introducing a successor to such a successful product as the Dörries VCE?

Quack: The last redesign of this successful series took place in 2009. So we need to develop a new generation that's state of the art and retains the advantages of the VCE. We've analysed the market

requirements and know that a new generation of turning lathes is needed. We're moving away from heavy-duty machining towards multifunctional, high-precision and flexible pre-machining and finish machining. This requires less power and torque, as well as flexible interchangeable systems.

How has the newcomer affected the strategy?

Quack: Our strategy's changed. After intensively analyzing our products' life cycles, we've decided where upgrades and new developments are necessary. We received help from other business units that think in terms of larger quantities. The Dörries VT 28 is designed for planetary carriers and large engine housings. Smaller machines for more compact engine components and housings will follow in 2025.

What about service and spare parts supply for the Dörries VCE series?

Quack: Our machines have been in use for 30 to 70 years and are looked after by a support team in Mönchengladbach (western Germany). The service also includes follow-up training – despite shortage of skilled labour.

We'll continue to support the Dörries VCE series, just as we still handle old Schiess and Wotan systems that have been discontinued for years.

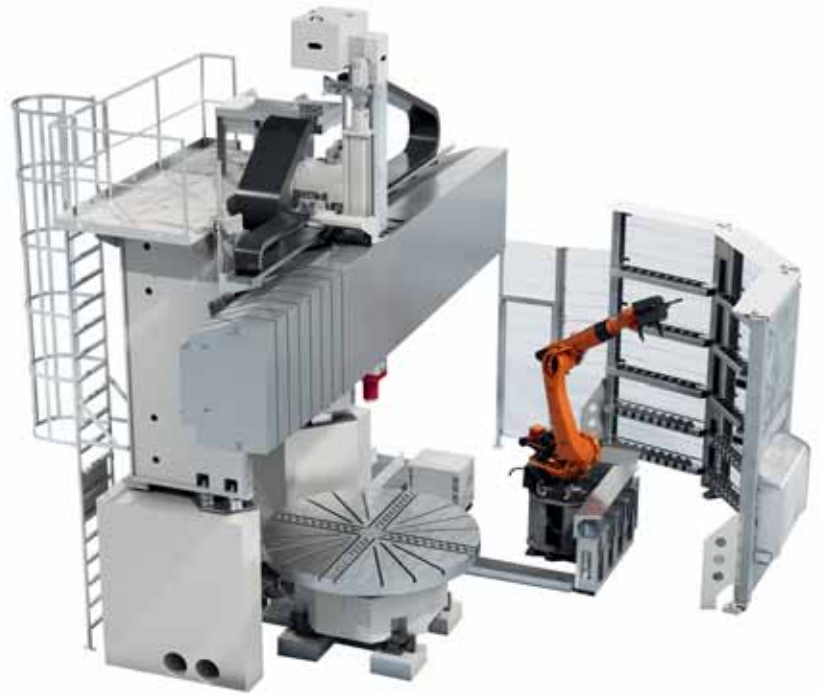
What does Starrag expect from the new high-performance direct table drive and the introduction of new hydrostatic guide systems?

Quack: The water-cooled direct drive in the rotary table enables more dynamic positioning and faster start-up. We'll also continue to use hydrostatic guides in all linear axes, primarily in the RAM, to dampen vibrations and ensure high precision. A new hydrostatic system, which has also proven itself in Droop+Rein machining centers, ensures stable gaps and better geometry control. It reacts more robustly to temperature fluctuations and changes in viscosity.

What new functions and technologies are you also introducing?

Quack: The new Dörries VT machines feature flexible robot mold handling, minimum lubrication of the table bearings, digital IFM sensors for recording and analyzing data and a Siemens One control system. The use of ultra-high-performance concrete (UHPC) instead of cast iron for the table base ensures low vibration and temperature stability. UHPC is characterized by its exceptional strength and durability. In order to machine high-temperature materials like titanium and inconel quickly and reliably, we use a high-pressure coolant supply of up to 350 bar. It reduces the machining time and increases the tools' service life. For complete machining, the machine's already equipped

Cool and dynamic:
The water-cooled 98 kW direct drive in the rotary table of the Dörries VT 28 enables dynamic positioning and reduces processing times.



with a 64 kW integrated water-cooled direct drilling and milling drive as standard.

But this huge investment in new technical equipment does have an impact on costs: Hand on heart: Will the machine be more expensive?

Quack: No, because we can significantly reduce costs through standardisation and higher quantities. For example, the new head interface improves the precise transmission of forces, movements and commands from the machine head to the mould and offers more functions than previous interfaces. As long as we can cover significantly more than 90 percent of all requirements as standard, we offer fast delivery times at attractive prices.

With its high degree of standardization, can the machine still be customized?

Quack: We offer a high degree of flexibility in workpiece automation and integration into flexible manufacturing systems (FMS). The standard version of the machine can be set up without a deep pit or, if the hall height is low, it can be optionally lowered into a pit. Our goal is not to individualize too much. The Dörries VT 28, for example, is designed as standard for a turning diameter of 8.5 feet (2.6 m) and can be extended to 9 feet (2.8 m).

What measures have been taken to reduce the Dörries VT 28's carbon footprint?

Quack: We reduce energy consumption through numerous measures like using special cement with its good technical



The best of both worlds: The new Dörries VT 28 builds on the successful Dörries VCE series and adopts its proven features to offer maximum precision and efficiency in machining.

“With the new VT series, we are moving away from heavy-duty machining towards multifunctional, high-precision and flexible pre-machining and finishing.”

Heiko Quack, Head of Sales,
Large Parts Machining Systems

and ecological properties. The adaptation of the drives, minimum lubrication and the use of components of the highest efficiency class also pave the way for sustainability.

What further developments or improvements is Starrag planning for the future of the VT series?

Quack: We're looking for field test customers for the first machines and will provide close support. We'll use this customer experience for further development. The development process for the first machine size has now been completed, with further sizes to follow in 2025. ▾

Machine, how are you?



Fingerprint Online determines the condition of spindles, axes and other wear parts within minutes – without a service technician on site and with a meaningful evaluation in less than 24 hours.

If errors occur in the production process or unclear damage situations arise, these must be analyzed as quickly as possible. This is a task for Fingerprint Online. In just ten to 15 minutes, the software program installed on the machine carries out frequency response and vibration analyses as well as a circularity test. It also records the current consumption of all processing axes, determines the degree of contamination and wear of the linear measuring systems, counter readings and temperature data. And after 24 hours at the latest, the user finds out how their machine is actually doing. After automated data analysis, they then receive a meaningful report with detailed information on the wear status of the main assemblies, e.g. the axes, drives, bearings and, of course, the spindle.

It's no wonder that Fingerprint Online, which Starrag has been offering since

2021, is so popular. What previously had to be determined manually on site by a service technician can now be done by the user with the Fingerprint Online software. All Heckert machines delivered since then are already equipped with the program. Older machines built from 2013 and after can be retrofitted accordingly, if they are controlled by a Siemens 840D sl Operate CNC. Fingerprint Online has also been available for Fanuc controllers since 2024. Furthermore, the software was rolled out to the Starrag machines at the Rorschacherberg, Vuadens and Bielefeld sites.

"No additional measuring device is required for Fingerprint Online," says Marcel Weber, Product Manager Service at Starrag. "We only use the sensors that are already integrated and other on-board equipment." They deliver data that is only a few megabytes in size at the end

The advantages of Fingerprint Online are considerable: The customer receives a quick and meaningful analysis of the wear condition of the main assemblies of their machine at a low cost and quickly. It can save costs for maintenance and resources and prevent unplanned machine downtime due to wear.

of the measurement process. The package must be sent to Starrag for evaluation – either via remote access, by e-mail or with a USB stick. The evaluation is automated. Developer Leon Madalschek explains: "We assess the recorded values and compare them with previous measurement results. We have developed algorithms to analyze the data and fed them with knowledge from our experts. This gives us a consistently high evaluation quality." Fellow developer Denny Auerswald adds: "We are constantly developing the algorithms, incorporating the latest findings and suggestions from all locations so that our customers



The Fingerprint Online supports the user in increasing machine availability and productivity and ultimately reducing workpiece costs.

can derive as much benefit as possible from the Fingerprint service.” On the one hand, the customer benefits from the rapid assessment of the machine’s condition mentioned above. On the other hand, regular fingerprint measurements reveal increasing wear, so that unplanned machine downtime can be avoided by implementing predictive maintenance measures at an early stage. “We recommend carrying out the Fingerprint Online service every three to six months,” says Marcel Weber. “With the low evaluation costs, it will definitely pay off.” The results report, which the customer receives no later than the next working day, is informative yet easy to understand.



