

Starrag and HAIMER:

Turbine Technology Days 2018

Partnerships open up potential for productivity

All inclusive for France: à la carte

Berthiez RVU vertical grinding machine in General Electric's gas turbine production

When it gets really big

As a manufacturer of customer-specific industrial gearboxes, Eisenbeiss GmbH is increasingly focusing on bringing a large share of production in house

Bumotec s191H: MacKay Manufacturing Inc., USA

Interview: Katie MacKay, Vice President, Gregg Meyer, Milling Department Supervisor

Success with
inspiring regular
customers

25 years
of the FOG series

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Engineering precisely what you value

25

years of ideas!

Celebrating the great success
from the originator
of the overhead gantry
Droop+Rein



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Dr Christian Walti
CEO of the Starrag Group

Dear reader,

I would like to greet you in my new capacity as CEO of the Starrag Group. I took over this position from Walter Börsch on 1 June, 2018 and he has been alongside me during my first few months.

I am delighted to guide Starrag and its highly-qualified team on their journey to becoming one of the world's leading manufacturers of precision machine tools.

I gained my professional experience working in various industries. Germany's machine tool industry is very familiar territory for me. I first came to understand and appreciate the industry while writing my thesis at the University of St. Gallen on the subject of "Sales management through the example of the Swiss machine tool industry".

As a former executive at the machine construction companies Faes AG and Bosch Packaging Systems, I am fully aware of the strength of innovation in the machine and plant construction industry. Nevertheless, when I looked in detail at the current highlights in the Starrag magazine, "Star", I was once again fascinated by the variety and wealth of ideas within Starrag concerning the machine tool, which many experts rightly consider to be the mother of all machines.

I am particularly excited by off-centre line machining, which allows Dörries vertical lathes to be upgraded to multi-functional machining centres at low cost. As well as turning reliably, efficiently and precisely, these vertical lathes are also able to mill, drill and cut threads in one clamping device with the same high levels of speed and accuracy.

But that is only one high point of many: The interview with Ulrich Wiehagen from Starrag Technology GmbH in Bielefeld is inspiring. His look back on a successful 25 years for the FOG series in the Droop+Rein product range astounded us with the statement: "To date, not a single FOG has ended up on the scrapheap. If, for example, a Droop+Rein FOG is 15–20 years old, it is worth modernising the control system and possibly some of its mechanical components."

All of the other articles featured in this issue are interesting in equal measure: These range from the success story of the Berthiez RVU 2800/250 vertical grinding machines, which allows General Electric in France to machine drive elements for turbines in their entirety, right through to the production of vehicle components on the new Heckert T45. Specialists discussed the manufacture of aircraft components at the now traditional Turbine Technology Days in Roschacherberg. Meanwhile, at a new Starrag roadshow, experts from areas such as the medical technology and watchmaking industries carried out a detailed examination of the high-precision manufacture of delicate components on Bumotec machining centres. The range of topics is rounded off with reports on our comprehensive spare parts service and our ServicePlus concept.

I hope you thoroughly enjoy reading this magazine, and if you would like to familiarise yourself with Starrag, our products and our services even further, I recommend coming to visit us in person at one of the numerous trade shows we take part in, such as IMTS 2018 in Chicago (10–15 September) or AMB 2018 in Stuttgart (18–22 September).

Dr Christian Walti
CEO of the Starrag Group

“Perfection through precision”

STARRAG USA TOUR

For decades, Starrag, the global technology producer of high precision multi axis machining centres has successfully demonstrated the diversity of applications performed on its machines.

The model Bumotec s191FTLR 7-axis precision turn mill is evidence of Starrag’s expertise in manufacturing complex parts in a single set up. The Swiss manufacturer demonstrated its capabilities in a road show organised at Ellison Technologies in Kent, WA on February 13th & 14th and in Portland, OR on February 20th and 21st 2018. Each mobile were focused on live machine demonstrations. Additionally, engineers from Switzerland presented a technical overview for users that feature: multi axis programming, milling, grinding, polishing, measuring, building CAD models and implementing cost effective solutions for the workshop.



For a premiere in the USA, this road show was a success. Starrag worked closely with Ellison to communicate to customers and potentials in order to raise their interest and their curiosity ... and it worked, almost 80 visitors from 38 different companies participated to live demonstrations.

Today’s medical field requires a high dose of precision and repeatability. The requirement to manufacture complex micro size shapes is more than ever in demand! The MedTech industry is further challenged by the mix of hard metals and alloys used in its products. To overcome these challenges, Bumotec advanced

The result is unlimited precision possibilities.





Today's medical field requires a high dose of precision and repeatability.

technology delivers the perfect price performance ratio when grinding, milling, turning, drilling and polishing complex parts in a single cycle.

One such part that has been manufactured at the road show was the "femoral head". Made from Chromium Cobalt, Bumotec's approach to manufacturing a femoral head is to start with unground bar and finish the head complete in one single set up! Attendees could watch first-hand the s191FTLR machine "hands off" six sided shapes – including, grinding a spherical shape (2.5 µm) to a polished roughness RA 0.05 – without one single interruption to the machining cycle. The advantage of machining such complex shapes in a single cycle is realised

through Bumotec's seasoned know-how of maximising the performance of linear motors, direct torque drives and thermal management on a rigid machine platform. The result is unlimited precision possibilities.

Attendees of the road show could interact with the Swiss engineers to learn more about practical examples of quick change over and fast set ups that deliver higher throughput and lower cycle times compared to traditional methods of costly set ups spread over various machines. With all the capabilities the Bumotec s191FTLR offers and Starrag's innovative engineering staff, we were sure our solution would fit precisely the precision needs. ▾



With all the capabilities the Bumotec s191FTLR offers and Starrag's innovative engineering staff, we were sure our solution would fit precisely the precision needs.

Success with inspiring regular customers

25 years
of the FOG series

HD characteristics: Excellent machine dynamics mean that the new Droop+Rein FOGS HD (Heavy Duty) can finish items around 20–30% faster and more economically than a comparable portal-type milling machine.



The overhead gantry milling machine (FOG) series of Starrag's Droop+Rein product range celebrates its quarter centenary this year. Reason enough for Ulrich Wiehagen, Sales and Plant Director at Starrag Technology GmbH in Bielefeld, to take an exciting look back at such highlights as the world's first high-gantry machine for simultaneous roughing and finishing.

Mr Wiehagen, you've been part of the scene since 1999 and have guided and supported a large part of the FOG success story. How did it all start, and what were the first highlights?

Ulrich Wiehagen: At the suggestion of notable customers in the field of toolmaking, the company Droop+Rein developed a highly dynamic milling centre in 1993 in which the tool performs all movements and therefore the workpiece is no longer moved. The beds are not installed at floor or corridor level as with more familiar gantry machines, but rather on columns. This eliminates the moving columns and means that the tilting movement typical of floor-guided gantries is no longer an issue. The new development thus meets all requirements for a highly dynamic, extremely precise HSC machine for the

> **SUCCESS STORY:** Over 150 machines in operation

production of high-end surfaces in toolmaking. It is a concept that has now been copied by many competitors. There are even some that are bold enough to claim that they supplied the first machine with roughing and finishing capabilities for toolmaking – but we can prove that we did this as early as 1998. And since 2000, we have even offered a fork-type milling head in which both mechanical spindles and motor milling spindles can be used.

The FOG series isn't just used in toolmaking now though is it?

Ulrich Wiehagen: Soon afterwards we also began supplying to the aviation

sector, where machines with 40 kW spindles for highly dynamic and high-precision milling of the outer cylinders of aircraft landing gears are tried and tested. Thanks to these machines we have now captured a global market share of over 80%.

But machining heavy workpieces quickly and precisely on a machine also requires a highly rigid base. Why do you rely on a U-shaped foundation?

Ulrich Wiehagen: It's something we introduced about 15 years ago as it offers a very high degree of rigidity and also lowers the necessary foundation depth by about a third, thus reducing the construction effort. In addition, the dynamic



Ulrich Wiehagen, Sales and Plant Director at Starrag Technology GmbH, Bielefeld:

"A customer conducted a benchmark test in which a 15-year-old FOG performed much better than a completely new machine from a competitor. The FOG produces high-precision surfaces of consistent quality and with a proven availability of 94 % – and does so for years."

