

120 experts, 10 stations, 2 days

Aero Structures Technology Days 2016



Helping users to help themselves:

Advanced Application Training / Advanced Maintenance Training

When it is all about speed and precision

... we can deliver the required quality in a very short space of time

Productive single-item production

Heckert-BAZ HEC 800 HV MT at Romit, Netherlands

We specialise in providing a comprehensive package

TechCenter for Medical Technology and Precision Engineering, Immendingen, Germany:

The launch of the medical-technology think tank



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LEGAL NOTICE

**Star – The Starrag Group
magazine**

Publisher:

Starrag Group Holding AG
Seebleichstrasse 61
9404 Rorschacherberg
Switzerland

Tel.: +41 71 858 81 11
Fax: +41 71 858 81 22
Mail: info@starrag.com

Managing Directors:

Walter Börsch (CEO)
Gerold Brüttsch (CFO)

Editorial staff:

Lucille Hopfmann, Eva Hülser,
Sabine Kerstan, Angela Richter,
Michael Schedler, Antonia
Schegg, Ralf Schneider,
Stephane Violante

Picture credits:

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starrag

Starrag Group

Engineering precisely what you value

Focus

at the **AMB**

Experience the Focus live!

We are looking forward to your visit:

13. - 17.9.2016, Stuttgart, Hall 7, Stand C38

Reduce costs with the new Heckert horizontal machining centre Focus



-20%

lower investment costs

-60%

shorter delivery time



www.starrag.com



Walter Börsch
CEO of the Starrag Group

Dear reader,

The Starrag Group is looking back on the first half of the year, and it is one that has been exciting in all aspects. It reflects the diversity of our group, which is adding value on a daily basis in our three target markets: Aerospace & Energy, Transportation & Industrial Components and Precision Engineering. The milestones from the first half of the year include extremely well-attended technology days, the opening of a new technology centre for the medical technology sector and a wide range of projects and orders for all three target markets.

However, the focus was not solely on “diversity”; a term that is inextricably linked with the Starrag Group. The year 2015 saw the introduction of the new slogan “Engineering precisely what you value,” which expresses the philosophy of all ten brands of the Starrag Group. We always provide the customer with precisely what they need and what is important to them: nothing more, nothing less.

The third edition of our customer magazine illustrates how the individual business units in our group are implementing the new brand message with consistency, creativity and diversity. Marc Lehmann from the “Precision Engineering” business unit is a great example of this. Marc is very pleased with the extremely positive response in the German “Medical Valley” to the new TechCenter for Medical Technology and Precision Engineering. A neighbour of Marc’s is also in particularly high spirits: Judith Schmitt from the SMS group in Mönchengladbach reports how happy she is after she was able to reduce throughput times by 30 % and manufacturing costs by 10 % following implementation of complete machining on a vertical turning lathe. The feedback from visitors to the Aero Structures Technology Days 2016 in Mönchengladbach was also highly positive. As Dr Matthias Lange of Premium AEROTEC says: “Besides the enormously high levels of efficiency, the machines from the Starrag Group stand out due to the fact that the production systems have been developed and adapted exactly in line with our needs.”

A particularly successful example of the implementation of the slogan “Engineering precisely what you value” is the new Heckert Focus machining centre from Chemnitz: The new Focus machines have a consistent “focus on customer benefits.” They can be used without major, customer-specific adjustments, reducing investment costs by 20 % and delivery times by 60 %.

I hope that these and other “Star” stories have sparked your interest in us, our slogan and the services we offer. I am excited to hear your personal feedback.

Sincerely, Walter Börsch



120 experts, 10 stations, 2 days

AERO STRUCTURES TECHNOLOGY DAYS 2016

The numbers often reveal more about an event than a wordy description: At the 2016 Aero Structures Technology Days, more than 120 experts from the global aerospace industry visited the ten stations of the Aerospace and Energy business unit to find out about the precise, highly productive manufacture of titanium and aluminium structural components for aircraft in accordance with the Starrag Group slogan "Engineering precisely what you value".

"We are demonstrating how to increase productivity and safeguard reliability in the production process by increasing availability and component quality". The message from Dr Norbert Hennes, head of the new "Aerospace and Energy" Business Unit was well received by representatives from the aircraft industry. Due to a dramatic increase in demand for new aircraft, manufacturers in the industry who need to increase productivity – often under conditions where space is mostly limited in their production halls. The new ECOSPEED F 1540, which provides increased performance of up to 87% with a small footprint, was created as an answer to this difficult remit, and is designed for medium-sized structural components for example (pallet size: 1,500 mm x 4,000 mm). The 100th machine in the ECOSPEED series, which celebrated its première at the

Aero Structures Technology Days 2016, also features significantly simplified installation and quick commissioning.

Industry 4.0 is also more than a vision for the future at the Starrag Group – it is already a reality and is ensuring a high level of reliability in the production process. The flexible manufacturing system (FMS) for Korea Aerospace Industries Ltd. (KAI) in Sacheon city is a prime example. South Korea's only aircraft manufacturer ordered nine ECOSPEED F machining centres, which are connected by a rail transport system. In 2016, this FMS is being fitted in one of the world's largest concentrated lines in the aerospace industry. As its core element, the system features a master computer, which automatically monitors all processes. "It ensures that everything runs automatically", says Dr-Ing Bruno Valkyser, Head of Electrical Engineering and Commissioning.

"The user only needs to clamp the parts to be machined on the pallets. The rest happens fully automatically". The master computer controls the entire process – from automatic loading and storing of the raw material to the unloading of the finished components.

The new 150-kW spindle, which almost doubles (+87%, to be precise) the removal rate compared to typical 80-kW spindles offered by the competition, attracted high levels of interest in Mönchengladbach. Dipl.-Ing. (BA) Lüder Kahle, Supervisor Applications ECOSPEED: "We therefore developed a 150-kW spindle to complement our standard 120-kW version for use in the Sprint Z3 parallel kinematic machining head from the ECOSPEED series." Numerous technical innovations (including extended spindle monitoring) enable significantly higher cutting forces, which increase the

removal rate to an effective 12 l/min – an increase of 25 % in comparison to the 120-kW spindle. The market launch of the new spindles is planned for 2017.

It is often the amount of unproductive time that affects performance. A lot of productive time is lost checking geometric deviations, for example. A new procedure ensures an enormous amount of time is saved by making it possible for every operator to check the head kinematics and – if required – to compensate for this. It allows the operator to quickly check the machine and result log at any time, thereby ensuring the quality of the components. “The ECO-TRIM program enables every operator to check the machine and quickly compensate for any deviations if required”, explained Thomas Troup, Head of Application Engineering during demonstrations on an ECOSPEED F machining centre. “The Sprint Z3 head of the machining centre can be checked geometrically in the simplest way – this all happens very quickly and is even possible with very little previous knowledge. A straight, fully automatic check including the log with a time stamp for

the current status of the machine with the geometric deviations to the last electronic fingerprint saved in the CNC takes 40 minutes”.

It was not just these three highlights that received a positive response. Demonstrations on the other seven stations and at the stands of technology partners (such as Ceratizit, CGTech, GMN, Haimer, Ingersoll, Iscar, Kennametal, Sandvik, Siemens and Walter), as well as the presentation by Prof. Dr. Christian Brecher of the Machine Tool Laboratory at RWTH Aachen University, were also well received by visitors from Belgium, China, Czech Republic, France, Germany, Korea, North America, Russia and United Kingdom (see also Opinions: Views from at home and abroad). As a regular customer commented, “Everything is done right with a focus on productivity, profitability and process reliability”.