Marcel Weber (middle), Product Manager Service and his Team: “We are constantly developing the algorithms further, incorporating the latest findings and suggestions from all locations so that our customers can derive as much benefit as possible from the Fingerprint service.”

It displays the results – sorted by measurements – in various forms: A diagram provides the experienced technician with in-depth information. The status of the respective module is described in plain text and, if necessary, a suggestion is made for rectifying faults or for maintenance work. Finally, the display in the traffic light colours green, yellow and red helps you to understand the situation at a glance.

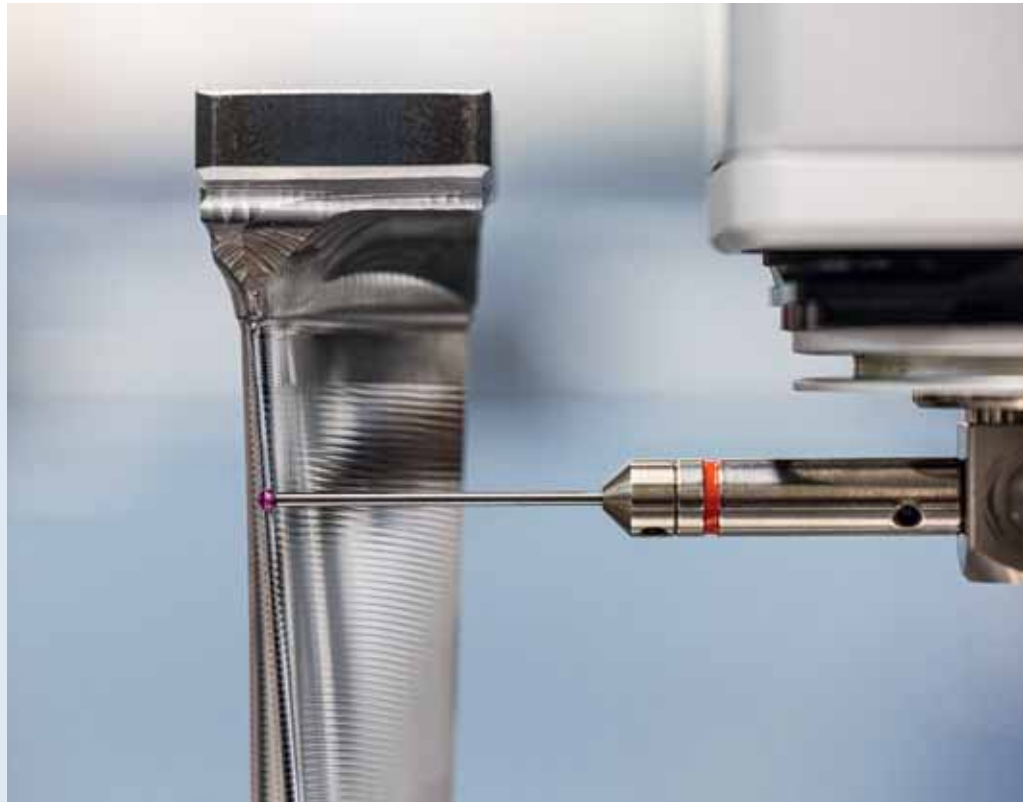
However, before the report is sent to the customer, a service employee checks the results in order to make personal contact if necessary – if urgent work needs to be carried out or if it is advisable to keep a spare part in stock. ▀

Aerospace: Mission accomplished

From pilot to reference customer – Starrag ensures precision without compromises with ZEISS solution.

Starrag develops and produces manufacturing solutions for the aerospace industry. In order to shorten the measuring times for turbine blades, the Swiss company was the first in the world to work with the ZEISS PRISMO fortis coordinate measuring machine as part of a pilot project.

Customers react with fascination and great amazement when they see how accurately and quickly turbine blades can be measured on a ZEISS PRISMO fortis with ZEISS CMM Acceleration Mode for Aerospace Applications. Roland Ziltener, Plant Director at Starrag AG, Rorschacherberg, understands the amazement of his colleagues. "Speed and maximum precision didn't go together for a long time." In the aerospace industry, where components such as turbine blades have to be fully inspected after each production step, "quality assurance therefore



quickly becomes a bottleneck." Using more measuring devices is not a solution for Ziltener. "To ensure reliable and profitable production, you need very fast and reliable feedback as to whether the components meet the high quality requirements."

Customer requirements have top priority

Ziltener knows what he's talking about. This is because customers from all over the world come to Rorschacherberg

with their specific tasks to obtain suitable machining centers for the production of turbine blades, blisks, impellers, casings and other aircraft applications. Starrag designs the respective production solution with the appropriate fixtures based on the specified requirements for the number of units or running time of the components. Customers often want a complete solution that ranges from the processing machine and tool production through to metrology programming. According to Ziltener, Starrag is therefore "not only familiar with the requirements



In order to check whether the new development delivers the required precision despite the huge optimisation of the measuring time, all turbine blades manufactured by Starrag on behalf of partner customers were measured with the ZEISS PRISMO fortis over a period of one and a half years.

“Starrag has set new standards in quality assurance with this pilot project in an industry that requires the highest precision in production and quality control.”

Roland Ziltener,
Plant Director, Starrag



of the industry, but is also at the cutting edge of technology in many areas, including measurement technology.”

Pilot projects secure market leadership

For Ivan Nytsch, Head of Global Customer Segment Aerospace at ZEISS, Starrag was and is “an ideal pilot customer”. This is also because the provider of complete solutions is very familiar with its customers’ manufacturing processes. And this is where things come full circle for Nytsch. Because ZEISS also understands its customers’ processes and develops customized solutions. ZEISS has responded to the aerospace industry’s challenge of measuring aerospace components with

high precision, reliability and speed by expanding the PRISMO family with the ZEISS PRISMO 7/12/7 fortis coordinate measuring machine.

Fascination for a new solution

Roland Ziltener, who was still Head of Quality Management at Starrag at that time, remembers the start of the project well. “We had a look at the machine in Oberkochen and were immediately impressed.” In order to check whether the new development delivers the

required precision despite the huge optimization of the measuring time, all turbine blades manufactured by Starrag on behalf of partner customers were measured with the ZEISS PRISMO fortis over a period of one and a half years. As the size, material and geometry of the turbine blades are different, the machine was “widely tested”, according to Ziltener. In order to evaluate the accuracy of the ZEISS PRISMO fortis, the measurement results were compared with reference values from the ZEISS PRISMO navigator.

The standard measurement, which took four minutes and 30 seconds at Starrag and delivered accurate and reproducible results, was reduced to 70 seconds during the pilot phase.



As both coordinate measuring machines were located in the same measuring laboratory, it was possible to rule out the possibility of external factors influencing the results.

Cooperation at eye level

As Starrag had already been working with the ZEISS CALYPSO software for many years, the implementation of the solution on site went smoothly. And even during the pilot phase, Ziltener and Nytsch agree that Starrag and ZEISS worked closely together "on an equal footing at all times." For example, the measurement data was discussed together in regular meetings. ZEISS used this information to further optimize the start-up and acceleration



"Starrag is not only familiar with the requirements of the industry, but is also at the cutting edge of measurement technology."

Roland Ziltener, Plant Director, Starrag

behaviour of the rotary table and the machine. ZEISS also simplified the usability of the machine and the creation of test plans during the pilot phase. The performance of the ZEISS PRISMO fortis equipped with the ZEISS CMM Acceleration Mode for Aerospace Applications package still impresses Ziltener today. "Despite the shorter measuring time, the precision is maintained without any compromises."