**> VERY MUCH SOUGHT-AFTER AND EXPENSIVE USED MACHINES:
40 bids from over 10 countries on a 17-year-old machine alone**

load capacity increases. Another important cost-saving effect is the way in which the geometry of the machine remains constant for a very long time, so the effort required for re-calibration during the life of the machine is much less. After all, the calibration of a large portal milling machine can take between five and ten days, during which it is not earning any money. The U-foundation is the most rigid – and therefore the best – variant for setting up a high-gantry machine.

What would you say is your unique selling point?

Ulrich Wiehagen: We are the only manufacturer to date to offer a standard

machine with integrated tool for surface hammering or machine hammer peening (MHP). During machining, a pulsed impact ball hammers rapidly at a defined power and frequency. This process, known as peening, compresses the boundary surface layers to a depth of 10 µm. So in principle, the peening tool behaves like any normal tool that can be inserted into the machine and then controlled by the CNC. MHP technology has been so well received that a major German automobile manufacturer is already using it at three toolmaking locations. It is the only MHP application in industrial-series production anywhere in the world.

What sets the FOG series apart from competitor machines?

Ulrich Wiehagen: In toolmaking and mould making, this multifunctional machine guarantees the highest surface quality and exceptionally efficient production. There are benchmark tests in which 15-year-old FOGs perform better than the latest developments from competitors. The FOG produces high-precision surfaces of consistent quality and with a proven availability of 94 % – and does so for years. A special version of the machine is also used in the high-precision production of aircraft construction in which, for example, complex drilling patterns on large workpieces must match

> **NO DOWNTIME:**
The first machines
are still working



Premiere in East Westphalia: The first high-gantry machine for finishing and roughing was developed 19 years ago in Bielefeld as the Droop+Rein FOGS 32 55 M30 K.

> **MAXIMUM ROBUSTNESS:**
No damage even after
rapid traverse crash

to a few hundredths of a millimetre. We adhere to the strict regulations governing interchangeability of parts apply to ensure that the drilling patterns of workpieces machined independently of one another at different locations also fit together. This is one of many examples of how successfully the FOG series has already proven itself as a reliable means of production in a wide range of applications and in a variety of industrial sectors.

What happens at the end of a machine's life?

Ulrich Wiehagen: To date, not a single FOG has ended up on the scrapheap.

If a Droop+Rein FOG is 15–20 years old, for example, it is worth modernising the control system and possibly some of its mechanical components. Thanks to this retrofit, which usually only costs a third of what it would to invest in a new machine, the customer receives a production tool in mint condition for the next 15–20 years. With a FOG, however, we can expect a service life of more than 30 years.

A regular customer inspired you to build the FOG: Has it happened again?

Ulrich Wiehagen: Indeed, and more than once. The latest innovation is the new

Droop+Rein FOGS HD (heavy duty), which was inspired by CONCAD GmbH in Walldürn (in Germany's Neckar-Odenwald district). This particular company was looking for a machine for the high-precision complete machining of large, heavy tools, especially for outer skin parts in vehicle body construction and machine components in a single clamping operation. However, because there were no machine types that combined all of the ideal features, we crossed the two machine types FOGS and the portal machine Droop+Rein TF to form a new machine concept in which we placed

> **LOYAL USERS:**
Most customers have more
than one FOG machine



“Oldie but goldie”: Even very early machines (a FOG 2500 is illustrated) are suitable for further years of productive use after retrofitting.

> **VERSATILE:**
 Portal milling machine with the largest milling head portfolio for all applications

.....
25 years
 of the FOG series

the modules of the portal machine on top of the foundation: A high-gantry machine for heavy and precise machining with hydrostatic guides in all linear axes.

How was the new product received by customers?

Ulrich Wiehagen: It was met with an unusually positive response from many interested parties. Our FOGS NEO N40 is the first choice for tool and mould makers who need to produce first-class surfaces with high dynamics and high precision and who require the additional benefit of 40-kW roughing performance.

If customers primarily need milling power of between 50 and 100 kW for heavy-duty machining tasks and require dynamic finishing capability without compromising surface quality as an additional benefit, then our new FOGS HD is the first port of call. The HD is also ideal for use in mechanical engineering for workpieces that are difficult to machine and have high precision requirements. In general, we have noticed that more and more FOG machines are replacing table-top portal machines with fixed crossbeams. The high-gantry version requires approximately 40 % less installation

space for the same working area. The workpieces do not enter the dynamic mass, multiple clamping is possible during machining time, and the guideways are optimally protected above the clamping surface. ▀

> **RELIABLE:**
 FOG series in operation for 25 years since 1993 with an average availability of over 94 %

The first **Christian Belz Marketing Award**



First award ceremony for the Christian Belz Marketing Award (from left to right): Marcus Schögel (University of St. Gallen), Walter Börsch (Starrag AG), Christian Belz (University of St. Gallen), Carsten Paulus (Gallus Ferd. Ruesch AG), Sven Reinecke (University of St. Gallen), Daniel Frutig (Starrag AG)

On 9 May 2018, Starrag AG and the Institute for Marketing at the University of St. Gallen awarded the first **Christian Belz Award for Reality-Oriented Marketing** to **Dr Carsten Paulus**. In his research, he critically examined the optimisation of marketing communication in the industrial investment business and made ground-breaking findings

that are of enormous importance for both research and practice alike.

Starrag is donating CHF 10,000 for the prize, which will be awarded every two years, to promote application-oriented marketing research. This topic was always a major concern for Professor Christian Belz, which is why the prize bears his name.

Professor Christian Belz has worked at the University of St. Gallen for more than 40 years, and in this time he has been especially dedicated to the subjects of sales and marketing in the industry. He gave his farewell lecture on 8 May 2018 at the University of St. Gallen. The prize will also emphasise the strong partnership between Starrag and the University of St. Gallen. ▾

Service – precisely what you value

On a small, high-tech machine, one customer produces high-precision components for respiratory protection devices, another mills gigantic tools on several portal systems, the third produces turbine blades on a 5-axis machining centre. Günther Eller, Head of the “Customer Service” business unit at Starrag, knows only too well that such different customers with their own individual requirements do not want off-the-shelf products. In this interview, you will find tailor-made answers.

What does the service strategy look like in a company that has made a name for itself through, among other things, a unique parallel kinematic machining head for machining aluminium or through Starrag machining centres specialising in turbine blade production?

Günther Eller: We go to great lengths to offer our customers service solutions tailored to their needs. As part of this, the service often starts before a failure occurs. We use a wide range of measures to ensure that machines fail rarely or not at all.

How do you optimise the service? What do you focus on?

Günther Eller: We are currently investing in developing proactive support in particular. This is not just a question of products for preventive maintenance, but also preventative consulting. We want to promote dialogue with the customer during the useful life of the machine. To this end, we have significantly increased the number of on-site support staff to reserve time for customer visits.

The spindles play an important part in the life of a machine: what do you see as a strength of your spindle service compared to manufacturer-independent service providers?

Günther Eller: Of course, as the manufacturer, we know our products a lot better. The customer can also be sure that, where necessary, our service

will use the latest methods to bring the spindle up to current levels of technology. All in all, we differ from external providers in one key respect: We are responsible for the safety of the entire machine, not just for the safety of the repaired or replaced spindle. We also have replacement spindles available that the customer receives immediately with no waiting time.

The motor spindle is extremely common across all Starrag model series: what do you recommend here for a customer who is very interested in high reliability and stable costs?

Günther Eller: Here, I would recommend a contract with predictable fixed costs: If the spindle fails before the typical service life, the customer only pays a proportional amount, i.e. pro rata. Otherwise the full price is due.

Is there a special service offer?

Günther Eller: Yes, this is the new **ServicePlus** concept, which contains a tailored, customer-specific solution to guarantee machine availability according to agreed availability targets. This is all available for a fixed price. I see this concept as our most innovative solution at this time for each machine from the Starrag Group.

What exactly does ServicePlus offer?

Günther Eller: The customer receives a five-year warranty including annual preventive and forward-looking



Günther Eller, Head of the “Customer Service” business unit at Starrag

maintenance according to MTBF consideration for the period of the contract. There are additional special agreements regarding things like spare part supply, remote diagnostics, telephone support and training of machine operators. All of these extras complete the package.

Who has been enthusiastic about this concept?

Günther Eller: We have successes in the UK, France and even in China. In Germany has the Siemens turbine factory in Görlitz decided for **ServicePlus**. We offer **ServicePlus** today as well along with new machines as well in hindsight.

What about the cost?