Opinions: Views from home and abroad

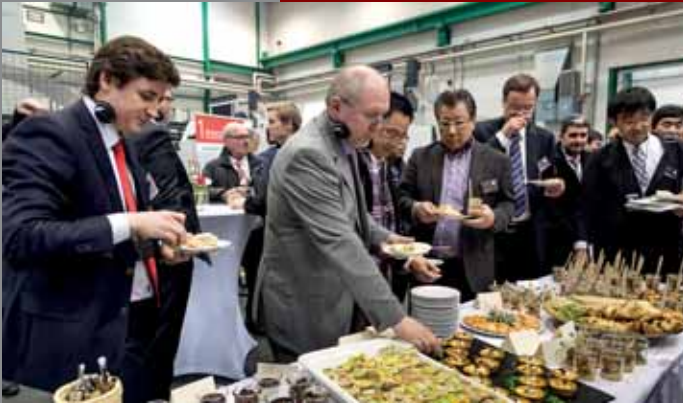
About one-sixth of the 100 ECOSPEED machining centres that have been sold so far (16, to be precise) are in use at Premium AEROTEC. “Beside the enormously high levels of efficiency, the machines from the Starrag Group stand out due to the fact that the production systems have been developed and adapted to be exactly in line with our needs”, explains Dr Matthias Lange, Head of Cube and Rotation Machining at the Varel plant. “Thanks to the highly dynamic 5-axis simultaneous cutting, parallel kinematics sets the benchmark for us when it comes to machining large, complex aluminium structural components compared with conventional machining”.

The Starrag Group also enjoys a particularly good reputation in China:



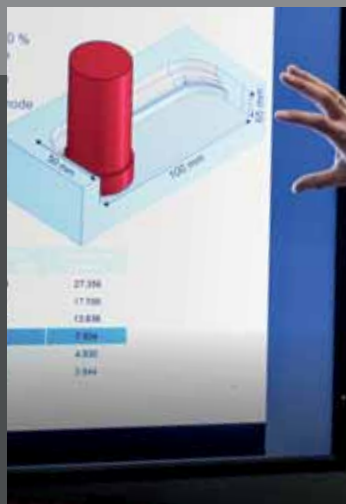
“The user only needs to clamp the parts to be machined on the pallets. The rest happens fully automatically”

"Everything is done right with a focus on productivity, profitability and process reliability"



Yang Hong, Vice General Manager of the Aviation Industry Corporation of China (AVIC: state-owned aerospace and defence company with headquarters in Beijing), was an honorary guest at the 2015 Turbine Technology Days in Rorschacherberg, the Swiss headquarters of the Starrag Group. A delegation from an influential AVIC subsidiary also visited the 2016 Aero Structures Technology Days, no doubt due to imminent investment in production technology by the Chinese aviation industry. Zhang Yuan, Deputy Director of Product Management Department for the AVIC Beijing Aeronautical Manufacturing Technology Research Institute was visibly impressed after a look behind the scenes. Together with his team, he took a closer look at the ten demonstration stations, examining everything in detail.

As one of Europe's leading aerospace engineering firms, the British Hyde Group has been providing customers around the world with design and manufacture solutions for over 40 years. Hyde is a trusted partner in the field of



engineering solutions for many aircraft manufacturers. However, the company is not yet using machine tools from the Starrag Group, so it was also Paul Mellor's first visit to Mönchengladbach and his first experience of tripod technology in a factory. The technical director of the Aero Products division of Hyde Aero Products Ltd., Dukinfield was very interested in and impressed by the ECOSPEED with the new 150-kW spindle. "With regard to its accuracy and efficiency it could be a solution for our future business. With regard to the software and the additional service, I can see a really good solution for us and I'm looking forward to collaboration on future projects", said Mellor.

Michael Lurquin from the Machining Competence Center of Belgian company SONACA (Société Nationale de Construction Aérospatiale SA) in Gosselies was also particularly interested in the tripod technology. "I'm very impressed by the efficient way the ECOSPEED is cutting aluminium parts", commented the technology expert. Lurquin was intrigued by the characteristics of the ECOSPEED F 1540 and the demonstrations for the different services (such as application technology and advanced training). He was also impressed by the level of knowledge and expertise demonstrated by the Starrag specialists in the new Aerospace & Energy Business Unit. ▀

Focussed on customer benefits

Heckert presents its new Focus machining centres
HEC 400F/HEC 500F/HEC 630F



The Starrag Group's slogan is "Engineering precisely what you value", and with the new Heckert Focus machining centres, the Group has lived up to this slogan in exemplary fashion

With its new Focus machines, the machine tool manufacturer Heckert is addressing all users who attach great importance to the high performance values, reliability and long-term precision of their machines, but who do not require an extensive performance specification with special equipment requirements. For this target group, the Chemnitz-based company developed the new HEC 400F, HEC 500F and HEC 630F horizontal machining centres – using the established dynamic HEC 400D, HEC 500D and HEC 630D machines, which can be adapted in a customer-specific manner, as a basis.

The investment costs are 20 % less and the delivery time 60 % shorter. This means lower hourly rates and a faster start to production for the user. Furthermore, the Focus machines require around 10% less space. From a technical perspective, there are no major differences between this and the dynamic series: The three focus versions are equipped with a motorised spindle featuring a HSK-A63 tool holder. They have an output of 32.4 kW, their maximum torque is 67 Nm (this can be increased to 130 Nm as an option) and their top speed is 18,000 rpm. This top speed is reached within 1.85 s. A 10,000 rpm, 32.4 kW and 259 Nm hollow shaft spindle is also available as an option. The largest machine type, the HEC 630F, can also be supplied for heavy-duty machining operations with a HSK-A100 motorised spindle, which achieves 60 kW, 10,000 rpm and 452 Nm.

The Focus machine is specifically designed for rapid machining. The chip-to-chip time for all machine sizes is just 3 seconds, a pallet can be changed in as little as 8 seconds. The linear axes can accelerate at up to 9 m/s², the maximum rapid traverse speed is 65 m/min. The NC-rotary table,

which comes with even the standard version, also helps to reduce unproductive times. With a top speed of 80 rpm and an acceleration of 8 r/s², it ensures fast positioning of components.

Made in Germany and compliant with Industry 4.0

The HEC 400F, HEC 500F and HEC 630F Focus centres are certainly not "cheap products"; they are top-quality premium machines, in which only high-performance, tried-and-tested modules are used. All functional components are made in Germany and all assembly work is also carried out in this country. Compared to competitor products in the same price category, our Focus machines also generally offer longer traverse paths and enable larger workpiece contours; adds Dirk Müller, Product Manager at Heckert.