Convincing results

The quality assurance of turbine blades and blisks is not only subject to very

strict requirements, it also costs companies a lot of money. Experience has shown that quality assurance accounts for 20 percent of total production costs and 25 percent of total production time. The pilot project showed that productivity in the measurement of turbine blades can be significantly increased with ZEISS PRISMO fortis. The standard measurement, which took four minutes and 30 seconds at Starrag and delivered accurate and reproducible results, was reduced to 70 seconds during the pilot phase. This saves time, "which gives us greater flexibility in the selection of parameters and workpieces to be



The pilot project showed that productivity in the measurement of turbine blades can be significantly increased with ZEISS PRISMO fortis.

“Despite the shorter measuring time, the precision is maintained without any compromises.”

Roland Ziltener,
Plant Director, Starrag

measured and helps us to optimize our production processes,” emphasizes Ziltener. Given the large number of turbine blades to be measured, the benefits for Starrag are significantly increased.

Widespread use of the solution

Due to the advantages described above, Starrag decided to acquire the measuring machine at the end of the pilot project. The coordinate measuring machine is used to measure turbine blades, which are produced as a proof of concept during the acceptance of the machining centers assembled at the site by the customer.

And the turbine blades, which are milled for a handful of customers at the Aerospace & Turbine Competence Center, continue to be inspected using the ZEISS PRISMO fortis. And because the machine measures so accurately and quickly at the same time, parts from incoming goods are also inspected.

Simple and understandable

Quality is “produced and not just measured,” Ziltener likes to quote a former colleague. Starrag therefore does not just rely on a simple good/bad evaluation of the workpieces. Instead, it relies

on high-quality feedback to determine machine performance.

New standards in quality assurance

For Ziltener, Starrag has set new standards in quality assurance with this pilot project in an industry that requires the highest precision in production and quality control. For him, having been involved in the measurement of turbine blades since 2008, the collaboration with ZEISS was and is “a real success story.” A view that Nytsch also shares. Both are therefore certain that “the next pilot project will come.” ▀



Seyer Productivity levels set to take-off with Starrag

If there was ever a ‘cracking’ story of a company’s rise to prominence, you wouldn’t have to look much further than Seyer Industries. As a world-class manufacturer investing in machine tools from a world-leading brand like Starrag to manufacture critical aerospace components, growth at the Missouri-based manufacturer conceived in a farmer’s garage in 1957 is reaching boiling point.

It was self-taught tinkerer and inventor Lou Seyer who made enough money in the 1950s from his ‘Easy Egg Cracker’ invention for boiled eggs to partner with Harold Buckner and purchase machinery from a failing business. In the early 1980s, the company started manufacturing support equipment for the military as well as working on McDonnell Douglas Aircraft – the success has been exponential ever since.

Now, Seyer is a 3rd generation family-owned aerospace company that has developed into a world-class manufacturer with four primary product groups operating from a 210,000 sq/ft facility. This includes supporting customers in the commercial aerospace, military aerospace, military support equipment and maritime industries. The investment strategy is proving successful, as the AS:9100D, ISO:9001, ITAR registered

and NADCAP certified company has grown 20% year over year for the last 5 years. One impressive element of the company’s investment strategy is its 1.8MW solar panel system that generates over 30% of Seyer’s electricity needs. Covering three of its four buildings, the only reason the 4,216-panel installation doesn’t qualify as Missouri’s largest commercial solar-powered system is because it is spread over three buildings.

“Our mission is to be the best-in-class supplier of complex aerospace products.”

Mark Seyer
President at
Seyer Industries

Despite this, Seyer’s commitment to minimizing its carbon footprint is admirable and exceeds the largest in-state installation of 4,085 panels on top of the world known Swedish furniture store.

Discussing the company’s activities, Mark Seyer President at Seyer Industries says: “Our mission is to be the best-in-class supplier of complex aerospace products. Seyer specializes in hard metal machining and deep bills of material. We offer great value through vertical integration and a high degree of collaboration with customers. As part of our efforts to take complex problems off our customers’ hands, we have built our process offering to support large, hard-material machined parts and assemblies. As price and lead time are everything in aerospace, adding the capability of large-capacity machining will help Seyer offer a complete partner solution for more of our customers. To achieve this, we have decided to invest in machine tools from Starrag.”

Starrag’s reputation as the world’s leading machine tool partner for the aerospace industry is beyond reproach. Working with most of the world’s aerospace primes and their supply chains, Starrag



Seyer is a third-generation family-owned aerospace company that has developed into a world-class manufacturer with four main product groups.

was the obvious choice for Seyer when it won a contract to manufacture defense industry components. With the project requiring the machining of hard metal parts with dimensions of 57 inch x 43 inch x 51 inch (1 m x 300 mm x 300 mm), the billets had to undergo high material removal machining with impeccable precision and surface finishes on the completed parts. The solution was the Starrag Heckert 800 X5.

The Heckert 800 X5 is a 5-axis horizontal machine with a trunnion design that delivers both the precision and rigidity required for Seyer to machine the hardest materials with high material removal rates.

This is complemented by a powerful 12,500 rpm mechanical spindle that was specifically selected by Seyer to deliver the torque needed for milling hard aerospace grade alloys as well as the higher RPM and horsepower to machine softer materials. The pallet changer allows the operator to set up the next part while the machine is in operation. This ensures the spindle is always turning, maximizing efficiency, output and minimizing set-up idle times for Seyer. Set-ups and downtime are further minimized by an 180 position tool changer with temperature-controlled coolant, part probing and laser tool probing to deliver unparalleled process control and efficiency.



Mark Seyer: "This machine HEC has been selected because of the need for a high material removal rate while maintaining accuracy, precision and reliability."

These features enable the new Heckert 800 X5 to run for prolonged periods unmanned whilst providing maximum productivity output with minimal operator intervention.

Commenting upon the relationship with Starrag, Mark Seyer from Seyer Industries adds: "Starrag comes with a great reputation of providing robust machines with top-notch accuracy and precision. There is no room for error with the parts we plan to produce on this machine. That is why we have partnered with Starrag. It is the exceptional build, quality, rigidity, stability, performance and precision that is backed by Starrag's excellent support network and technical experts that will

ensure we attain impeccable quality levels to exceed our customer expectations."

"During the sales portion of our journey, Starrag sold itself as an 'engineering company that manufactures machines.' From contract negotiations through the build cycle of the machine, the Starrag Group has been fantastic to work with, especially regarding the customization and design elements of the machine."

Looking to the next step in evolution for this department at Seyer, the company has already committed to machine number two—a 6-axis Starrag STC 1800-170 set to be delivered in the fall.

"There is no room for error with the parts we plan to produce on this machine."

Mark Seyer
President at
Seyer Industries

Alluding to how the investment in Starrag machines will accelerate growth at Seyer, Mark Seyer continues: "With the next Starrag machine scheduled to be delivered in Q4 of 2024, we have not yet had the ability to see the impact it will have on our business growth. However, when talking about this new capability, customers have shown great interest and they can't wait to have a supplier with this capability. Based on customer feedback, we see a strong need in the industry for this capability."

The 6-axis Starrag STC1800-170 has been purchased for manufacturing large titanium structural parts for the defense industry— and with a 130 inch x 80 inch x 80 inch (3.3 m x 2 m x 2 m) capacity, the new Starrag STC1800-170 will add both capacity and capability that will give Seyer a huge competitive advantage. Discussing the parts lined up for machining on the STC1800-170 when it arrives, Mark Seyer continues: "We expect this machine to mainly process stainless steel, titanium, and Inconel structural aerospace components, typically in smaller batch sizes in the realm of 2 to 10 pieces." To manufacture these challenging materials, Seyer has specified its STC1800-170, with a 70 HP (53kW) mechanical spindle that boasts over 958ft/lbs (1300 Nm) of torque at 100% duty cycle with a spindle speed of 5,600 rpm. The power of the HSK-A100

spindle enables this machine to deliver class-leading material removal rates of beyond 50 cubic inch (800cm³/min) on titanium, giving Seyer the industry's most robust and productive machine available for the aerospace sector. The quality and stability of this spindle are so assured, Starrag provides a 5-year warranty that can be extended to a decade – giving Seyer complete peace of mind.

Optimizing flexible manufacturing, the 6-axis machine STC1800-170 selected by Seyer can handle very large parts and is equipped with a tilt station that allows the machining of parts in both the horizontal and vertical orientation, the STC1800-170 permits one-hit machining that will reduce set-ups and enhance component quality for the aerospace manufacturer.