Günther Eller: Practice has shown that the **ServicePlus** concept is cheaper for the customer than to pay for unplanned outages. ▀

ServicePlus:

New service concept for the experts in low-pressure blades

Jörg Brückner (Head of Maintenance at Siemens Görlitz, right) and Martin Finkeldei (Starrag Service Manager) in front of an LX 251 milling machine

In response to continuous development efforts in the manufacturing sector, machinery manufacturer Starrag will be collaborating on maintenance for a blade manufacturer in Görlitz.

Görlitz-based blade manufacturing is currently undergoing transition from a traditional manufacturing area in the turbine factory to a centre of excellence for low-pressure blades for Siemens steam turbines. In addition to the overhauled manufacturing layout with new machines, the centre of excellence is distinguished by its professional staff and perfect processes.

It is worth taking a closer look at the processes involved, since these are undergoing change too. For example, where previously a blade step was manufactured as a full batch, the individual production of blades denotes the future direction (one-piece-flow). Moreover, digitalisation continues to make inroads into operational processes. It is increasingly supporting staff and processes; in the form of the Manufacturing

Information System (MIS) or through Track & Trace (locating software), for example. Processing is becoming faster, safer and more flexible. This means that the maintenance requirements for machines are also changing.

ServicePlus concept with Starrag

Modern maintenance and repair must meet requirements in order to ensure maximum technical availability of machines and to sustainably reduce maintenance costs. But one must not exclude the other. The new **ServicePlus** concept is a key aspect in fulfilling this, with Starrag as part of the local maintenance concept. Starrag is the manufacturer of almost all milling and machining centres for blade manufacturing. The concept is based around increasing the level of manufacturer support for

Starrag machines, with the site responsible for both minor repairs and autonomous maintenance completed by machinery operators. The aim is to elevate the technical availability of these machines from an average of 92 to 95 %, whilst boosting competitiveness. ▀

Key elements of the partnership with Starrag include:

- Performing preventative and methodical maintenance measures in line with an agreed maintenance schedule.
- Starrag establishing a warehouse facility for wear parts at the Görlitz site in order to facilitate quick access to required parts—parts stored directly on site for Siemens.



Thomas Weyers, Head of Service Spare Parts & Logistic at Starrag Technology GmbH in Mönchengladbach. "We are proud of the very close cooperation between employees in upstream and downstream departments such as design, purchasing, warehousing, shipping, internal and external installation services. This is how we achieve a fast supply chain."

Spare part sales

With expertise and passion

It's a million-euro operation of a particular logistical type: We're talking about items worth millions, which wait day after day for the moment they're needed in Europe alone. This occurs when a component fails in one of the large Starrag machines. That's when the clock starts for "Service Spare Parts and Logistic" at Starrag Technology GmbH in Mönchengladbach and Bielefeld.

The numbers show how important this is: Worldwide, the experts look after 3,000 large machines in operation, for which 6,300 different items are held in the central warehouses in Mönchengladbach and Bielefeld. To enable faster delivery, Starrag also holds additional stock in the USA (Dallas), Korea (Incheon) and soon also in China (Shanghai).

"Our **experienced** staff in spare parts sales have the necessary technical expertise for both old and new machines," says Thomas Weyers, Head of Service Spare Parts & Logistic at Starrag Technology GmbH in Mönchengladbach. "We are proud of the very close cooperation between employees in upstream and downstream departments such as design, purchasing, warehousing, shipping, internal and external installation services. This is how we achieve a fast supply chain."

Weyers sees it as an additional benefit that his team in Mönchengladbach and Bielefeld don't simply work in an impersonal call centre. The eight spare parts sales people work in small project teams like the key account managers, who handle each activity as a project. They know the spare part product because



Customer-oriented: The spare parts sales people work in small project teams like the key account managers, who handle each activity as a project.

they can see it in the warehouse. This allows them to advise the customer with passion and expertise. A team member may then consult the designer to find out precisely which task an urgently required component carries out in a machine. This meticulous procedure doesn't just apply to expensive, important components like motor spindles, whose importance even a layman would understand, but also to smaller, seemingly insignificant components, such as switches.

Service theory is dull, but here is a "colourful" example: A regular customer in Northern Germany needed a replacement motor spindle immediately as their machine had broken down. Without any red tape, Starrag sent the part immediately by taxi courier even though the written order hadn't yet arrived from the customer's maintenance personnel. Weyers: "This only works because we have a good relationship based on mutual trust and confidence." ▀

Starrag and HAIMER: Turbine Technology Days 2018

> Partnerships open up potential for productivity

Where aeroplane turbines are concerned, OEMs and suppliers must meet constantly increasing production requirements in terms of quantity and quality. Long-term partnerships between customers and suppliers are a tried-and-tested means of addressing this, as demonstrated multiple times at Turbine Technology Days 2018. But the process chain also offers great potential for productivity gains, as shown by various application-oriented examples.



Dr Christian Walti, CEO of Starrag Group: "The event is a gathering of the entire turbine industry."

The Turbine Technology Days have become the annual industry event for leaders in turbine production. This year, the event was jointly organised by Starrag AG and HAIMER GmbH. 160 participants from 16 countries travelled to Starrag headquarters in Rorschacherberg by Lake Constance to pick up tips on managing turbine production in an even more efficient and reliable manner.

Mauro Fioretti, President and CEO of the Italian Pietro Rosa TBM (Turbine Blade Manufacturing) Group was invited to be the keynote speaker. The family business with 350 employees has been operating for 130 years and specialises in the development and manufacture of turbine blades. Fiore's conviction:

"Small and medium-sized businesses can only meet the requirements of the aviation industry with strategic partnerships."

Such long-term partnerships connect Pietro Rosa TBM with both customers and selected technology partners. An example of these is Starrag. Pietro Rosa has used Starrag's machines, components and technological expertise – to the full – since the 1980s in Maniago, north of Venice: The turbine blade manufacturer uses not just Starrag 5-axis machining centres, but individually developed carbide cutters and equipment as well as the Starrag CAM system RCS. Pietro Rosa also builds on the support with respect to process design and simulation, in-process measuring equipment, process automation and monitoring.

Such a close collaborative partnership with customers and other suppliers within the process chain is also favoured by Dr Christian Walti, CEO of Starrag since the beginning of June. He therefore attaches great importance to the Turbine Technology Days: "The event is a gathering of the entire turbine industry. The concept is recognised worldwide, meaning that key decision makers even take on the long journey from Asian and American countries to find out about the latest developments here. I am sure that each participant takes home at least one idea for further increasing their efficiency."

The host, Dr Bernhard Bringmann, Managing Director at the Starrag site in Rorschacherberg, is also convinced



Workpiece-specific carbide tools from Starrag: A modular alternative to the solid carbide version of this milling cutter (left) has recently become available with the extremely rigid Duo-Lock™ interface developed by HAIMER.



Keynote speaker Mauro Fioretti: "Small and medium-sized businesses can only meet the requirements of the aviation industry with strategic partnerships."



Participants even took on the long journey from Asian and American countries to find out about the latest developments at the Turbine Technology Days.

of this. He goes on to emphasize: "We are not just machine manufacturers. First and foremost, we develop processes. Our high-end machine tools are part of these along with numerous other components. As a result, the Turbine Technology Days event we are hosting is not a sales event, but a gathering of ideas for process improvements."

Event partners play the one-two

Logically, partner companies are also involved in the event. In 2018 – once again – the HAIMER group is co-hosting. "We have been working closely with HAIMER on process development for over ten years" explains Bernhard Bringmann. "The entire product range, from tool holders, shrinking and balancing

technology to tool pre-setting focuses fully on quality. This means we know that it works, and this is crucial for our customers in the aviation industry."

The energy and aviation industry sectors are also key markets for HAIMER. Andreas Haimer, Managing Director of the family-owned company, reiterates: "We are pleased to be able to work in partnership on this event once again, in order to show our joint customers the added value achievable with HAIMER solutions. With our holistic product solutions for machine tools, we enable significant productivity increases with absolute process reliability." At the Turbine Technology Days event, HAIMER is presenting itself as a system supplier for machine tools with a wide range of

tool holders, carbide tools, shrinking and balancing technology and tool pre-setting devices. Andreas Haimer points out that "all products are designed to complement each other perfectly and also offer the prerequisites for network integration and continuous data flow."