The control and monitoring devices and service and diagnostic systems are also state-of-the-art. "All of our HEC machining centres, including the F-models are compliant with Industry 4.0," emphasises the Product Manager. "The controller and sensors record and save all important

Focus on cost savings:

The horizontal Heckert Focus machining centres support the user in numerous ways with cost-optimised production, specifically through:

- Less investment for tried-and-tested quality
- High levels of energy efficiency
- Low maintenance and tool costs through control and monitoring devices, as well as service and diagnostic systems
- Reduced space requirements

values, and provide these values to external programs such as BDE/MDE or MES systems for evaluation purposes. "For example, a vibration sensor at the spindle permanently monitors the tools for unbalance, vibrations in the machining process or even for crash events. The condition of the spindle bearings is periodically analysed and the current status is displayed. The preconditions for a "fingerprint" are also satisfied. This allows the condition of the overall machine to be assessed, any necessary maintenance/repairs to be read off and sudden outage to be prevented. Such plannable maintenance and repairs increase availability and manufacturing quality. ▀



Safety:

Trained personnel
to ensure safety in the
production process

Helping users to help themselves: Advanced Application Training/ Advanced Maintenance Training **Increasing security, optimising the process, enhancing performance**

The commercial success of a company stands and falls with the reliability and availability of its equipment. The Starrag Group can help users help themselves in this regard, for instance with Advanced Application Training, an initiative that can significantly improve the operation of ECOSPEED machining centres. The focus here is on reducing losses in efficiency due to decreased availability, performance and quality. The countermeasures introduced by the training cover the entire process chain – from the detailed task analysis (HSC or HPC) and painstaking process planning to the optimisation of the simultaneous five-axis machining.

Applications expert Matthias Wimmers Dipl.-Ing (BA) highlights the benefits of this approach with a practical example: “Thanks to ECOSPEED, one customer was able to cut the time needed to machine a complex aircraft component by 27 % to eight hours compared to the previous conventional machine. Once we had optimised the process as a whole to transform it into a significantly more dynamic machining process, machining took just two hours.” The Advanced Application Training gives users the opportunity to tap into the experience and expertise gained from a host of similar customer orders.

The Advanced Maintenance Training is just as comprehensive. “The aim is to build up a well-trained and practice-oriented maintenance crew”, says Karl Hubert Jacobs from Customer Training/Applications. The training takes place in Mönchengladbach, Germany, in small groups with a maximum of four participants, using simulation tools and a machine that is similar to that of the customer. Depending on the requirements, the groups learn how to change a work spindle (including all the relevant tests), introduce an angled milling head, compensate for geometry errors in a parallel kinematic Sprint Z3 machining head or how to handle a tool magazine.




Profitability:

Increased productivity
thanks to shorter
machining times
Reduced downtime

Participants also learn how to use tailor-made maintenance tools that they receive as part of the training course in a special case. Karl Hubert Jacobs: "The training enables participants to undertake all necessary work independently and ensures maintenance can take place even during staff shortages." ▀





"... we can deliver the required quality in a very short space of time."

When it is all about **speed** and **precision** ...

Starrag is equipping its LX 051 five-axis blade machining centre with a six-axis robot that can take responsibility for loading, unloading and moving components. This flexible robotic cell works with a high level of speed and precision – ideal for scores of customers in the Aircraft and Energy industries. Starrag also uses this type of robotic cell itself to cover peaks in production when handling customer orders or to manufacture prototypes in the shortest of timeframes, such as for Belgian aircraft supplier Techspace Aero.

When it comes to producing prototypes, time is of the essence. Ultimately, the aim is to keep development times short and to launch new products onto the market as quickly as possible. The aircraft industry is no exception here. Starrag AG produces machines that are geared towards the requirements of this sector, and offers its customers

particular support in this regard. At its headquarters in Rorschacherberg in Switzerland, the company runs a Centre of Production Excellence (CPE). This application centre is equipped with state-of-the-art five-axis machining centres, machines that can be used to create a wide range of flow surfaces, as well as complex structural components. The technology experts at Starrag use these machines to optimise new and sophisticated machining processes, as well as to take on customer orders for prototype production. The machines are also used to reduce the strain in the event of production bottlenecks in the manufacture of turbine blades, compressor blades, impellers, blisks and complex structural components.

A real all-rounder: The flexible robotic cell

Among the technology used in the CPE is an automated production cell that features the LX 051 machining centre

as its core element. Starrag developed the LX series specifically with the highly precise, efficient, simultaneous five-axis machining of turbine blades in mind. A six-axis robot is also built into the machine. This robot can be programmed as required, delivering a high level of flexibility. The robot not only automates the process for loading and unloading components but can also ensure components are moved automatically, support integrated measurement processes and much more besides, depending on the production task at hand.

The robotic cell is the product of decades of experience in the development of machine tools and special tools and comes as a result of Starrag's wide-ranging expertise in the prototype and series production of turbine blades, as well as in the automation of the processes.

Rainer Hungerbühler, Head of Sales of the Aero Engines & Power Turbines

market segment, is impressed by the robotic cell: "With the level of flexibility it offers and the scope for automated operation with little intervention required from the operator, the robotic cell is guaranteed to deliver major benefits for customers – so much so we have already successfully delivered the product as a solution. However, our very own robotic cell in the CPE has also been able to put its performance to the test many times over, most recently for Techspace Aero, a large-scale supplier to the aircraft industry based in Belgium."

Rapid production in multi-shift operation

Techspace Aero, a company belonging to the French Safran Group, is the global market leader in the development and production of low-pressure compressors for civil aircraft engines. Thanks to key developments made over the recent years, today an aircraft equipped with a low-pressure compressor from Techspace Aero takes off every two seconds. These developments have seen the company grow over the past few years to the size it is today – employing a staff of 1,450

and achieving an annual turnover that most recently totalled 650 million euro. Techspace Aero recently received the order to manufacture a powerful low-pressure compressor for a new engine. In order to adhere to the tight schedule for special functional tests, a set of new starter blades was required. Due to the short development time of the new LEAP aircraft engine – which over the coming years is set to replace its predecessor, the CFM56, one of the most successful aircraft engines of recent decades – it was necessary to produce and test the newly developed compressor blades in a very short amount of time.

Tom Henkes, Process Engineer at Techspace Aero, explains: "I saw the robotic cell based on the LX 051 for myself on my last visit to Starrag in Rorschacherberg and was impressed by its flexibility and autonomy. When I asked whether it would be possible to produce the blade sets we required within the space of a few weeks, I received a positive response. The robotic cell has enabled us to produce the blades in three-shift

operation seven days a week, with a significantly reduced number of employees, and to deliver the required quality in a very short space of time. This was possible thanks to the flexibility and innovative drawer system offered by the Starrag robotic cell."

Machine, automation and process from a single source

Based on this order, Starrag configured the robotic cell in the CPE to fully machine the blades in two clamping positions. The LX 051 was equipped with the relevant tools and NC programmes. Two pallets executed as drawers serve as an interface between operator and cell.

Rectangular-shaped castings of any size and made from any material are provided by the customer in both drawers. A grid is located in the drawer that is adjusted to the current component size. The size of the drawers is selected so as to ensure that a full night shift can be worked through fully automatically. This enables customers to achieve a cost-effective form of production even in countries where labour costs are high. To ensure





maximum flexibility during this process and to make it easier to change between workpieces, each drawer can be allocated another component.