As expected with a brand that leads the way in the aerospace and defense industry, features such as automatic calibration and verification of machine kinematics, temperature-controlled coolant, probing reports, and extreme accuracy levels are standard on their Starrag machine. Furthermore, with Seyer recognizing that hard metals require a large number of cutting tools, the manufacturer has chosen to equip

their new STC with a 450-position automatic tool changer with an RFID system and tool verification laser for unsurpassed process control.

Highlighting the attributes of the Starrag brand and how it fits with the demands that family-run Seyer Industries places on its machines, Mark Seyer adds: "Precision and repeatability are key components that we focus on when selecting a machine. Depending on the gap we are

programmers and engineers to get optimal performance from the machine across the diverse products we produce are also a necessity. In summary, we need a highly flexible solution that is intuitive to operate with the highest degree of accuracy and repeatability."

Specifically looking at the Starrag STC 1800-170 that is awaiting installation and how its attributes matched the needs of Seyer, Mark Seyer concludes:

"Starrag comes with a great reputation of providing robust machines with top-notch accuracy and precision."

Mark Seyer, President at Seyer Industries

trying to fill, spindle selection, envelope size, tool capacity and automation abilities can be other areas of interest."

"With automation becoming more and more the norm, high tool capacity and data gathering are a must. Offline programming, setup and quick changeovers are also required to ensure the machine is fully utilized. Intuitive and maintainable controls that allow our skilled machinists,

"This machine has been selected because of the need for a high material removal rate while maintaining accuracy, precision and reliability. Two other items that stood out during the selection process were Starrag's commitment to service and minimizing downtime events due to maintenance or equipment failure. Another important factor was their ability to customize the machine to meet our exact needs." ▾



"Precision and repeatability are key components that we focus on when selecting a machine", says Mark Seyer.



Automation becoming more and more the norm, high tool capacity and data gathering are a must.

Hello neighbour!

A visit to Pentzold
Metallbearbeitung
und Musterfertigung
in Chemnitz

“I know what the machines are capable of and that I can rely on them one hundred percent.”

Holger Pentzold, Owner Pentzold
Metallbearbeitung und Musterfertigung





Short distances, close ties – Holger Pentzold learnt and worked at Heckert and has also remained loyal to Heckert machines in his own company: “I know what the machines are capable of and that I can rely on them one hundred percent.” His company, a service provider for precision machining, has been based at the ITC – the Chemnitz Industry and Technology Center – for many years and is well worth a visit, and not just because of its proximity to today’s Starrag GmbH.

Pentzold Metallbearbeitung und Musterfertigung (PMM) was founded in 1992 by Günter Pentzold (see box). His son Holger Pentzold has been running the company for 28 years, supplying foundries and companies in the automotive industry, agricultural machinery and general mechanical engineering as well as the hydraulics industry with precision parts. He explains: “We primarily manufacture series parts with varying batch sizes of 10 to 15,000 pieces, but also prototypes. Our in-house fixture and tool construction as well as a modular system for clamping fixtures allow us to react quickly and flexibly to customer requirements.”

Nothing is possible without automation

Six years ago, Pentzold began to automate his machinery in order to further increase flexibility and be able to manufacture more economically. He argues: “Firstly, it is difficult to find good employees, and secondly, it is even more difficult to get them to work regular night and weekend shifts. However, high-quality machines cost a lot of money and therefore need to be utilised in as many shifts as possible.”

And Pentzold does not compromise on the quality of his machines. “As we mainly machine gearbox housings, chassis and engine parts as well as hydraulic

components made of steel and cast materials, we need very stable, reliable machines. As a contract manufacturer, the aforementioned flexibility and long-term accuracy are also important to us.” This is why he chose Heckert machining centers from Starrag GmbH in Chemnitz.

“With the Heckert H50, we achieve the required concentricity of 10 µm.”

Holger Pentzold, Owner Pentzold Metallbearbeitung and Musterfertigung

The reason why the machining professional repeatedly buys Heckert machining centers is quite obvious. PMM has been located in the Chemnitz Technology Park (ITC) since 1999 – right next to the Starrag plant. “Nevertheless, we conduct research on the market for alternatives before almost every investment,” explains Holger Pentzold. “But it’s all in vain – we have repeatedly decided on universally applicable, horizontal Heckert machining centers.” This was also the case in 2018, when the entrepreneur started automated production with the then newly developed Heckert H50 compact machining center including an integrated six-pallet system.

Beta testers just 1640 feet (500 meters) away

“We took delivery of the H50 immediately after its initial presentation at the AMB and were effectively the first beta testers,” recalls Pentzold. “The proximity of our production hall to the manufacturing plant was extremely practical for Starrag and us. In the event of any problems, the Starrag technician simply had to cross a few halls and they were soon on site, where they were able to get an idea of the difficulties, which were then usually quickly resolved and incorporated into fundamental corrections.”

It was important for PMM to have an easy entry into automation, which was achieved with the Heckert H50. This is because it was equipped with a linear storage system developed by Starrag and a total of six pallets. It was a highly com-

pact, user-friendly solution in which the pallets could be managed via the machine control system. “Our production manager can set up the machine and prepare the pallets in the first shift,” explains Holger Pentzold, “so that the machine operator then only has to press the start button.”

The machine itself impresses with its high dynamics (0,04 mile/hr [80 m/min]) rapid traverse and precision. “For example, we machine a gearbox housing for lifts that requires a hole that we have to machine from both sides,” explains Holger Pentzold. “With the Heckert H50, we achieve the required concentricity of 10 µm.”

Automation further expanded


The machine was quickly utilized to capacity. As the 500 pallet size was too small for many orders, in 2022, Pentzold and his team decided to invest in a Heckert

HEC 630, automated with an Erowa Loadmaster shelving system with 21 pallet spaces. A major purchase in every respect. This machining center works with 25.6 inch (630 mm) pallets and allows components up to 1500 kg in weight, 61 inch (1550 mm) in diameter and 49 inch (1250 mm) in height. “It covers an even wider range of components than our old CWK630, which we replaced with it,” Pentzold is pleased to add: “We also opted for an SK50 Big Plus spindle with 7500 rpm for the HEC 630. The higher speed of this spindle increases the machine’s range of applications even further.” PMM can continue to use its existing tools in this spindle, but can also use tool holders with a flange contact surface if required. The existing NC programmes can also be reused with minor modifications. PMM was advised by Sebastian Höbler, the responsible regional salesman at Starrag GmbH Chemnitz. He points out



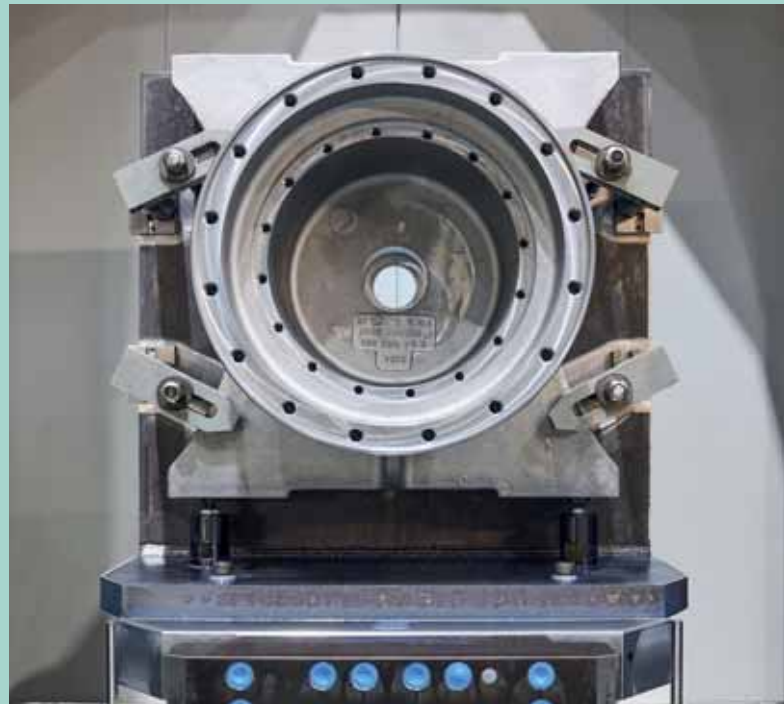
“In addition to the high rigidity and damping in the basic structure, the thermo-symmetrical design should also be mentioned, which guarantees maximum accuracy.”