The close nature of the partnership between the two event hosts is made clear at several stations, for example, through Starrag's own milling tools, which create process benefits for the customer through their workpiece-specific design. Recently, an alternative to the solid carbide version of this milling cutter has been developed. Bernhard Bringmann explains: "The extremely rigid Duo-Lock™ interface, developed by HAIMER, allows us to also offer



Dr Bernhard Bringmann:
"The Turbine Technology Days event we are hosting is not a sales event, but a collection of ideas for process improvements."



HAIMER presented a holistic solution approach from a single source—Smart Tool Management—from shrinking, tool balancing and measuring, to data transfer to the machine tool.



Example for process improvement:
Using Starrag expertise, it has become possible to machine these stator segments in one clamping operation instead of four.

exchangeable head cutters in carbide that exhibit comparable properties but offer easier handling to the user. This means we acquire shafts and solid carbide blanks from HAIMER with this interface, into which we then grind our specific tool geometry."

Tips for efficient turbine production

Another station was dedicated to the efficient machining of stator segments (in the example: 300 mm length, 16 blades). The core element of the presented solution is the Starrag LX 051 machining centre, specifically developed for high-precision, simultaneous 5-axis machining of turbine blades. The machine kinematics, customised tools and

technological expertise make it possible to reduce the previous machining operation involving four clamping operations to a single clamping operation. The user saves time and benefits from increased accuracy.

Visitors were able to experience how Starrag implements its claim of "Engineering precisely what you value" using the example of the 5-axis machining centre STC 800 MT, which is excellent at both turning and milling operations. It played to its strengths by machining a two-stage blisk, achieving excellent surface quality and profile tolerances. The equipment designed by Starrag specifically for this component is also jointly responsible for these results. It uses integrated

damping elements to prevent the disks from flying up and hindering the process.

A vertical 5-axis Bumotec s191 linear machining centre from Bumotec, who is located in the Swiss canton of Freiburg, shows that Starrag does not just specialise in blade machining within turbine production. The high-precision machine demonstrates its strengths using the example of an injection element for aircraft turbines: Following milling, turning, grinding and deburring operations, the component can be removed, fully machined.

Bumotec has also maintained a successful partnership with HAIMER for many years. This means the machine



In small groups, the participants received detailed information about the process and the respective benefit – in several languages to suit the international nature of the participants.

presented at TechDays is equipped with the new high-precision collet chucks. The optimised design combines high rigidity with vibration damping and noise reduction. Concentricity ensures smooth running at high speeds.

Consider every element of the process chain

It is not just machines and tools that contribute to process improvements. The CAM system also plays an important role. With RCS (Rigid CAM Software), Starrag offers its own CAM software, which specialises in turbine blade machining and contains many useful modules, such as an “adaptive roughing strategy”. Here, the forged blank is measured at

160 participants from 16 countries travelled to Starrag headquarters in Rorschacherberg by Lake Constance to pick up tips on managing turbine production in an even more efficient and reliable manner.

various points before machining using a probe. This allows the respective material allowance to be determined. Based on the results, the CAM system adjusts the NC program, thus avoiding air cuts when roughing. Users benefit from shorter processing times, lower tool costs and excellent collision safety.

Two marketplaces with expert partners, whose products play a significant role in the process chain – from coolants (Blaser) to tool systems (Benz; Heule) and software solutions (CGTech Vericut; tdmsystems) also made sure the presentation programme was well-rounded. ▀

All inclusive for France: à la carte

Berthiez RVU vertical grinding machine in General Electric's gas turbine production

At General Electric Energy Products France, the end to the previous demanding machining of gas turbine components across multiple work steps was marked with a simple "C'est fini". With that, the Group is now shifting the high-precision complete machining of drive elements over to Berthiez RVU 2800/250 grinding machines.

The energy revolution stands and falls with new, efficient gas turbines, which are used in the new clean and efficient gas and steam power plants, for example. There are particularly high requirements on plants for maximum-precision, low-vibration and at the same time highly productive machining of the drive elements. The Berthiez product range of

Starrag SAS from Saint Etienne has made a very good name for itself in this aspect of the energy sector, with its large vertical lathes and grinding machines. The factory of GE Energy Products Europe in Bourgne, France, manufactures gas turbine discs made of steel and Inconel using four Berthiez machine tools whose high-precision machining (concentricity

Focus on XXL: Hydrostatics allow very large components weighing up to 20 t to be positioned within 5 µm on the rotary table of the Berthiez RVU 2800/250 vertical grinding machine.



30%
productivity gains



Automation à la carte: The laterally-positioned robot automatically equips the tool head of the Berthiez RVU 2800/250 with all tools required for the complete machining of gas turbine discs. By using a robot instead of a pallet changer, fewer tools need to be stored. This has allowed costs to be reduced considerably.

and axial run-out less than 2.0 μm) is not the only one where they are setting standards. A fifth machine will be delivered in 2019.

Post-processing is a thing of the past

“The key objective in purchasing this machine is to bolster our production capabilities,” explains Patrick Kaufmann, Project Manager at GE Energy Products. “This is achieved in part by reducing machine cycles and post-processing steps, which means that our quality criteria can be met faster.”

The new formula for success is all about complete high-precision processing, and GE’s aspirations in this regard are highly specific: “Due to the specific requirements of our products, we’re not really in a position to be repeatedly post-processing workpieces across several work steps. We have therefore chosen to shift production to a multifunctional machine.

The new machine fulfils all of our processing requirements. The workpiece only needs to be clamped once. Moreover, stringent requirements around precise dimensions are adhered to.”

The pieces of equipment in question are the new Berthiez RVU 2800/250 machining centres, which are suitable for grinding, turning, drilling, cutting and performing inline measurements on large components (diameter: max. 2,500 mm; height: up to 1,500 mm) weighing up to 20 t in a single clamping operation. The investment was necessary given the huge changes to production conditions seen since purchasing the first two Berthiez RVM vertical grinding machines in 2002. The size of components is continuously increasing, while tolerances are becoming ever more constricted. “We thus had to find a machine manufacturer who was able to combine durability, processing stability and accuracy,” stresses Mr Kaufmann. “The situation is further

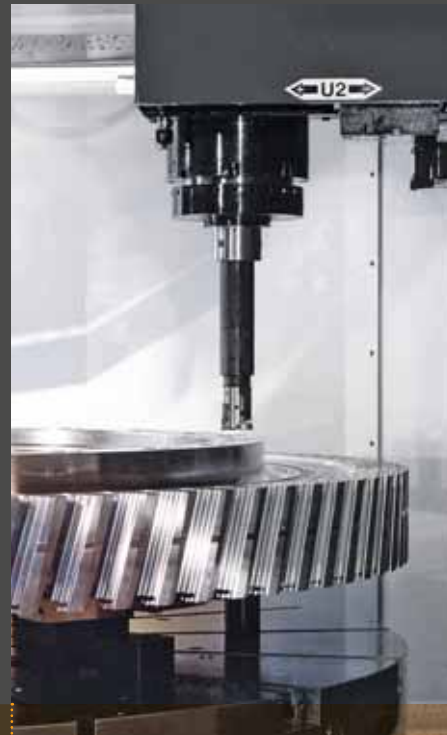
complicated by a specific, changing environment. We therefore need machines that allow us to further refine our products with as little investment expenditure as possible.”

To 5 μm exactly: positioning workpieces weighing several tonnes

The large facing head has an important role to play in high-precision machining, for example. Rotating at up to 200 rpm with a 51-kW drive, hydraulic collet chuck and hydrostatic positioning unit, it helps position even particularly heavy workpieces with a deviation of 5 μm . The various tools bring into position a multifunctional tool head that can swivel through $\pm 90^\circ$ and travel along the linear X and Z axes. A 45-kW milling spindle (max. speed of 6,000 rpm) drives the grinding discs and the drilling and milling tools. Lathe tools and probes are attached separately.



Grinding



Milling



Turning

Thanks to complete processing, post-processing is a thing of the past.

One of the main advantages of the multifunction head is the integration of two complementary and independent retainers, each of which has a diamond dressing roll and a nozzle that are tailored to the shape of the grinding disc. These two attachments are arranged on two controlled linear axes that follow the wear of the grinding disc and ensure continuous dressing and efficient lubrication (40 bar, 300 l/min) of each grinding disc. This makes dressing on a distant dressing station completely unnecessary. Simplified working processes also boosts productivity considerably.