Thanks to its flexibility, the robot can be programmed with a host of workflows to cater for different types of turbine blades. The process for a turbocharger blade is presented below as an example: The workflow starts with the robot taking a casting from drawer 1. First it checks whether it has the correct one for the blade geometry to be produced in its gripper using a measuring station inside the cell. Once the OK has been given, the robot loads the casting in the hydraulic clamping device. There, the blade base obtains its pine tree profile, which later allows the blade to be fixed in the impeller on the shaft.

The profile is also used for the second clamping operation – moving the component is again a task for the robot.

However, as the required positioning accuracy of the blade profile to the blade base is within a range of approximately 0.01 mm, the position of the pine tree profile is measured beforehand in the second clamping operation. Based on the data acquired, the control automatically optimises the milling programme for the blades to ensure the required accuracy is achieved.

Equipped with a double gripper, the robot finally removes the finished component and, after a small pivot, immediately positions a new casting. Once the robot has moved back from the machining centre, it places the finished turbine blade in drawer 2. At the same time, it starts the machining process again.

Regardless of whether the Starrag robotic cell is used for this type of service or whether it is used by an end customer, the benefits are impressive. The user

Growth

High level of flexibility enables very different machining tasks to be completed

benefits from a solution where the machine, automation and entire machining process are coordinated with one another to optimum effect. This includes the complete machining of all blade types being completed with a single clamping device. The result: clearly calculable, optimised unit costs for the ready-to-install blades. What's more, once loaded the robotic cell is able to continue working through the stock without further intervention from the operator, enabling capacity to be utilised around the clock. Thanks to the flexibility offered by the six-axis robot, the system can also be configured for different machining tasks without substantial setup costs. ▀

TTL introduces “Probing PL+S” (Siemens NX Edition) for increasing productivity and reliability

TTL, a subsidiary of the Starrag Group, has launched a new software “add on” package called Probing PL+S (Siemens NX Edition)

The post processor specific software module provides the capability for manufacturing engineers and CNC programmers to plan, visualise and simulate machine based process control probing routines in an offline programming environment.

Traditionally probing programs and associated process control parameters are managed at the machine control as part of a component by component proving process. This takes valuable machine time and is an uncontrolled activity that becomes disconnected from the upstream part planning/part programming workflow.

Probing PL+S will fully integrate Siemens NX CAM software with all standard

machine tool control based Macro Probing routines, whether it's Renishaw, Siemens, BLUM, Heidenhain, MSP etc., and will enable increased component quality, reduced set-up times and maximised productivity to be generated via the associative NX CAM programs.


With its simple and easy to use functionality, process control is defined within the familiar NX CAM interface and integrated into post processed NC programs, giving confidence that component probe positioning moves will be navigated safely and collision free.

Rob Pope, Managing Director of TTL explains, “At TTL we are all about recognition of the importance of developing innovative software technology solutions.

Bringing products like Probing PL+S to the market fits naturally within our strategy to add value to our customers across a wide range of industries and to help them improve their manufacturing processes.”

Probing PL+S is available for NX 8.5 and above and can be integrated with:

- Renishaw Inspection/Inspection+
- Siemens Macro cycles
- BLUM Macro cycles
- Marposs Macro cycles
- M&H Macro cycles
- Heidenhain Macro cycles
- MSP NC Perfect Part



Component quality, reduced set-up times and maximised productivity to will be generated via the associative NX CAM programs.



High levels of precision: The CONTUMAT vertical turning lathe meets the IT6 tolerance grade set by the SMS group



Towering: The seven metre-high CONTUMAT VC 2400 can be used to process workpieces weighing up to 17 tonnes, with a maximum height of 2,585 mm and a diameter of up to 2,400 mm



Dörries CONTUMAT VC 2400/200 MCV turning lathe in the production of machine components

Setting our sights high ...

10% lower manufacturing costs

Compliance with the IT6 tolerance

Reliable cooperation

Custom-made solutions

... with an order for the SMS group. The machine and plant manufacturer from Mönchengladbach ordered a very high double-column vertical turning lathe for complete machining of challenging machine components from its neighbour, the Starrag Group.

“An important element here is our international, closely integrated manufacturing and workshop network” emphasised Burkhard Dahmen, Chairman of the Board of the SMS group from Düsseldorf. “We continue to produce challenging machine and plant components in our German plants – at the very highest technological level. Our continued investment in the expansion and modernisation of the factories is helping us secure this status.”

A visit to the SMS group on location in Mönchengladbach proved just how

ambitiously and thoroughly the group is approaching this task: As part of a modernisation drive, the machine and plant manufacturer has invested around EUR 37 million into production modernisation and involvement in the Industry 4.0 project. The company was able to make the plant future-proof within the space of three years as part of this modernisation drive, and this effort has paid off. According to Dipl.-Ing Judith Schmitt, Head of Mechanical Manufacturing, this allowed the SMS group to “reduce machining times during operation by up to 50 %”

This is not only a great financial achievement, but also an amazing technological and logistical feat: The Mönchengladbach-based company has reorganised its setup and processes with a view to Industry 4.0 and has exchanged 15 machine tools. One of these machine tools is the Dörries CONTUMAT VC 2400/200 MCV from the Starrag Group subsidiary, Dörries Scharmann. “The vertical turning lathe replaces at least two machines which we had previously been using to manufacture the workpieces,” explains Industrial Foreman Norbert Hoffmann. “It used to be the case that after turning, we would have to carry out drilling and milling on a boring mill or machining centre, and then switch back to using the turning lathe.” “The keywords here are complete machining” adds the Head of Mechanical Manufacturing.



“We are now able to carry out turning, drilling, milling and grinding within a single clamping operation”

But typically, no two Starrag Group machine tools are alike, and the Mönchengladbach-based neighbour was also particularly impressed with a truly outstanding extra: The CONTUMAT is a tower measuring over seven metres in height. The large machine table (120 kW drive capacity; 56,100 Nm torque in S1) can be used to machine workpieces up to 17 tonnes in weight, with a maximum height of 2,585 mm and a diameter of up to 2,400 mm. The turning lathe also features a cross-beam, which can travel up to 1,000 mm. The Mönchengladbach-based company machines a broad spectrum of materials on the VCE 2400, such as high alloy

Productivity doubled, one **CONTUMAT VCE** replaces two machines

heat-treatable steels, copper-tin casting alloys and structural steels.

The VCE 2400 is used to create a large spectrum of cubic and round, small and large, flat and tall components that changes almost daily in very small batch sizes. These components will be used almost exclusively in large manufacturing plants at a later date for steel rollers or pipe manufacturing. The VC 2400 is particularly well suited to machining

large components. Hoffmann says: “It allows us to process very tall components and also to penetrate much more deeply, when drilling for example”

Compliance with the company’s own standards plays an important role for the machine and plant manufacturer, also taking into account the closely-integrated manufacturing and workshop network. The Starrag Group has effortlessly met all the requirements set by the product



Complete processing: Thanks to machining within a single clamping operation (in this case, the machining of an elliptical component), the machining time on the CONTUMAT decreased by at least 30 %

-30 %

“We are now able to carry out turning, drilling, milling and grinding within a single clamping operation.”



Judith Schmitt (Dipl.-Ing, Diploma in Engineering), Head of Mechanical Manufacturing at the SMS group, Mönchengladbach

specifications – in remarkable contrast to “some other machine tool manufacturers” (Schmitt). “Another aspect that made a particularly good impression was that the Starrag Group managed to achieve the high level of geometric accuracy required by us” said the Industrial Foreman. “It’s not just any lathe manufacturer that’s able to meet the prescribed IT6 tolerance”. Another specification related to ergonomics: Therefore, the CONTUMAT was supplied to the customer with complete housing, which works together with the suction device to reliably protect employees from aerosol fumes.