Sebastian Höbler, regional salesman Starrag, Chemnitz



“The HEC 630 is ideal for automation thanks to its high process reliability.”

Holger Pentzold, Owner Pentzold Metallbearbeitung and Musterfertigung



Pentzold – Heckert fans for many years

When Günter Pentzold founded Pentzold Metallbearbeitung und Musterfertigung (PMM) in 1992, he was still employed as a fitter at the former Heckert plant. After work and at weekends, he used a second-hand Heckert CW500 to carry out small milling jobs in an old tractor workshop in the Ore Mountains. In 1999, PMM was one of the first tenants to move into the Chemnitz Industrial and Technology Park (ITC), which back then was built in the office tower and six halls of the former Heckert site. Business was successful. PMM invested in further Heckert machines. Today, Holger Pentzold is the owner of the company, which employs ten people. Like his father, he is completely convinced of the quality of Heckert machines. After all, he is familiar with their performance as a user, and he knows what's behind them: Holger Pentzold trained as an electrician at Heckert.

the many details that contribute to high-precision machining: “In addition to the high rigidity and damping in the basic structure, the thermo-symmetrical design should

also be mentioned, which guarantees maximum accuracy. The control system also compensates for any spindle growth that may occur.” PMM also opted for

coolant temperature control, which enables high precision to be achieved even in a non-air-conditioned hall. “The HEC 630 is ideal for automation thanks to its high process reliability,” explains Holger Pentzold, mentioning the free chip fall, tool breakage monitoring and Balluff identification of the tools, which are available in sufficient variety in a magazine with 270 slots.

Speaking of automation: The decision was made in favor of the Loadmaster system from Erowa, as this is also suitable for heavy and large parts up to 55 inch (1400 mm). Erowa was also able to customize the pallet system to the machine and the spatial conditions. In order to be prepared for the future, Pentzold had the automation system equipped with a second set-up station and prepared for an additional machine and further pallet spaces. ▾



A breeze of optimism in production

Mechanical production in Chemnitz is currently being upgraded to the latest state of the art. One of the most important new investments is in a flexible manufacturing system incorporating two Heckert HEC 800 X5 MT machining centers, which recently went into operation. The second standout feature is a Droop+Rein FOGS HD large machining center, for which a vast foundation is currently being laid. What prompted these measures? An ambitious corporate strategy.

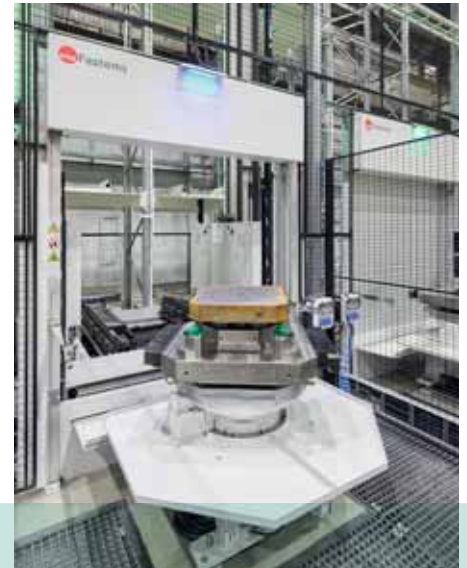
June 2024 at the Starrag plant in Chemnitz, Hall 4: This will be the future focal point of mechanical production for medium and large components, which make a decisive contribution to the precision and durability of various Starrag machining centers. It is currently being upgraded to the highest technical level at a cost of tens of millions of euros.

Automation makes its entrance

Part of the investment has already gone into financing the new flexible manufacturing system (FMS), which is over 98 ft. (30 m) long and was recently put into operation by the Chemnitz-based machining specialists. At its core, it contains two identically configured



“The five-axis HEC 800 X5 MT all-round machining centers we produce in Chemnitz are equipped to the maximum with a turning function and an extensive portfolio of functions.” Benjamin Walter, Production Manager (left)



Heckert HEC 800 X5 MT machining centers, which are linked via a Fastems linear storage system with 64 storage locations. The addition of a third machining center is also scheduled.

Production Manager Benjamin Walter explains: “We use the FMS for sophisticated, high-precision components, which is why we have chosen the best of the best in terms of machines. The five-axis HEC 800 X5 MT all-round machining centres we produce in Chemnitz are equipped to the maximum with a turning function and an extensive portfolio of functions. The tower magazines each offer 450 tool places, so that the machines can perform a wide range of machining tasks in fully automated operation, which in turn allows for large variation in the range of components.”

With a pallet size of 31.5 inch x 39.4 inch (800 x 1000 mm) and a workpiece displacement circle of 47 inch (1200 mm) in diameter, Walter and his team have selected the machines for small to medium-sized focus workpieces, as they are calling them. These are components with the highest requirements in terms of precision and

“With the FMS, we can significantly increase our throughput and increase added value at the site.”

Benjamin Walter, Production Manager

durability, such as bearing blocks for ball screw drives, gearbox housings and guide parts for main spindles, etc. The Fastems linear storage system can be loaded with up to 64 machine pallets during the machining operation via two set-up stations, which reduces non-productive times and enables long-term automated operation. Batch sizes are of secondary importance. “We are able to cover a very large portfolio of different parts. Even prototypes are no problem,” says Benjamin Walter. “With the FMS, we can significantly increase our throughput and increase added value at the site.”

Machining machine beds in the µm range

As of June, excavation work is taking place on an enormous scale right next to the impressive Fastems FMS. Preparations

are underway for a foundation to accommodate a new Droop+Rein FOGS HD large-scale machining center, which will be built in fall.

Kai Fischer, Product Line Manager for Production Systems, is in charge of the Hall 4 remodelling project. He knows the figures that show the extent of the preparations for the large machine: “The Droop+Rein occupies a floor space of 72 x 46 feet (22 x 14 m). For the foundation, we broke up around 4521 square foot (420 m²) of concrete flooring and excavated it to a depth of around five meters.” Over the next few months, 70 tonnes of reinforcing steel and 24720.3 cubic foot (700 m³) of concrete will be installed to form a deep foundation. The machine foundation itself, which requires a further 18716.8 cubic foot (590 m³) of concrete,

will be surrounded by an additional 29311 cubic ft. (830 m³) of compacted frost protection material. The prospect of the forthcoming heavy-duty machining center manufactured at the Starrag site in Bielefeld is a very exciting one, explains Production Manager Benjamin Walter: "This enables us to machine all machine beds, columns and other precision-determining large parts to an accuracy of just a few µm. This is a significant improvement on our previous solution and also ends our dependence on external suppliers."

Utilizing synergies, increasing added value

The modernization of mechanical production in Chemnitz is an important part of

Starrag's future strategy, which began a year ago. Since then, the Starrag sites in Chemnitz, Germany, and Rorschacherberg, Switzerland, have been combined under the umbrella of the "High Performance Machining Systems (HPMS)" business unit.

Its director Christian Kurtenbach explains: "In HPMS, we want to utilize the synergies in mechanical engineering offered by the two renowned sites together with the expertise of their employees. There is enormous potential in the combination of 'Made in Germany', which stands for quality and reliability among other things, with the proverbial 'Swiss precision'." He points out that sales and expertise for "Aerospace and Energy" in Rorschacherberg and for "Transportation and Industry"

will remain assigned to their respective locations. "The industry-specific technological know-how is at home there and we don't want to change anything," emphasizes Christian Kurtenbach. "Our focus is on the production of Heckert, Starrag and Ecospeed machines, which we are reorganizing."

Kurtenbach mentions a new organisational structure with overarching responsibilities and a shared database as an important starting point: "We are introducing an MDE/BDE system that includes all the existing order-related workstations in Chemnitz and Rorschacherberg in design, technology, production, assembly and project management. This is supplemented by a detailed planning system. There is also a shared tool data management system that makes it easier for data to be exchanged between the two production sites."

"We use the FMS for sophisticated, high-precision components, which is why we have chosen the best of the best in terms of machines."

Benjamin Walter, Production Manager





“Our goal is to increase our output in Chemnitz by a total of 40 per cent over the next two years.”