Further boosts to productivity: Unmanned shifts with a robot

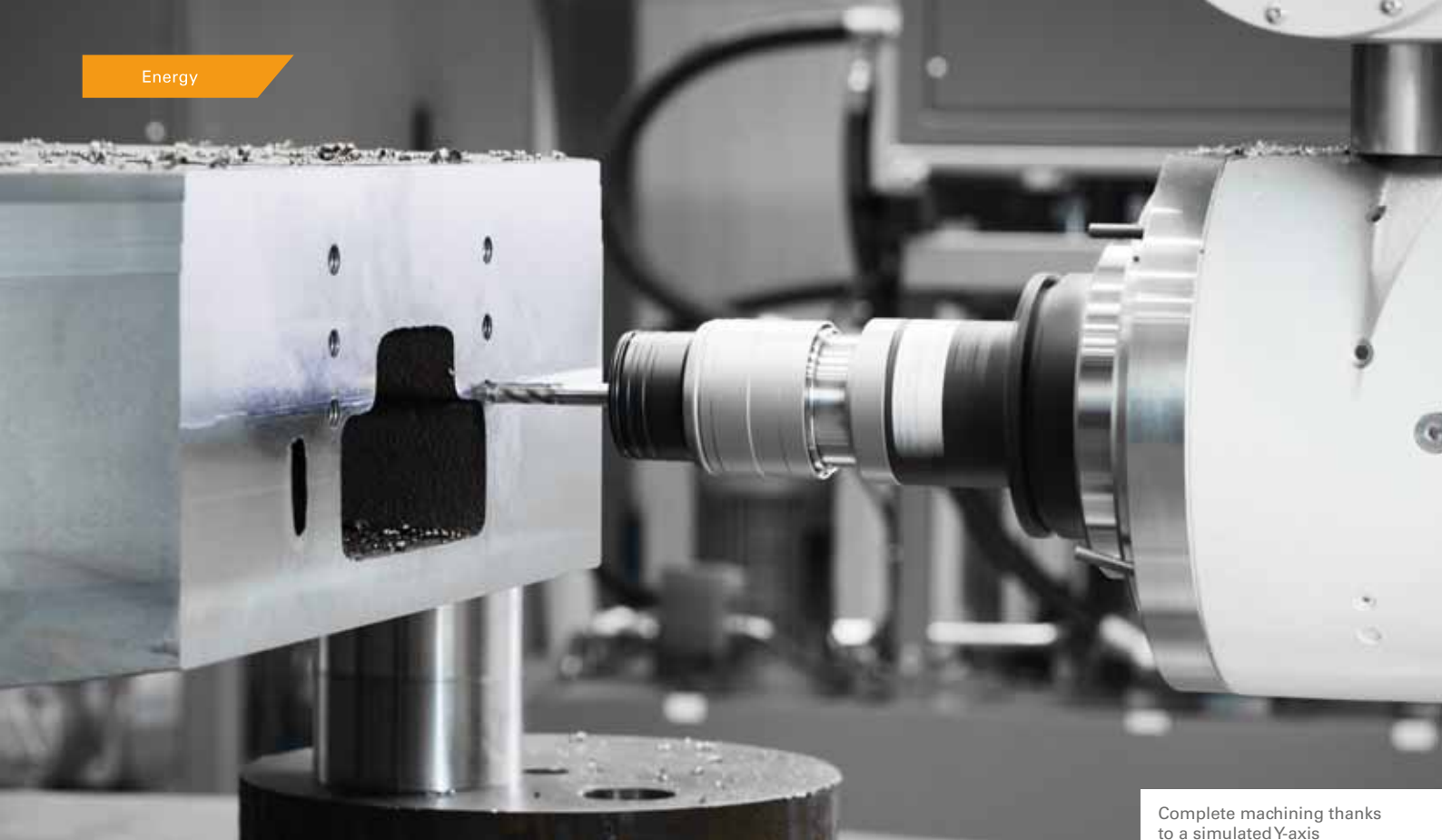
To further bolster productivity, the long-standing Starrag customer from the energy sector ordered three further Berthiez RVU 2800/250 machines with new robot tool change systems in 2015. These machines now enable unmanned shifts. Automation has had a positive impact on production: Integrating a

Accuracies < 5 μm thanks to complete processing in a single clamping operation

robot into the tool loader enables all tools to be housed together in a single storage facility. "The greatest benefit we have seen in all of this is the elimination of components used in our previous lathes, including those with a measuring rod and slide bar," reports Mr Kaufman. "The machine is also able to process larger elements." By using a robot instead of a pallet changer, the company requires fewer tools in storage, given that a single tool can now be used for various applications. "This has enabled us to considerably reduce our costs. We believe

we can still make further headway with this." All things considered, experts predict productivity gains of around 30 %.

The robot has direct access to seven pallets, as well as 78 lathe tools, drilling tools and milling tools. Each pallet consists of the grinding disc, its dressing roller and its nozzle, both tailored to the shape of the grinding disc. The robot selects the required tool or grinding system and attaches it directly to the tool head. Operation and programming are facilitated by a digital control system (Siemens Sinumerik 840 D sl) with the Berthigrind user interface from Starrag, which also factors in the special features of the new robot change system. It is the digital icing on the cake for a successful model expanded for the purposes of "Industrie 4.0". It ties into the strategy of the major energy group rather well, which as Mr Kaufman puts it, "continually seeks out new, powerful technologies with the capacity to adapt to various processes, thereby ensuring continuous improvements to the quality of our products." ▀



Complete machining thanks to a simulated Y-axis

Off-centreline machining on Dörries vertical lathes

Complete machining in a single clamping operation on a vertical lathe—without an additional linear Y-axis? There is no denying that reports from Starrag experts on converting a Dörries vertical lathe into a machining centre using double C-axis interpolation sound a little fantastical.

“The idea to simulate a Y-axis came to mind some years ago in our application technology,” explains Dr-Ing. Marcus Queins, Technical Director of Starrag Technology GmbH at Mönchengladbach. “We’ve now made it a reality in a project for a customer from the wind energy sector (gear manufacturer).”

Electronically-controlled interplay

Ordinarily, all machining processes on a lathe are oriented towards the centre of rotation; only two infeed axes—the X-axis and Y-axis—are used. If machining is also required in the Y-direction, an additional third linear axis, the Y-axis,

is usually necessary. The alternative to this involves rotating two C-axes which are synchronised with one another. This is achieved thanks to the electronically-controlled interplay of the rotary table (C-axis) with an axially-parallel CY-axis (angle head with an NC-axis rotating around the Z-axis).

This is where double-C-axis interpolation comes into play. The linear Y-axis is thus achieved using simultaneous interpolation of the round table C-axis and the CY-axis. It is certainly not fitting a square peg into a round hole, but the method does have a sense of mathematical wizardry about it. Dr Queins explains:

“The intelligent interplay of the C- and CY-axes transforms two circular movements into one linear motion. When combined with the X- and Z-axes, a lateral surface on a workpiece, for instance, can be milled off-centre thanks to four-axis interpolation.”

Always perfectly aligned with the workpiece

The simulated Y-axis creates a multitude of possibilities for production managers. Drilling and cutting threads which do not point towards the centre of the table is suddenly possible with a Dörries vertical lathe. And it is also possible to machine



The tool is always correctly aligned with the workpiece.

“Costs associated with creating the foundations are **reduced by around 40%.**”

grooves with axially-parallel, off-centre lateral surfaces. Though all new off-centre machining processes have a common denominator. Dr Queins explains: “The coordinated rotational movements of the two C- and CY-round-axes ensure that the tool is always correctly aligned with the workpiece.”

Though it is not just these technical aspects – the simulated Y-axis has even more cards up its sleeve. Staff in Mönchengladbach analysed the benefits on two standard vertical lathes of type VCE 2800 and VC 3500 with a swing diameter of 2,800 mm and 3,500 mm. “The investment turned out to be around 30 % less compared to a machine with an additional linear Y-axis,” summarises Sales Director Hubert Erz. “This saving

increases with the size of the machine due to the increasing technical outlay associated with the additional linear axis.”