The new plant is also characterised by a very comprehensive manufacturer network, which follows the guiding principles of Industry 4.0. This also had an impact on the embedding of

the machine tools. The requirements set by the product specifications in terms of electronics and interfaces were correspondingly high: As a result of this, the VC 2400 was equipped with laser technology for measuring workpieces and tools, along with systems for recognising collisions and tool breakage.

“Engineering precisely what you value” is the Starrag Group’s slogan, how does the Head of Mechanical Manufacturing assess the current state of affairs with regard to the VC 2400 in relation to this slogan? “We’ve already seen an enormously positive impact in terms of the machining time, which has been reduced by at least 30 %” said Judith Schmitt. “We want to reduce manufacturing costs by 20 % in the long term, and we are currently at 10 % with the CONTUMAT”

The close proximity to the machine tool manufacturer is of particular benefit to the SMS group because the optimisation process is ongoing. “The fine-tuning of the NC programme is still underway, for example” said Industrial Foreman Martin Pach. “In addition, machine operators should familiarise themselves with CONTUMAT to a greater extent in order to get more out of it”.

The SMS group runs optimisation projects with Starrag operators and maintenance staff. Judith Schmitt has an optimistic view of the future, as she has faith in the continued cooperation with a neighbour “who up to now has always reliably taken all our requirements and change requests seriously and gone on to implement them”.

Higher productivity with **flexible manufacturing**

Pump and compressor manufacturer CVS invested in a flexible manufacturing system with two horizontal machining centres HEC 630 Athletic from Heckert and a Schuler pallet system. The success of this investment is reflected in significantly reduced setup and processing times when machining cast iron components in small batch sizes. Furthermore, the quality of the components has also improved.



“We are investing in the future ...”

CVS Engineering GmbH develops, produces and distributes vacuum pumps for suction vehicles as used, for example, in sewer cleaning. Their product range also includes compressors for silo vehicles, with which media such as plastic granules or building materials can be discharged. Compressors for tanker trucks, and pneumatic systems for trams, commuter and local trains also belong to the business segments of the company from Rheinfelden, Germany.

Since it was established in 2006, when CVS started with 30 employees, the company has developed very successfully, as General Manager and Head of Production Uwe Schröter reports: “Today we have 57 employees and an annual turnover of around 14 million euros. Our success is primarily due to our employees,

who already brought a wealth of experience in the compressor and vacuum pump-world with them when the company was founded.”

This enabled CVS to capture about 70 % of the German market for vacuum suction vehicles within just a few years, making it the clear market leader. As a supplier of oil-free screw compressors for silo vehicles, the company is now the number two in Germany. The Rheinfelden pump and compressor manufacturers also have a strong international presence.

The early days were anything but easy, despite all the experienced staff. The available capital had to be used to the very best effect. For manufacturing, this meant falling back on tried and trusted used machines to begin with.

Head of Production Schröter explains: “We manufacture the main components of the pumps and compressors ourselves. For this we need high-performance machining centres, but also machines for processing small parts and for special machining, such as for honing. Our machine park has enabled us to produce at a high quality, while still being able to respond to special customer requests. “This demands high flexibility, particularly when considering the delivery times. According to Uwe Schröter, the range of delivery dates requested by suction vehicles customers is between one day and four weeks. For silo vehicles, the time span is a maximum of just two weeks, then the compressors – usually between five and ten per order – need to be ready for delivery.”



The Heckert tower magazine installed at CVS offers a total of 240 tool pockets. It can even accommodate large and heavy tools up to 800 mm in length and 340 mm in diameter weighing up to 50 kg individual weight

+
High precision
and accuracy
+
Best cooperation
+
Improved
quality

Flexible manufacturing system for higher productivity

In recent years, economic conditions have deteriorated. New product developments have also made modernised production, that can act more quickly and flexibly, a must at CVS. At the beginning of 2011, a team of employees headed by Andreas Marterer, who is primarily responsible for work preparation, took over the task of rethinking the entire manufacturing and assembly process and re-planning it according to modern criteria – including investing in innovative machines and automation equipment.

Two machining centres linked via a linear pallet system were to form the core element of the new flexible manufacturing. At the EMO 2011, the responsible CVS team visited a variety of machine

tool manufacturers and obtained detailed information on relevant cutting solutions. Head of Production Schröter was surprised by the result: “Most manufacturers back then, especially suppliers from the Far East, had focused on fast, light machining, as required particularly in the automotive industry. For a medium-sized company like ours that conducts heavy-duty cutting in small batches, the range of offers was rather small, so we only shortlisted two suppliers.”

Andreas Marterer defines the necessary cutting operations more closely: “We machine housings for compressors, valves and gearboxes, their corresponding covers and flanges, oil containers and the like - usually in batches of less than 30 units. 75 % of the parts are made of cast iron and 20 % of aluminium.

The remaining ones are made of other materials.” For cast iron processing in particular, the machining centres require maximum performance. “In our company, drill-finishing pump housings is the core operation. We use this type of machining for all bearings and housing bores, starting at a diameter of 30 mm up to 520 mm. For this we need a strong spindle that has to provide a torque of at least 900 Nm.” Another key requirement was a tool magazine with more than 200 pockets and a changer that can also cope with large tools weighing up to 30 kg and more than 450 mm in length.

Rigid machine design and generous work space

CVS decided to invest in two identically constructed HEC 630 Athletic horizontal machining centres from Heckert.



The Heckert HEC 630 Athletic horizontal machining centre is controlled by a Siemens 840 D sL. The CNC provides high ease of use, which the staff at CVS appreciate



Whether it concerns machining a housing or a cover, the batch size at CVS usually varies between 5 and 20 units

“The 630 model pallet size corresponds to our preceding machines. While that is a bit tight, the available space in the production hall doesn’t permit any larger machines.” The comfortable working environment of the Heckert HEC 630 Athletic was all the more decisive. It enables a workpiece swing diameter of 1,550 mm, and a maximum workpiece height of 1,250 mm. “We have enough

period. The steep workspace cover and the wide, centrally arranged chip conveyor contribute to the safe and rapid removal of even large quantities of chips – as well as the associated heat.

Modular system enables optimal machine configuration

As the HEC centres have a modular design, CVS was able to choose an

CVS, therefore, decided on a tower magazine with a total of 240 pockets. It can even accommodate tools of up to 800 mm in length and 340 mm in diameter (bridge tools up to 520 mm), weighing up to 50 kg individual weight. This also poses no problem for the tool changer. The user-friendly magazine can be retooled during running time and saves space with its slim, tall design.

50% lower setup times

space for retracting and for table rotation, even with our large parts. What’s more, enough leeway remains for larger work pieces, which addresses the general trend with pumps,” says Uwe Schröter.