Benjamin Walter, Production Manager

Large and medium-sized specialist parts are processed in Chemnitz

As part of the reorganization, all basic units will be machined in Chemnitz in future – e.g. machine beds and columns, as well as other parts that are also responsible for the accuracy, durability and availability of the machine tool. Some large components will therefore be transferred from Switzerland to the Chemnitz production specialists’ area of responsibility. They in turn outsource the manufacture of components such as circular swivelling tables, spindles etc. to Rorschacherberg. “To ensure that this is successful, we make sure that both Chemnitz and Rorschacherberg are as qualified as possible for their respective production tasks,” promises HPMS Manager Kurtenbach, adding:

“It is important to us that each site retains its own identity and that we do not interfere with the corporate culture. Instead, the goal is to make the best possible use of their expertise through a tailored range of tasks and to better balance the utilisation of the plants.” A positive knock-on effect: If both sites are jointly involved in the value creation of each product, they become less vulnerable to economic fluctuations in individual sectors.

Starrag machines manufacturing Starrag machines

Back in Hall 4, where, aside from the temporary excavation work, lots of chips are being produced. For this, not only the new Fastems FMS, but also other Starrag



Preparations are underway for a foundation to accommodate a new Droop+Rein FOGS HD large-scale machining center, which will be built in autumn.

machines are in operation, including the large Heckert HEC 1800, 1250 and 1600 machines and a SIP 5000 jig boring machine. “When the modernization project is completed, we will have a showcase production facility for medium and large precision parts here,” says Production Manager Benjamin Walter. “We will then be able to produce a selected range of components for all other Starrag sites as well. In any case, our goal is to increase our output in Chemnitz by a total of 40 percent over the next two years.” ▀



“Only the best is good enough for our customers,” says Karl Kordik, who is responsible for the area of contract manufacturing at Neuson Hydrotec GmbH in Linz. With the new Starrag HEC 800 X5 MT machining center, his machining team is even able to machine complex housing with numerous holes at different angles with maximum precision – in a single clamping position and in half the time. The “best” is therefore also a clear advantage for Neuson Hydrotec.

Contract manufacturer is reducing production times with the Heckert five-axis machining center with turning function

Production times almost halved

Neuson Hydrotec GmbH in Linz is a company in which mechanical engineering, mechatronics and hydraulics are intertwined in many ways (see box). With around 50 employees, contract manufacturing is the largest business unit. Walter Füreder, who is one of the two GmbH managing directors responsible for this division, describes it as essential for the entire company: "We generate around half of our turnover with our contract work. Twenty percent of this involves doing groundwork for other business units, while we achieve the rest with leading companies in the plastics recycling, railway and mechanical engineering sectors."

Karl Kordik, Sales Manager for Contract Manufacturing, has known his customers and their needs for many years. He explains that many long-distance trains around the world, such as ICE, Railjet, etc.,

have a component that has been manufactured by his company – "namely a wheelset bearing housing, of which we have already manufactured tens of thousands in different variants". Components for injection moulding machines are also part of the recurring contract work, as are shredder shafts, bearing blocks, etc., which are supplied to machine tool manufacturers. "We supply the largest proportion of our work, around 40 percent, to the plastics recycling sector," says Kordik. "Like us, the world's largest and most important system manufacturers are based here in Upper Austria, and we can count most of them among our customers."

Neuson Hydrotec's contract manufacturing has a lot to offer – starting as early as the development support phase, which includes advice on production-ready design. The services we offer range from the

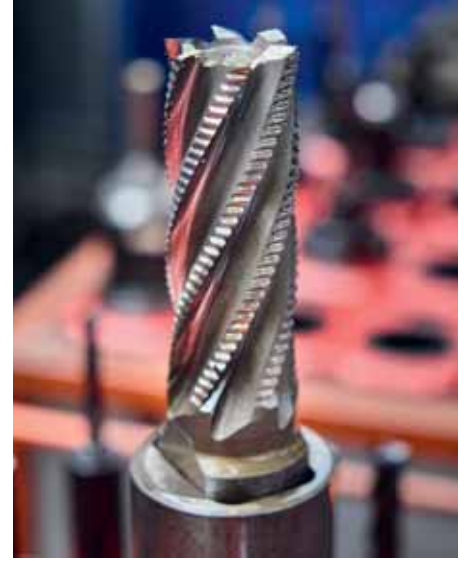
procurement of raw material to CNC milling, grinding, lapping, honing, welding and superfinishing, right up to pre-assembly. Karl Kordik is aware that "our customers appreciate the fact that we supply them with a complete component, including a 3D measurement report." Since 2023, the contract manufacturing division has had a large 3D coordinate measuring machine, which can confirm the quality produced and can also ensure process optimisation.

Sophisticated components, powerful machines

The central topic in contract manufacturing is machining, and various CNC turning and grinding machines as well as several machining centers with a pallet pool are available for this. The highlight is the HEC 800 5X MT five-axis machining center, which was put into operation in May 2024. This investment was triggered

“We want to clamp components with a length of 43 inch (1100 mm), and drill through them from one side with an appropriate tool.”

Karl Kordik, Sales Manager Neuson Hydrotec



by a complex component for a plastics recycling machine that requires turning and milling operations, and in which numerous holes have to be drilled at different angles. In this recycling plant, the used plastics are heated to around 400 degrees after shredding. A spindle presses the liquefied mass through a plate with tens of thousands of holes about 0.008 inch (0.2 mm) in size – called a laser filter – which retains any contaminants. These are removed by a permanently rotating scraper disc. The cleaned plastic flows

onwards to a cooling station, and is then cut into pellets. Neuson Hydrotec manufactures the housing for this laser filter. It contains intricate contours and numerous channels, through which first the contaminated and then the cleaned plastic flows. “One hole runs through the entire component, and other channels meet at a certain angle,” says Karl Kordik, explaining details that are difficult to produce. High precision is particularly important for the latter. This is because, for fluidic reasons, the channels must not be offset when

they meet. “We manage this because we achieve a positioning accuracy per hole of less than 0.002 inch (0.03 mm),” adds Kordik. “Although that doesn’t sound particularly difficult, the value corresponds to only a few μm per axis if the holes are drilled at 45 degrees.”

The surfaces of the holes are also of decisive importance for a smooth flow. That is why they are sanded and polished by hand. The finer the surfaces coming from the machine, the less reworking is required.



Complete machining saves non-productive time

Until recently, the contract manufacturers were producing this housing on a vertical turning and boring mill and a three-axis milling machine, in a total of seven clamping positions. When the customer ordered significantly larger quantities, Neuson Hydrotec decided to modernize production in this area – primarily to achieve shorter manufacturing times. The solution pursued was complete machining

on a five-axis machining center with a turning function. The vertical turning and boring mill was to make way for a machine like this. “We had shortlisted four machines,” explains Karl Kordik, who also oversees production in addition to his role as Sales Manager. There were several reasons why the decision was made in favour of the HEC 800 5X MT. According to Kordik, one important factor was

that the HEC 800 allows the component to be clamped vertically: “These components can only be clamped on a horizontal turning and milling center with great difficulty. Fast, automated work-piece replacement is even more difficult. The HEC 800, on the other hand, already comes with a dual pallet changer as standard, which enables setup parallel to the primary processing time.”

“The time saving is 48 percent.”
Karl Kordik, Sales Manager Neuson Hydrotec



Another argument in favor of the Heckert machine was the fifth axis. On the HEC 800 5X, this is located in the workpiece and not in the tool.

Bed extension for deep holes

Another argument in favor of the Heckert machine was the fifth axis. On the HEC 800 5X, this is located in the workpiece and not in the tool. "That saves us from having to reclamp," says Kordik. Ultimately, however, the decisive factor was the possibility of obtaining a bed extension along the Z axis and an extended Y travel path. Kordik describes the background: "We want to clamp components with a length of 43 inch (1100 mm), and drill through them completely with an appropriate tool. The standard Z travel path of 51 inch (1300 mm) is not sufficient for this."

Starrag finally supplied the HEC 800 5X MT with travel paths of 81 inch (2050 mm) along the Z axis and 51 inch (1300 mm) along the Y axis. "At moderate costs," says Karl Kordik, adding that "no other machine manufacturer had offered such extensions. We would have had to switch to much larger machines, which would, however, have been more expensive and would have been associated with reduced dynamics."