All in all, there are eight major plus points:

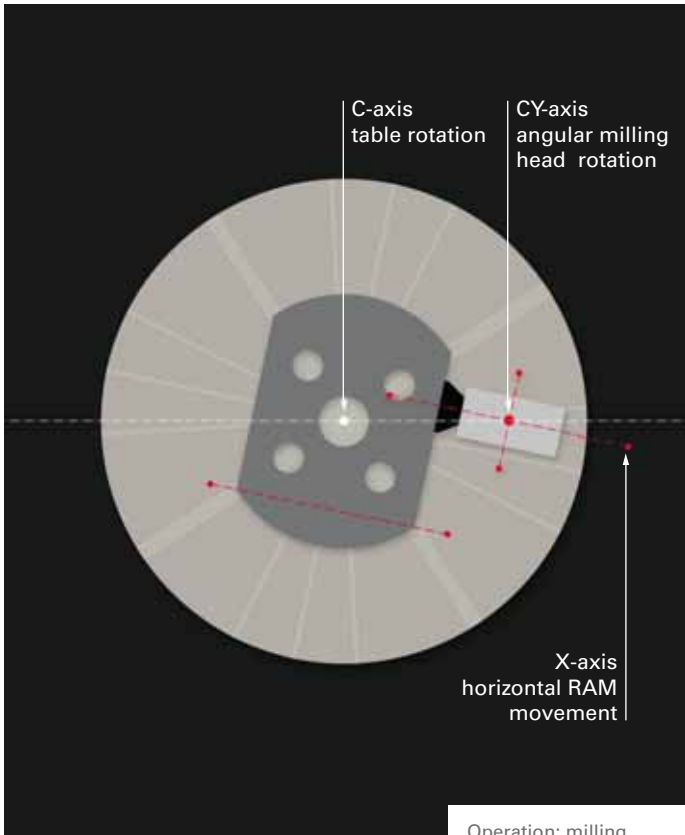
1. **Lathe with extras:** The operator is able to perform milling, drilling and thread-cutting procedures off-centre on a vertical lathe with reduced additional technical outlay.
2. **Lower costs:** Investment is reduced by around 30% compared to a traditional machine with a third linear axis.
3. **Small footprint:** The installation space is halved.
4. **Reduced outlay for setup:** Costs associated with creating the foundations are reduced by around 40%.
5. **No change to construction:** Unlike normally, there is no need to convert

a single-column machine into a portal machining centre.

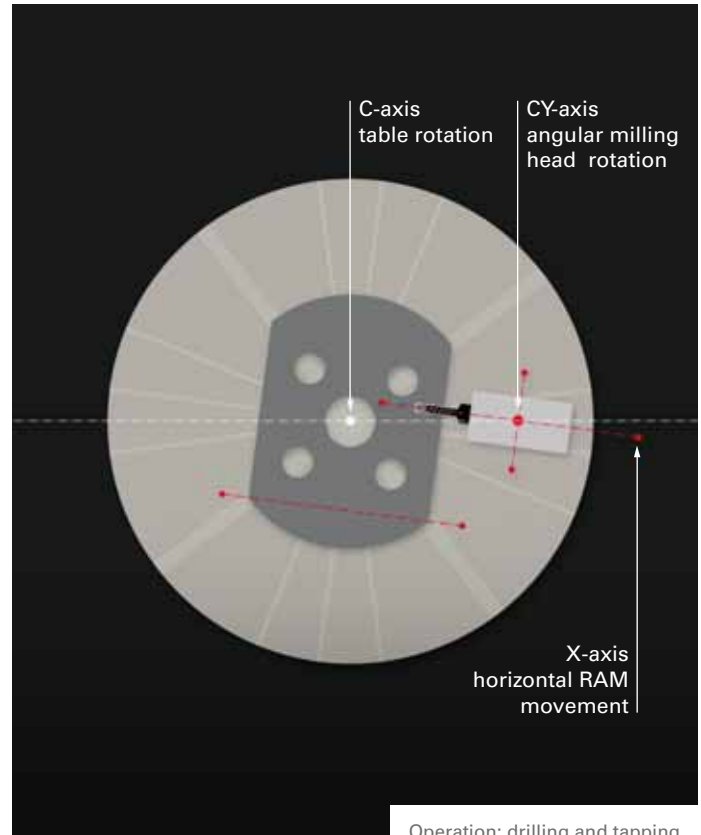
6. **Low energy consumption:** Less mass is moved compared to traditional Y-axis.
7. **Retrofitting options:** A conventional Dörries vertical lathe can also be subsequently upgraded to include the functionality of off-centrelined machining.
8. **Shorter delivery time for new machines:** Reduced to 12–13 months (rather than 14–15 months for a traditional lathe with additional Y-axis).

Inexpensive retrofitting

“**We recently created** the first reference machine for a customer, which is currently being constructed,” remarks the sales manager. “From speaking with potential customers, it is clear that there



Operation: milling



Operation: drilling and tapping



is a considerable level of interest in this solution. But this also extends to customers who already own a vertical lathe, or those looking to upgrade." Upgrading is a particularly appealing option for subcontractors, since the simulated Y-axis offers them an inexpensive and technically-straightforward expansion of their range of services. This additional option is suitable for companies in a range of sectors – from wind energy to oil and gas. Erz adds, "Our first customer will produce torque supports for wind power transmissions on the reference machine."

Information on this new, exciting option for vertical lathes is also available to

"Investment is reduced by around 30% compared to a traditional machine with a third linear axis."

prospective customers at all key trade fairs attended by Starrag: Specialists from Mönchengladbach will demonstrate how two circular movements can be converted into one Y-linear movement using Starrag's sophisticated approach at IMTS 2018 in Chicago (10.–15.9.;

South Building Level 3, Stand 339074.) and at AMB 2018 in Stuttgart (18.–22.9.; Hall 7, Stand B33). Erz adds, "This new option is yet another example of how Starrag stays true to its claim of 'Engineering precisely what you value'. And sometimes, less is more." ▀

When it gets really big

As a manufacturer of customer-specific industrial gearboxes, Eisenbeiss GmbH is increasingly focusing on bringing a large share of production in house. With a Heckert HEC 1000 machining centre tailored precisely to the needs of its application, the company, located in Upper Austria, is now set up perfectly for machining large transmission housings.



The tower magazine offers space for over 300 tools with a length of up to 800 mm.



“We were thoroughly impressed by the high level of flexibility shown by Starrag during design and implementation of the machine. Then, of course, we were also very satisfied with the commissioning and start-up phase running so smoothly.”

JOHANN PANZENBÖCK

Group Leader for Cubic Manufacturing at Eisenbeiss GmbH

Anyone needing technically advanced industrial gearboxes simply cannot ignore Eisenbeiss GmbH from Enns. The company has a long history, having been founded in 1911, and has become one of the leading providers of specialist gearboxes for a wide range of applications. Customers of this niche provider include members of the plastic, food processing, steel, aluminium and energy industries.

Further expanding vertical range of production

The manufacture of extruder gearboxes is an important business area for the Upper Austrian company. A high level of vertical integration allows the greatest possible flexibility and the means to achieve short lead times despite a wide variety of individual customer requirements.

In 2015, Eisenbeiss decided to invest in a large machining centre in order to increase both capacity and productivity. An existing machine, which is over 20 years old, will make way for the new machining centre. “We have limited space available on our site. We had earmarked a certain area of the building for the machine to further optimise the production process. Finding a concept that would fit was a particular challenge. Another decision was whether to choose a machining centre with four or five axes. To aid this decision, we provided an overview of the available and upcoming machines at the 2015 EMO trade fair in Milan. We looked in detail at six concepts from different manufacturers, and the final decision was between just two,” recalls Johann Panzenböck, Group Leader for Cubic Manufacturing at Eisenbeiss.

A series of criteria were applied to evaluate the machines. The machining centre itself, a large tool magazine and a set-up point needed to be accommodated in the limited 8.5 m x 7.5 m space. Ideally, there also needed to be enough space available for handling large workpieces. “For us, though, the essential criterion was whether the new machine would allow us to process a particular gearbox housing, known internally as ‘part 7’. We passed this framework to the respective machine manufacturer and asked them to present a suitable space concept,” continues Panzenböck.

Modular to large parts

The described benchmark part is a gearbox housing produced as a cast blank part. With a 2,000-kg clamping weight



The limited available space meant a Heckert HEC 1000 base system was built upon for the X-axis. The other axes are formed using components from the Heckert HEC 1250.



“Configuring the machine to meet the very limited space available was a particular challenge. The fact that it worked out so well in the end is down to the really excellent collaborative effort.”