The casting bed and thermo-symmetrical machine construction with its high rigidity also scored points for the Heckert horizontal machining centre. These factors are a fundamental requirement for progressive cutting performance and high precision. Profile rail guides in all linear axes, pre-clamped guide carriages and ball screws with counter bearing ensure accuracy is maintained over a long

optimal solution with respect to the work spindle and tool magazine. “We decided on the powerful 78 kW gear spindle,” Andreas Marterer explains. “It provides up to 1,500 Nm of torque at 25% c.d.f. and covers a speed range of 20-7,500 rpm. This gives us a buffer for even more intensive processing power.”

The tools and their handling were an important part of the specifications: In order to achieve high flexibility and reduce setup requirements, the magazine should provide space for all the necessary tools, including the particularly large and heavy ones.



“The alternative machine tool we looked at from another supplier would have required various special modifications in respect of tool handling, whereas the HEC 630 Athletic already fulfilled all our needs in the standard version,” says the delighted Team Leader Marterer.

In addition to the two Heckert HEC 630 Athletics, the Schuler LoadMaster Compact 1,400 pallet system with two setup facilities and 33 shelf positions on three levels is an important component of the new production concept. “After all, we are investing in the future, and this includes flexible manufacturing with some degree of automation,” says Uwe Schröter about their investment. “The Schuler system offered us optimum use of the space available and flexible design of the setup facilities, which are loaded by crane.”

Bottom line: Time savings and improved quality

The restructuring took place in 2014 without disrupting production. This was achieved by first exchanging one machine and taking the pallet system into operation. Six months later,

the second machine followed. Andreas Marterer is full of praise: “The scheduling and indeed the entire cooperation with Heckert and Schuler worked perfectly.” Their experience so far with the new production plant has also been very positive, as production manager Schröter confirms. “We are currently using them in operator-controlled two-shift operation. If necessary, we will introduce an unmanned third

In addition to the time saving, the new production plant also resulted in improved processing quality. For example, with the HEC 630 Athletic, CVS effortlessly achieves the position tolerances of 0.04 mm required for screw compressors. Bore tolerances in the range of IT6 are also complied with, as is the necessary surface roughness of Rz = 6 µm. Uwe Schröter explains:

10% lower processing times

shift. But first it is still necessary to optimise downstream processes right through to the assembly.”

As far as machining is concerned, the goals have been met. Setup times have decreased by 50% and the processing times on the HEC 630 Athletic are around 10% lower than before. Planning Engineer Marterer is particularly pleased that he was largely able to take over the existing tools and programs as they stood.

“We subject our components to regular quality control. We inspect the critical dimensions of every fifth screw compressor, for example. Here we observed a trend towards a significant improvement compared to our previous production.”

www.cvs-eng.de

CVS had their HEC 630 Athletic fitted with the powerful 78 kW gear spindle. It provides up to 1,500 Nm of torque at 25% c.d.f. and covers a speed range of 20–7,500 rpm



Productive single-item production

Extrusion dies for plastic pipes are among the key products of the Dutch supplier company Romit. By optimising production with a Heckert HEC 800 Athletic HV MT milling/turning centre, they were able to reduce the total processing time of such tools by up to 65 %.

Heckert horizontal machining centre HEC 800 HV MT, Romit, Netherlands

+ Profitability + Process reliability + Product quality

For Auke Sjoerd Tolsma, CEO of Romit BV in Dedemsvaart, the situation is clear: "We need to optimise our production continuously in order to survive in an increasingly competitive global environment." His company was formed in 2001 from the machining department of Rollepaal BV, one of the leading global manufacturers of extrusion lines for PVC and PO pipes. In the same year it was founded, Romit already acquired the neighboring tool- and mold-manufacturing company Ramix, thus extending its range. As a result, the company, which employs approximately 70 staff, quickly became an established service provider for machining and assembly tasks serving the plastics industry, oil and gas drive engineering, and the maritime sector.

The manufacture of extrusion dies has remained one of Romit's core tasks. Auke Sjoerd Tolsma applied his optimisation initiative to the demanding precision machining of these components: "Extrusion dies are manufactured mostly as single parts or mini-series of up to three pieces. Because of their rotational symmetry, they mainly require turning, but also drilling and milling. Until recently we used vertical lathes and bed-type milling machines for the purpose. But the time spent on machine changes and weaknesses in process reliability gave us the idea of switching to complete processing and automation."

In early 2013, CEO Tolsma and his machining specialists began their search for a turning/milling centre that is able

to machine the components, which measure up to 850 mm in diameter and weigh up to two tons, in a maximum of two setups. In addition, the sought after machine should reliably meet the required tolerances in order to also permit unmanned operation and handle maximum spindle hours.

Of five multi-functional machines tested with a reference component, two provided the level of performance required. In the end, a number of essential details, such as the load capacity of the table and the simple use of strongly cantilevered tools, determined the final decision: In mid-2014, Romit invested in an HEC 800 Athletic HV MT milling/turning centre made by the





The machining table is suitable for loads of up to two tons. Due to the spindle's high torque, the core drill shown in the picture can drill into solid material, even with highly tempered steels

65 %

reduce of
total
processing
time

Chemnitz Heckert GmbH, which is part of the Starrag Group, a global technology leader in precision machine tools. Auke Sjoerd Tolsma explains: "I've long been aware of Heckert as a renowned supplier of machining centres for serial production. The test operations finally convinced me that Heckert can also provide high-performance solutions for the complete machining of individual parts." And adds, satisfied: "In our case, the best solution even."

Precision and dynamics

Romit's demands on the machine are high: For five-sided machining they require a minimum of three linear and two rotatory axes - one for turning and one for the swivel movement of the tool or workpiece. It needs to be mounted

extremely stably in order to ensure high precision milling, turning and drilling. At the same time, a high dynamic range is required in order to keep processing times short. Because of the size and high weight of the components, the load capacity of the table and the working space available play an important role. Benny Van Haver, responsible as Sales Manager Benelux in the Starrag Group for the Dutch company Romit, helped with the selection: "Heckert's HEC series horizontal machining centres have a completely modular design and are therefore highly configurable. For Romit, the HEC 800 HV MT was ideal, on account of the requirement for milling/turning operations and an 800 pallet size."

The selected high-precision NC rotary table is loadable with two tons and provides 57 kW power (at 100 % duty), up to 500 rpm, and a maximum torque of 2,520 Nm. The swivel horizontal/vertical milling head also provides decisive advantages: It saves on a pivot function for the table that would take up valuable working space. Auke Sjoerd Tolsma argues: "This means we can easily use strongly cantilevered tools such as a 450 mm long core drill." This tool, with a diameter of 120 mm, is used for the required pilot drilling before the inner contour of an extrusion die can be milled out. Thanks to the high torque of 1,088 Nm (at 60 % duty) of the two-stage gear spindle (6,000 rpm, 30 kW), it is possible to drill into solid material even with highly



Convenient tool storage: The chain magazine has 80 tool pockets. It is equipped with a second control panel and a Balluff tool identification system. The tools can be up to 450 mm in length, weigh up to 35 kg, and have a maximum tilting moment of 50 Nm

tempered steels. Here, the internal coolant supply with 80 bar flushing pressure comes into effect, ensuring the reliable removal of swarf.

The HV-head has two working positions, horizontal and vertical, in which it can pivot even when the spindle is running. If the respective final position is reached, the head is locked in a Hirth coupling. The positive fit this creates contributes to a high stability, which is especially important in turning. The turning tools, for which HSK-100T holders are used, are disengaged when the spindle is inserted and fixed with a second Hirth coupling, secured against turning with the positive connection. Thanks to the overall stability, it is even possible to use 450 mm long standard turning tools, which would require damped boring bars in other machines.