Instead, Neuson Hydrotec preferred to invest in useful additional equipment, such as a cooling lubricant temperature control system. "Our roughing operations

generate a lot of heat, which would otherwise be transferred into the cooling lubricant and onto the component. But this would run the risk that, when it comes to generation, the exact fit sizes would no longer be correct after cooling."

Interpolation turning instead of reclamping

The control software for interpolation turning was also on our 'to-buy list'. This is because the laser filter housing requires a 14 inch (350 mm) hole that is offset from the center by 0.31 inch (8 mm). "Thanks to the precisely controlled interpolation

“Essentially, it’s the reduced non-productive time that has an impact.”

Karl Kordik,
Sales Manager
Neuson Hydrotec



of the X and Y axes, we can create this without any problems,” confirms Karl Kordik. Alternatively, his production colleagues would have to take the additional step of clamping the component so that it is centered on the hole. According to Arno Berger, the responsible regional salesman at Starrag, this can also be done without any problems: “We have tested this. Despite the imbalance that then occurs on the quickly rotating table, we are in line with all required tolerances.” However, it saves more time if you produce the eccentric hole using interpolation turning. Success can be

seen after just a few weeks. In the case of the filter housing described, it was actually possible to reduce the number of clamping positions from seven to one. “The time saving is 48 percent,” says a delighted Karl Kordik, who had campaigned for this investment. “Essentially, it’s the reduced non-productive time that has an impact.” And he mentions yet another advantage: “As the component is now on the machine for longer, the operator has more time for other tasks.” The Heckert milling and turning center also pays off when machining other components. “Now that the vertical turning and

boring mill is no longer available, we also use the HEC 800 5X MT simply to produce turned parts. Even here, we are around 20 percent faster than before, which is due to the use of multi-cutting tools, shorter tool change times, faster rapid traverse, etc.,” says Kordik.

He had hoped for such savings – or rather, he had expected them. After all, back when he bought the new machining center, he had already negotiated the possibility of a second, compatible Heckert HEC 800 – an opportunity which he will probably take up soon. ▽

Goodbye Delphi, hello clarity: OEE provides an overview



In ancient times, those seeking advice asked the Oracle of Delphi to clear the mists of the future. The experts at the Immendingen TechCenter, on the other hand, rely on analyzing overall equipment effectiveness (OEE) when it comes to future-proof production solutions for the medical industry.

In the age of precision and innovation, uncertainty is paradoxically the greatest challenge for suppliers to the medical industry," says Michael Paulus, Head of TechCenter Immendingen at Starrag Vuadens, during discussions with customers. "How can I be sure that the machine I buy today won't be outdated tomorrow and make me work inefficiently?" customers ask.

This is particularly important for manufacturers of medical products who demand the highest levels of accuracy and reliability. Paulus: "In medical technology, even

the smallest deviations can have serious consequences. Our customers therefore expect machines that are not only precise, but also extremely reliable." The challenge now is to guarantee this precision in a production environment that is increasingly characterized by rapid market changes and high flexibility requirements.

"From this point of view, the Starrag product area 'Bumotec' deals with the issue of overall equipment effectiveness (OEE)," explains Paulus. OEE stands for 'Overall Equipment Effectiveness' and is used by Bumotec experts as an important

performance indicator for evaluating the productivity and efficiency of devices and machines.

OEE: Proven in everyday operations

"OEE is a precise key figure in daily plant management, as it evaluates the actual utilization of the machines during the planned production time," explains Paulus. "This allows us to specifically identify and eliminate inefficiencies and sources of loss within operational production times in order to increase efficiency and profitability," adds René Benninger, Business



“With an OEE process, we can specifically identify and eliminate inefficiencies and sources of loss within operational production times in order to increase efficiency and profitability.”

René Benninger,
Business Development
Manager Medtech

All parts are produced in a single pass and completely deburred – set-up and waiting times in further processing are eliminated.

Development Manager Medtech at Starrag Vuadens SA. OEE provides a comprehensive assessment by taking three main factors into account: Availability, performance and quality. Availability describes the percentage of time the equipment is available for machining during the scheduled production time. Higher availability means minimal downtimes and optimum utilization of the devices.

Performance rates how efficiently the device works during operation – in comparison to its maximum possible speed.

Paulus: “Slow cycle times and minor failures reduce performance and overall productivity. A higher performance indicates that the device is working closer to its maximum capabilities.”

Success stands and falls with the third factor: Quality. This is because it measures the proportion of products manufactured in accordance with quality standards compared to total production: It takes into account errors, rework and

rejects. High quality shows that the manufacturer effectively controls the process and complies with the specified quality standards. Bumotec analyzes typical problems and develops targeted strategies to improve overall performance.

100 percent in sight

To calculate the OEE, the three main factors – availability, performance and quality – are multiplied together. The final result is

a percentage value. Paulus: “The ideal would be 100 percent, because it stands for perfect performance, where the equipment works with maximum availability, speed and quality without interruptions or defects.”

The six major loss categories in production are: Loss of availability due to equipment failures, material bottlenecks and stoppages; Loss of performance due to machine wear, inferior materials and labor shortages as well as loss of quality due

to rejects and reworking. Paulus: “All of these losses can be influenced by the system manufacturer.” Bumotec focuses on optimizing set-up times and minimizing production waste.

**Mouthpieces off the shelf:
More efficient machining thanks
to reduced set-up times**

A practical example from a Starrag customer shows how set-up times can be reduced. The supplier manufactures jaw

parts in various sizes and shapes from standardized stainless steel, directly from the round material bar. This enables stable clamping and makes the use of pallets superfluous. All parts are produced in a single pass and completely deburred – set-up and waiting times in further processing are eliminated.

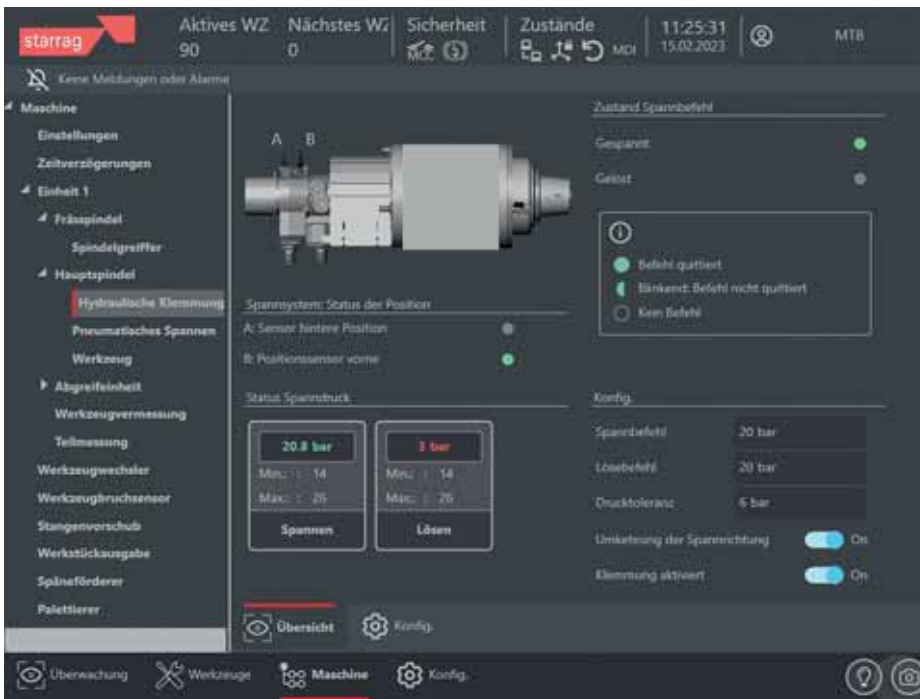
The uniform raw material results in a large amount of swarf, which can be easily managed thanks to a robust production solution with high-pressure flushing. Efficient program and tool management as well as an adapted finished part removal system ensures smooth operation. Tools are changed during production, critical dimensions are manufactured adaptively and measured during the process.

Bumotec focuses on optimizing set-up times and minimising production waste.



Adaptable: The large variety of parts requires particularly flexible machine kinematics with easy changeover, thanks to which the machining centers can be adapted to different production requirements without great effort.

Customized logistics: The MillTrun machining center transports finished parts via a parts belt, chute and/or unloading solutions that are equipped with or without identification.