ARNO BERGER
Sales Engineer at Starrag

and dimensions of 1,715 × 1,200 × 800 mm, it rotates in a 2,000 mm circle. Part of the requirement was that it must be possible to fully rotate this part. “In assessing the requirements, we realised very quickly that we would be unable to implement this with any of our standard machine versions. That is why we selected the Heckert machine as the basis for our concept since it meets the needs of our customers through its modular design. The size of the part would have required a Heckert HEC 1250, but there was insufficient installation space for this machine. An X-axis from the Heckert HEC 1000 was therefore used as a support system, and this was expanded with the Y-axis and Z-axis from the 1250. This created a processing area of 1,700 × 1,500 × 1,850 mm

(X/Y/Z). The clamping surface measures 800 × 1,000 mm with a height of 1,650 mm. The maximum workpiece weight is 4,000 kg. A 125 mm spindle sleeve with 500 mm travel path was implemented as an additional ZP-axis”, says Arno Berger, Sales Engineer at Starrag, describing the concept.

“**The Heckert HEC 1000** could not have offered the required size of interference circle if used as the basis. A workaround for this was to open the loading door when rotating the component. In programming terms, this meant a safety step had to be inserted to prevent rotation while the door was closed. The machine operator must actively confirm when starting the machining that the

part is not oversized in order to keep the door closed. The upstream set-up point also has an access lock so that part movement is stopped immediately upon entry to the safety area”, Berger explains further.

The system is complemented by a tower magazine, which offers space for over 300 tools. These can be up to 340 mm in diameter and 800 mm in length. With a spindle power of 55 kW and torque of 2,470 Nm, which is transferred to the tool via an SK50 interface, the machine has plenty of power reserves. The set-up point allows parts to be prepared in two places. Two longitudinal and one transverse conveyor ensure smooth chip removal at the front side of the machine.

A flexible control concept is needed

The machine is controlled using a Siemens SINUMERIK 840D controller with ShopMill function. "We process more than just pre-programmed parts. We often need to machine special parts at short notice for service and repair work. In these cases, the parts need to be programmed by the machine operator directly on the machine. The ShopMill software offers comprehensive yet simple options for this. The tool difference list from Starrag also provides valuable assistance for the operator," explains Panzenböck. Additional machining accuracy can be achieved on the new machine through a highly-accurate B-axis, a warm-up program and coolant temperature control.

Precisely matched configuration

The fact that the machine was tailored precisely to their requirements meant

"That is why we selected the Heckert machine as the basis for our concept since it meets the needs of our customers through its modular design."

Eisenbeiss selected the Starrag concept in the middle of 2016. "The high degree of flexibility Starrag showed when designing the machine was what impressed us in the end. We had a specified time for the benchmark part of between 27 and 30 hours.

Up to 100 different tools are used to achieve this in nearly 300 work steps. On the new machine, we generally manage part 7 in under 23 hours. We have now been able to manufacture 17 parts on the new machine, many of which we would previously have had to outsource. In the future, will probably process around 100 different parts on the machine," says the Department Head, justifying the decision-making process.

"**We deliberately** took a year to implement the machine to be able to manage the structural preparations properly. After all, a suitable foundation needed to be installed for the new machine. The new machine was put into operation in June 2017 and commissioned on the first of July 2017, a good two weeks ahead of schedule. Surprisingly, there were no teething problems and since then we have not needed manufacturer support once," Johann Panzenböck concludes, happily. ▽



This is what maximum productivity per unit area looks like



Starrag is presenting the brand new, multi-talented Heckert T45 for the first time at AMB 2018. The characteristics: a highly compact, yet robust machine construction and a rotary swivelling unit with 400 mm pallet specifically developed for turning operations; and to go with it, a rigid HSK-T100 spindle for high cutting performance. This makes the Heckert T45 the ideal solution for productive complete machining in a wide range of applications.

Up to 30% reduction in footprint and around 15% increase in productivity – these were the significant benefits of the new compact 4- and 5-axis horizontal machining centres heralded by Starrag one year ago. Now, the Heckert T45 – the powerful, high-end model specifically designed for turning and milling – is celebrating its world premiere at AMB 2018.

Dr Marcus Otto, Managing Director of the Starrag plant in Chemnitz, is excited by the possibilities: “The Heckert T45 is multi-functional. It is, in a sense, our Swiss army knife. The day-to-day work spectrum of this machining centre ranges

seamlessly from milling and turning to complex procedures such as gear milling. We have developed it for complete machining of a wide variety of demanding components in drive technology, hydraulics and general mechanical engineering.”

The low space requirements are almost unbeatable. The compact design of the temperature-stable and vibration-resistant mineral cast machine bed, with its central swarf conveyor and integrated cooling unit, means that space requirements are significantly lower than comparable machining centres on the market. The additional peripheral devices were intelli-

gently integrated into the machine room to ensure first-class accessibility and servicing, despite the compact design.

Productivity: increases of up to 25%

It also offers a high level of productivity. As opposed to components which require processing on multiple machines before completion, in most cases only one clamping operation is required – even for toothed parts. It eliminates the handling and waiting time during machine changes, as well as organisation and the space required for interim part storage. The user also benefits from high process



Managing Director Dr Marcus Otto: "The modular system we have designed makes it possible for us to supply our customers with an individually-configured machine in just ten weeks."



The new horizontal Heckert machining centres are space-saving, powerful and offer long-term accuracy.

reliability and precision, since error-prone repositioning is not necessary. The Heckert T45 therefore achieves a productivity benefit of up to 25% in comparison to conventional 5-axis centres when toothing workpieces.

During the development of this machine, the developers also focused on the well-known strengths of Heckert machines: high-quality, stable machine construction which provides long-term precision. Alexander Ludewig, Innovation Manager partially responsible for the development of the latest Heckert machines, explains: "We focus on high accuracy, beginning

with the mechanical components. On top of this, we make use of the electronic compensation that is possible today. This way, we can guarantee the highest precision and process reliability over many years. These conditions allow our customers individual and highly productive manufacturing from batch size 1. "The high level of vertical integration in the Starrag Group, which includes all major assemblies down to the spindles, means the manufacturer controls everything—from the quality to the secure provision of spare parts."

Stability: the basis for precision and process reliability

The key component in the Heckert T45 is the rotary swivelling unit. Here, the developers have impressed by managing to transfer the A-axis system, proven on the larger Heckert centres, into these compact machines. "The double symmetrical mounting gives the rocker the perfect stability to process the workpiece dynamically and with high precision," notes Alexander Ludewig. In addition, the rotary table masters even high-quality turning operations with ease, thanks to a maximum speed of 900 rpm. In order to enable high cutting performance at such speeds, Starrag supplies the Heckert T45 with a HSK-T100 tool holder as standard.



Innovation Manager Alexander Ludwig: "The double symmetrical mounting gives the rocker the perfect stability to process the workpiece dynamically and with high precision."

Starrag is presenting the Heckert T45 five-axis turning and milling centre at AMB 2018 in Hall 7, Stand B33.

This is because its large planar support provides the necessary rigid tool connection. In addition, the rotary table is available with freely-programmable hydraulic clamping systems. This enables the user to optimise the technology by adjusting clamping pressures during processing.

Flexibility: customer-specific configuration

The **tool magazine** offers the usual variety of options. The Heckert T45 can be combined with a classic chain magazine with 45 or 60 places, or with a linear chain magazine with up to 240 places. The tool stations allow a maximum length of 450 mm and the tool diameter can be up to 220 mm. The patented linear chain

magazine, developed in Chemnitz, provides tools for use by the machine as dynamically as a simple chain does. This means the cut-to-cut time is mere seconds, even with the 240-place version.

Downtimes during workpiece change have also been further reduced in the Heckert. The new dual-pallet rotary changer now only requires a little under ten seconds. However, the customer also has the option to order this machine without workpiece changer and utilise direct loading on the machine table, or use it in linked production lines. In this case, the Heckert T45 is also available as a line module.

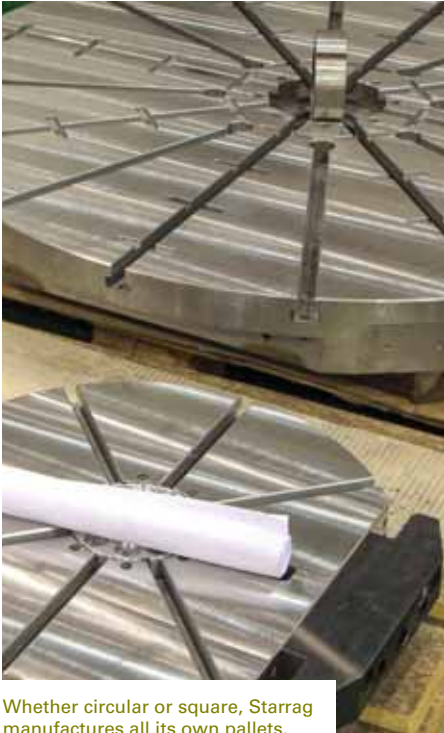
Flexibility also means that the Heckert T45 is prepared for various workpiece

automation concepts – from a flexible manufacturing system up to large-scale production with directed workpiece flow. For entry into the world of flexible automation, the Chemnitz staff have even developed their own space-saving system which contains six pallets and a setup station – enough for a small, flexible manufacturing cell.