Other important criteria in the decision-making process were the inclusive pallet changer and the option to integrate the machine into an automation solution with pallet storage. Auke Sjoerd Tolsma explains: "At the time, a dual changer system was important for us

so we could already reclamp parallel to machining." In addition to the standard 800 × 1,000 mm pallet with T-slots, he ordered two round pallets 1,000 mm in diameter, also equipped with T-slots and a claw system. In order to be able to precisely align rotationally symmetrical workpieces on the setup station already, he had it equipped as a highly precise swivel load/unload station with a bearing that has a rotational accuracy of under 1/100 mm.

Equipped for safe processes

In the near future, the installation of a fully automated high-bay warehouse is planned with a pallet system to which the Heckert HEC 800 HV MT and other equipment will be connected. The most important requirement for automatic operation is safe processes. The machine concept of the Heckert milling/turning centre HEC 800, with its rigid, thermo-symmetrically designed main assemblies, the digital AC feed drives, and elaborate profile rail guides and ballscrews in all linear axes provides a solid basis for the job.

As an extra safeguard, Romit opted for additional sensors. Auke Sjoerd Tolsma

explains: "Since we often process high-alloy steels and other difficult materials, we wanted to exclude the possibility of a crash during unattended machining. For this reason, we decided on the supplementary Brankamp collision monitoring system." Even greater security is provided by utilisation monitoring, which actively checks during processing whether the machining is proceeding according to plan. If there are any deviations, processing stops automatically. A vibration sensor on the spindle also shuts down the machine in case of tool damage.

Benny Van Haver also mentions the automatic imbalance detection, which comes as standard in the HEC 800 Athletic. If any imbalance occurs, the machine is able to measure it as well as indicate the position and size of the necessary counterweights.

Hoped for savings realised

The Heckert HEC 800 HV MT has been running in production mode since mid-March 2015. For Auke Sjoerd Tolsma the investment has paid off completely: "With this solution, we are able to

implement processing that previously took place on two different machines in two set-ups, on one machine with complete production. Depending on the size of the component, we save between 30–65% of the total processing time.” The CEO sees the HEC 800 HV MT’s performance data, which exceed the previous possibilities even in turning, as a crucial factor: “For example, we can machine an extrusion die from a 1,500 kg ingot to completion in about six hours, finish machined with a surface quality of $Ra = 0,4\mu\text{m}$.” The resulting swarf - up to 50% of the weight of the unmachined part - is disposed of at an ejection height of 1,500 mm via a link belt chip conveyor into a spacious container.

The dimensional accuracy is also correct. “On average, we need an accuracy of 5/100 mm. For sensitive parts, we need to be accurate to 15 microns”, Auke Sjoerd Tolsma explains. “With our Heckert machining centre, we can reliably adhere to such diameter tolerances over a turning length of 600 to 800 mm. We check this with a measuring cycle, which we developed jointly with Heckert, to correct any tool wear occurring. The machine meets the

required dimensions even in our non-air-conditioned hall, where temperature fluctuations are quite possible.”

Promising prospects

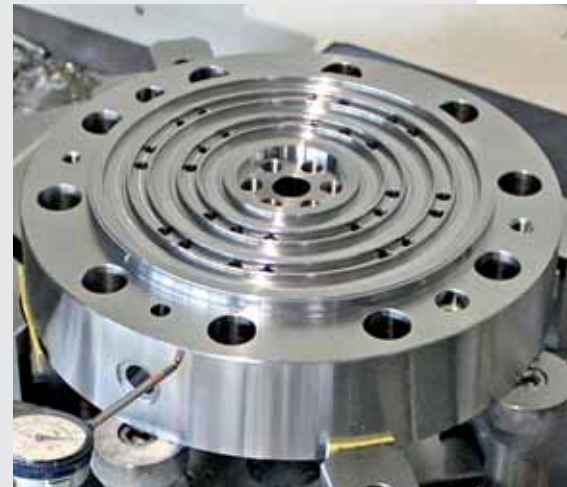
After its successes with the complete machining of extrusion dies, Romit is extending the scope of application of the milling/turning centre. In the meantime, contour parts for mold making have been milled, and the HEC 800 HV MT is also earmarked for single parts from the area of compressors. After all, those in charge have set the initial target of 100 hours’ operation per week.

To make production even more

cost-effective, Romit invested in a new CAM system, which masters milling and turning equally and is able to map and optimize complete processes. Next in line is the planned automation system and other machines, probably beginning with a slightly smaller five-axis centre. The plans have already been drawn up.

Conclusion

With the new HEC 800 HV MT milling/turning centre, the Romit company



The Heckert HEC 800 HV MT milling/turning centre offers plenty of space for large components with the travel paths: X = 1,350 mm, Y = 970 mm and Z = 1,300 mm

succeeded in sustainably increasing its profitability. Processing times decreased by 65%, the time previously spent on changing machines was eliminated completely. The staff’s workload decreased due to the quality and reliability of the machine. The integration into a comprehensive automation system is already prepared. ▀



“With this solution, we are able to implement processing that previously took place on two different machines in two set-ups, on one machine with complete production. Depending on the size of the component, we save between 30–65% of the total processing time.”

Auke Sjoerd Tolsma



The Technical Solutions are in our DNA and **customer benefits are our goal**

As manufacturers of machining centres for the production of small dimensioned parts, Bumotec has demonstrated over the years its ability to meet the highest demands of precision and quality and so to generate significant benefits to its customers.

Bumotec has developed in its machining centres, a multi-tasking integrated approach which allows the combination of a wide range of operations in a single machining cycle. The main objective is to shorten cycle times and thus increase customers productivity for the production of parts requiring very high accuracy, 6 sided machining, with a single optimised setup. This will also improve production safety

Customers often submit projects with the most difficult results to achieve. But beyond the ability to design machines with undeniable qualities, bearing the "Swiss made" quality label, we have developed a particular expertise in our field. In addition to our traditional ranges of turning and milling operations, Bumotec offers a range of additional expertise such as generating tool paths straight or helical, grinding, turning on hard materials (ferrous or non-ferrous), and also chamfering or "guillochage" so often used in the world of watchmaking, and machining of hard or soft ceramic, to name a few.

We detailed two concrete examples of developments that have brought great benefits. Our customers have trusted our engineers and our specialists to develop "The Optimum Solution" to match their expectations.

People and Expertise

In the micromechanics field, especially aerospace, Bumotec has achieved technical parts with high geometrical precision. One of them designated as

"a pinion regulator" for the fuel control equipment of aircraft engines is the most specific example. Produced from bar stock material, allowing the client to abandon the production of molded preforms, which is expensive and slows down the manufacturing process, our S191 machining centre has achieved the production of this part in a single cycle, machined on all sides, including turning operations, 5-axis milling, automatic finishing with dynamic correction using a contactless Renishaw probe. We are also capable of gear hobbing for the production

through regular requests from clients. We even developed a process to machine beveled gears with a new type of milling tool specially designed for this purpose. Our Applications department tested this tool and adjusted the programming method to facilitate the manufacturing process. A ring gear and an endless screw made out of titanium had emerged in a very short time, as it took one week for our team of specialists, between the receipt of drawings and the production of the first part. The solution for the customer was a complete manufacture



SAFETY
Very high accuracy thru 6-sided-machining in a single set-up

of an outer ring gear (module 1.0) and the pin for the inner ring (Module 0.8). The use of a CAM generated cutting path allows for a greater precision of the parts geometric shape and a reduced production time. All due to the fact that all operations are performed in a single production cycle time, while the traditional process requires additional re-taking operation. So significant time savings were archived alongside with improved quality.