Starrag HMI: The user interface for all software solutions and setting parameters is clear and easy to use.

predictive maintenance and the early detection of potential faults in order to reduce downtime and increase overall productivity.

Summary: More time for effective management thanks to OEE

Paulus: “These measures have enabled us to increase efficiency considerably and significantly reduce set-up times.”

The experts took a similar approach to another challenging application: The customer machines a very diverse portfolio of parts from batch size one to series production from a wide range of materials and in various designs. This requires particularly flexible machine kinematics with easy changeover, thanks to which the machining centers can be adapted to different production requirements without great effort.

Teamwork reduces production waste

OEE has also proven itself many times in practice with regard to production waste. The subtleties often make the decisive difference. This includes effective chip management and a continuous supply of raw material, for example through a bar magazine. These measures ensure reliable continuous operation and minimize unplanned downtimes.

Cooperation between machine manufacturers and customers is of central importance here. “Only through close dialogue can we ensure that the customer’s

“The basic accuracy of customer products has increased and remains at a consistently high level.”

Michael Paulus
Head of TechCenter
Immendingen

specific requirements are met and that the production processes run optimally,” explains Paulus. An equally important element in the OEE process is customer service – not only before, but above all after the purchase. Customized advice during the sales process ensures that the right machine is selected for the respective requirements.

However, the process reliability “acquired” with this decision can be significantly increased if the system manufacturer supports the user with processes in all situations. Customer service therefore plays a central role – from the right advice to

The benefits of a successful OEE process are huge. Continuous production overnight and at weekends ensures maximum capacity utilization, even with small batch sizes. The sets produced are processed immediately, which significantly reduces throughput times. The costs for operating materials are now minimal, as hardly any collets, pallets and fixtures are required.

“The basic accuracy of customer products has increased and remains at a consistently high level,” emphasizes Paulus. Today, material logistics is hardly an issue. Benninger: “The use of bar material eliminates the need for cutting to size, which simplifies the production process and makes material handling more efficient.” A positive side effect: Personnel expenses will also fall.

The OEE process is also well received by customers. Paulus: “A medium-sized user told us briefly and concisely about the advantages of a successful OEE process: ‘In the morning, I stock up on materials, set up a few tools if necessary and can then concentrate on running the business all day.’ That proves it: An optimally applied OEE process not only increases efficiency and productivity, but also reduces operating costs and ensures quality.”

TORNOS

“The quality Tornos provides has never been in any doubt. From the beginning, we knew it was the best choice we could make if we wanted to produce turned parts.”



High-quality products with exquisite design

From its beginnings in Switzerland in 2014, Bioscience Medical has become a renowned expert in everything related to high-end implants and prostheses. Since it was founded in La Chaux-de-Fonds and then moving to Rossemaison, this multinational has chosen Tornos as its one and only partner to ensure its production of intramedullary rods, screws and plates for the medical sector.

Eight years ago, Bioscience Medical, a company which is part of Bioscience Group, a Swiss holding company, established itself on the world market for premium implants and prostheses. Highly sophisticated, high-quality products are designed and manufactured using state-of-the-art technology, with Tornos machines the sole resource for everything related to priority medical intramedullary rods and screws. The commitment to the patient's health is demonstrated throughout the life cycle of the product, starting from the use of first-choice materials, which are differentiated by their mechanical, physical and chemical characteristics.

"We are a true Brazilian family business, working in the health sector, with a strong base in Switzerland, where we



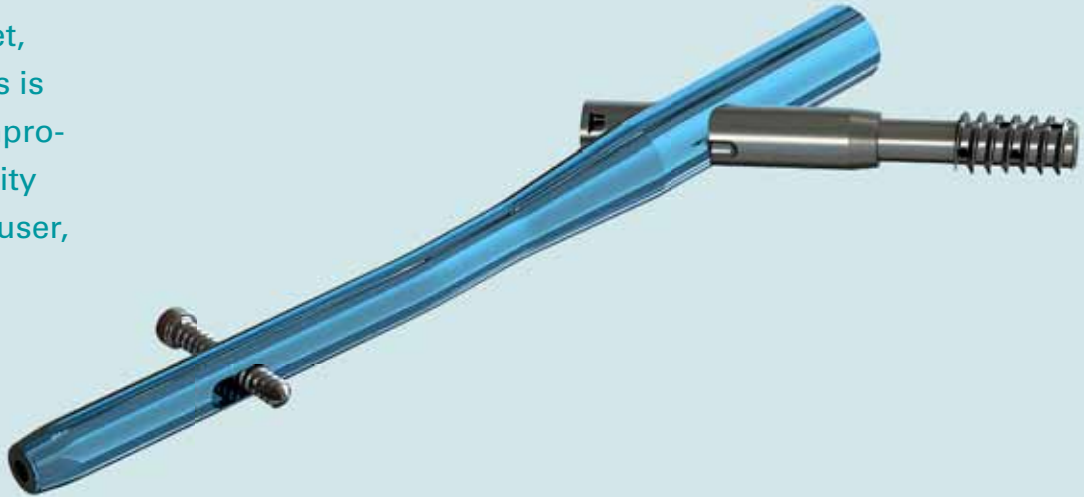
What is probably most special for Bioscience Medical are the rods. The rods as well as their entire range of products are produced in-house. The longest nails are not only turned on the outside but are also subject to boring and tapping operations.

were immediately given an excellent welcome. From the outset, our goal was to develop a new external fixator for arthroplasty. The parent company, Biomecanica, was founded by my parents, and over the years we have had

the opportunity to play an active role in all aspects of orthopaedics in Brazil," says Ana Carolina Pengo. Biomecanica is an orthopaedic implant and prosthesis company with 34 years of history, trust and transparency. The impetus behind

TORNOS

“We design our products to better serve the orthopaedic market, and our focus is always on improving the quality of life of our user, the patient!”



Biomechanica was the dream of helping patients to get better. With this idea in mind, their president, José Roberto Pengo, took a blank sheet of paper and a pencil and turned these into tools to create an external closure. This fixator was the precursor of this company and continues to provide a source of inspiration because it helps us to envisage dreams and projects, that can become reality, and lead to so many success stories. Biomechanica is more than just square meters of machines and equipment in a factory, it is people with a commitment to health. They carry within them the essence of life. Widely recognized because of the conviction they have demonstrated for so many years, they work to rehabilitate both bodies and minds. “We design our products to better serve the orthopaedic market, and our focus is always on improving the quality of life of our user, the patient!” explains Ana Carolina Pengo.



“Biomechanica manufactures more than 9000 different products, mainly because in addition to our implants, we also produce instruments. We do not outsource any type of production. For example, we have developed an innovative new product right here in Switzerland. It is a proximal femoral stem and it is a pioneering product. We also produce plates. These include a special locked plate to

inject orthopaedic cement directly into the bone, a really interesting feature! We also use buttons and we lock the plate with pins. We produce everything here in Switzerland,” says Ana Carolina Pengo.

Bioscience Medical had to find a company like Tornos from the start for two main reasons. Firstly, the quality. The quality Tornos provides has never been

in any doubt. "From the beginning, we knew it was the best choice we could make if we wanted to produce turned parts. The second reason is that we are in Switzerland and Tornos is our neighbour here," says Ana Carolina Pengo.

Thanks to this happy collaboration, Bioscience Medical has had the



opportunity to make prototypes of some tiny parts, even though daily production is essentially all kinds of screws. Bioscience Medical produces all the screws for Biomechanica, and everything is produced in Rossemaison, both for the premium line and the public health line. We create all types of screws: short screws, longer screws, and locking screws. What is probably most special for Bioscience Medical are the rods. The rods as well as their entire range of products are produced in-house. The longest nails are not only turned on the outside but are also subject to boring and tapping operations.

As a serious and dynamic company, Bioscience Medical is now taking the majority share of business in countries other than Brazil, mainly Switzerland. Thanks to its many years of experience and specific expertise, the company

can meet all the challenges of the orthopaedic sector, of course, but also more broadly across the medical sector. It is constantly innovating whilst relying on its solid base, in a happy partnership with Tornos. ▾

biosciencemed.ch



The company is constantly innovating whilst relying on its solid base, in a happy partnership with Tornos.

The logo for starrag, featuring the word "starrag" in white lowercase letters on a red background that is shaped like a stylized arrow pointing to the right.

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