„Industrie 4.0“: from the details to the entire shop floor

The trend towards automated production cells and lines is not limited to “mechanical” solutions; it extends to digitalisation. Starrag is paving the way for „Industrie 4.0“ in many ways. Managing Director Marcus Otto explains:

The A-axis, which swivels during turning, ensures free chip fall into the funnel-shaped disposal unit.



Whether circular or square, Starrag manufactures all its own pallets.

“Our developments cover the spectrum from digital integration of an individual machine through to the entire shop floor.” Accordingly, our machines are equipped with Profinet and IO-Link technology, providing a suitable basis for all types of data exchange as well as for implementation into customer-specific controller technology.

Starrag combines the „Industrie 4.0“ activities in the Starrag IPS (Integrated Production System), which is used across all brands and machines in the group. Starrag IPS consists, in principle, of three “shells” around the machine. The inner shell contains functions which have a direct impact on the machine and the cutting process. This includes



The new, small Heckert machines are tailored precisely to the specific needs of the customer, in keeping with Starrag's claim of “Engineering precisely what you value”.

monitoring cutting forces and vibrations, for example. The second shell concerns the machine's communication with the outside world, which includes tool and workpiece management. The third level is used for networking the production and its integration into general systems such as ERP software.

Like all Starrag machines, the new Heckert T45 includes many details as standard that help make the Starrag IPS extremely beneficial. This includes sensors that constantly analyse the status

of the machine. This can be used to optimise the machine status and to achieve both higher process reliability and planning security for service operations.

The fingerprint available on all Heckert machines is already well used. The current status of a machine is recorded on the basis of several parameters. It can be compared with the initial fingerprint which is taken when leaving the production facility. This makes it possible to recognise changes and introduce preventive maintenance measures. ▀

MacKay Manufacturing Inc.

INTERVIEW: KATIE MACKAY, VICE PRESIDENT, GREGG MEYER, MILLING DEPARTMENT SUPERVISOR

MacKay Manufacturing is a family own business, starting its activities under different other names since 1946 and owned by MacKay family since 1986. Based in Spokane Valley, MacKay produces parts and components for customers starting from technical drawings. Most of the time, the part produced are long term orders sometime for several years with

multiple production batches according to customer needs. MacKay offers a full turnkey solution for high mix and low volumes demands, around 5 to 20 parts per order and a mix of 300 to 500 different setups which represents the current and average production in process.

MacKay Manufacturing Inc, employees 145 people, among them 65 are machinery specialists offering a full service through trained staff dedicated to support the machining centres, to make them run 7days/24hours.

MacKay Manufacturing primarily serving the medical industry. 60% of MacKay's sales are done in the medical segment, especially in instruments and devices and included a few implants as well. Other segments are micro-mechanics with parts such as semi-conductors for microscopes industry or Aerospace.



Could you give us an overview of your shop floor equipment?

Katie MacKay: MacKay Manufacturing is Spokane's one stop job shop with milling, turning, mill-turn, EDM, Swiss turning, heat-treating, citric passivation, laser engraving, 4 axis laser welding, assembly, and even a class 10,000 clean room. An impressive 65+ CNC machine tools work permanently to achieve our goals.

Our facilities of 50'000 square feet contains screw machines, from different manufacturers so to have a diversity of processes according to customers approach. What is really important when we select a machine manufacturer is the support in after sales that we are going to have during machine lifetime, but also the transition when we buy an equipment and the time it needs to become familiar with all the functionalities. We do a lot of gun drilling so we have 9 units dedicated for this operation and now we combine screw machines including gun drilling options to get more flexibility while

producing parts. So we tend to fade out gun drilling machines on our shop floor.

Gregg Meyer: Our extensive milling department consists of 17 machining centres while our prototyping department uses vertical turn/mill equipment. Apart from our 2-axis lathes, others have milling, drilling capabilities. The aim is to simplify production processes by integrating all the operations, or most of them in one single setup. This way we gain time in production and we avoid scrap while having to adjust multiple setups and human interventions.

You have recently done the acquisition of 2 Bumotec s191H from Starrag. Could you explain what has motivated your choice?

Katie MacKay: From my point of view, we have started to work with that kind of mill/turn technology with one of your competitor machine. We have seen all the possibilities that could be offered to our business but it was such a slow

machine and then we found out on Bumotec that we were able to remove much more material, faster and bigger cuts. Bumotec is a much beefier heavier machine, compact and we could do whatever we want with it. This was the selling point which makes the decision of buying a Bumotec instead of another competitor's machine.

Gregg Meyer: Starting with mill/turn, we rapidly see the possibilities of the Bumotec machines to produce from bars to stock, again and again without any interventions. We regularly quote parts that if it corresponds to the dimension possibilities of the machine and using milling processes, I would prefer to produce on a Bumotec s191H as we have seen that it reduces dramatically setup times.

We have a particular job where setup time takes 24 hours on a standalone machine from the time to prepare the run to the time where the part goes to quality department to be checked.



- > Decreased cycle times
- > Setup time reduced by 66 %



Katie MacKay



Gregg Meyer

We have done it with the Bumotec and it took only 8 hours. The reason is bar stock in, including programs, the machine builds the parts, and there are only a few minor adjustments to be done.

Productivity starts for us when the machine is on the green light. It is profitable when we do chips and sooner we come to this point, more productive we are. With the Bumotec we reach this goal sometimes 3 times sooner than on standard machines.

What are the main functionalities of the machine you use the most?

Gregg Meyer: Drilling, milling, turning are the main processes that we use. Less of 50 % of our parts have turn work on them. The benefit of that machine is that I am making 100 % mill parts.

What kind of relationship do you have with Starrag / Bumotec support team?

Gregg Meyer: When we first buy the machine, one question was: "Where will the support come from?" And then we discovered that Bumotec machine support will come from the US through its Starrag Inc subsidiary and even from Seattle with a local service support. That was really a positive feedback for training and maintenance assistance. If I need support, I get in one day which is really impressive.

Katie MacKay: We have started our collaboration since 2015, we have a good relationship with the same solid staff.

Could you give us an example of a real success story produced on your Bumotec s191H?

Gregg Meyer: I will take the example of this invasive blade in the medical field, which was previously produced on another machining centre. Moving the production on Bumotec s191H, we have reduced setup time by 66 %, cycle time has also been decreased and running

with oil instead of water soluble, we have less scrap due to the fact that tools life has been improved.

What is your vision of the future for your business within the next 5 years?

Katie MacKay: Doing better and better, keeping up with the latest technology and continuing with a trend of 5 % growth per year, which represents our average evolution of the last years. In terms of organisation, our large plant will allow us to follow the trend of new acquisitions in terms of production solutions and we are always looking for motivated future skilled employees who would like to join our big family ... and be part of a team which spirit is based on continuous improvements. ▀

Exhibition highlights:

Heckert T45 (at the AMB)
Compact machining centre
for various applications
**Solutions for Industrial
Components**



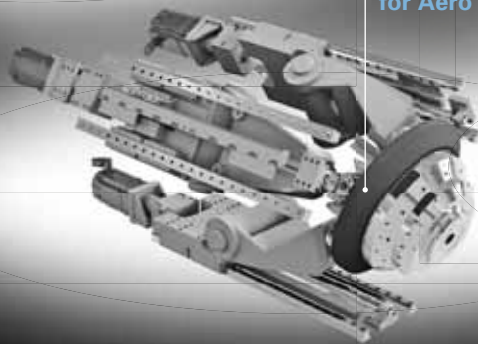
Bumotec s191
(at the AMB and the IMTS)
High precision CNC
mill-turn centres
Solutions for Med Tech



Heckert DBF 630 X
(at the IMTS)
Complete machining
in one clamping position
Solutions for Oil & Gas



Ecospeed Sprint Z3
(at the IMTS)
Parallel kinematic
machining head
**Solutions
for Aero Structures**



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