Today Bumotec has acquired a solid experience in this type of process,

from bar stock within single cycle for the precision gears with modules 0.3 and 0.5. The benefit for the customer was drastic reduced cycle time and also reduced waste material.

An additional benefit for customers is the Bumotec showroom in Sâles which will convince customers of Bumotec's ability to support machining projects, while keeping in mind that all challenges must remain synonymous with profitability, safety and growth. ▀

We specialise in providing a comprehensive package

The “Precision Engineering” business unit was seeking experts for the new German TechCenter for Medical Technology and Precision Engineering and found five specialists. One of these is Marc Lehmann, Head of Sales for the medical-technology market segment, who has been already met with a very positive response in Germany’s Medical Valley.



Marc Lehmann

Head of Sales of the medical-technology market segment, involved in setting up the new TechCenter in Germany’s Medical Valley

TechCenter for Medical Technology and Precision Engineering, Immendingen, Germany: The launch of the medical-technology think tank

Mr Lehmann, Jean-Daniel Isoz, Head of the “Precision Engineering” business unit, had been searching for experienced specialists for the medical-technology think tank in Immendingen (Tuttlingen, Germany) since the autumn of 2015. What stands out for you and your new job?

Marc Lehmann: I worked for many years with leading manufacturers of surgical instruments and implants before moving to become a Key Account Manager Medical for the machine tool manufacturer, Chiron. One day, the Starrag Group offered me the opportunity to set up a new technology centre for the medical technology and precision engineering market segments in the heart of Germany’s Medical Valley. It was an extremely tempting offer because we would literally be starting from scratch.

What do you – as a newcomer to the Starrag Group – see as its advantages?

Marc Lehmann: We are able to access the expertise of other members in the group, such as Berthiez, Heckert or Starrag, which means there is cross-industry dialogue. The global, well-established service of the Starrag Group also offers support.

In terms of the TechCenter: What is the current state of play?

Marc Lehmann: We are located in the building of a former supermarket, which has been fully converted into a technology centre. The team consists of two sales representatives for southern Germany and a programmer who supports customers with sample processing. They will shortly be joined by an application expert. All members of the team are very

familiar with the special materials and requirements of the Medical Technology and Precision Engineering sector.

What sets the new TechCenter apart?

Marc Lehmann: Our main expertise is intensive consultation with customers: For example, a customer comes to us with the prototype for a medical product that he wants to manufacture in a cost-effective way and to a high quality. We start by determining the machine concept to use and we then use this choice to recommend a customised machine configuration, plus the appropriate tools. To do this, we receive support from well-known manufacturers of cutting tools for medical technology and precision engineering based nearby, with whom we have been working closely over the years to develop customised

The TechCenter is located in the building of a former supermarket, which has been fully converted into a technology centre



Safety

A perfect customised machine configuration matched to the customers application brings process reliability

applications. We also work with other companies in the industry, which supply us with systems for coolant supply, for example. Good equipment and support makes it possible for us to intensively test how technologically challenging materials, such as cobalt, titanium and stainless steel, react to other components on the machine tool during machining.

And then you present the results to the customer?

Marc Lehmann: No, that's when we really get going. Application specialists and programmers start to optimise the machining process to achieve the fastest possible cycle times – while still complying with process reliability and quality requirements. We do not only pay attention to the speed but try to achieve a tool life that is as long as possible, while bearing cost in mind. This means the customer can finish as many work pieces as possible without replacing the tool. And in the end, under ideal circumstances, they will purchase one or more machine tools – including the complete process knowledge, which is developed jointly with the customer. This also includes consultation on clamping devices or coolant supply. But we do not leave them alone: We continue to offer support services and also provide training for the

customer's employees, for example, in the areas of machine operation and programming. This means we can offer the customer a comprehensive package, as proof of our claim "Engineering precisely what you value".

But other manufacturers also have technology centres. What is the unique selling point of the Starrag Group TechCenter?

Marc Lehmann: What sets us apart is the excellent machining concept of the traditional brand Bumotec, from the Swiss canton of Fribourg, a company that is part of the Starrag Group. Bumotec machines have a very robust and solid construction. Their complete thermal stabilisation and the use of linear drives means they achieve excellent values with a machine stability of $< 2.5 \mu\text{m}$. Also in the area of machining centres, they have distinct advantages compared to concepts from other manufacturers. They also draw on their experience and expertise gained from a portfolio of 500 machines used for customers in the watch industry, medical technology and precision engineering.

So, the value to customers also comes from the fact that they benefit from the experience gained from 500 very different and challenging applications: But what actual value does the TechCenter offer customers?

Marc Lehmann: They receive enhanced production solutions. Building on the wealth of experience from 500 machines in the field means that we can up the ante for customers following the test run. Our team looks very closely at how the machine responds and what needs to be changed in the ergonomics. We take a close look at how the machine can be constructed to make it even more stable during the process than it has been so far.

The pool of machines is a very important part of a technology centre: What systems are used at Immendingen?

Marc Lehmann: Firstly, the S191 linear CNC turn-mill centre is a proven solution for the six-sided complete machining of components with backlash-free, repeatable precision in the μm range. In the summer, this will be supplemented by an S128 five-axis turn-mill centre and also



the new S181, which Bumotec presented for the first time at EMO 2015 in Milan. This five-axis turn-mill centre with a retaking unit for the complete machining of complex and high-precision workpieces is well-suited for the individual machining of very small components or for bar-stock machining with a maximum diameter of 32 mm. These three machines enable us to offer customers a wide range of machining options, with high-precision, bar-stock machining as the focal point. This Bumotec speciality also provides a form of automation that enables fast retrofitting from the start. Other manufacturers may not offer this option.

Bumotec machines are also used in the watch and jewellery industry: How do customers benefit from the expertise in this area?

Marc Lehmann: These sectors also work with titanium, stainless steel and ceramic materials, so many years of experience has also been gained from countless

applications in this area. We can also tap into that expertise. The TechCenter will essentially focus on machining medical technology and precision engineering components but in the long term we will also carry on working for the jewellery industry.

How do you share the work with the other technology centres?

Marc Lehmann: Within the "Precision Engineering" Business Unit there are four TechCenters: The institution in Sâles in the Swiss canton of Fribourg primarily serves the watch and jewellery industry as well as precision engineering, while Immendingen is mainly responsible for the German medical-technology sector. There are also two technology centres in the USA and in China and the new German TechCenter also exchanges expertise and experience with them. Immendingen also functions as a service centre for Germany, which the customers in the region especially appreciate because it is in the immediate vicinity.

The S191H 16 linear CNC turn-mill centre is a proven solution for the six-sided complete machining of components with backlash-free, repeatable precision in the µm range

How has the initial feedback been?

Marc Lehmann: There has been a lot of interest: We have already performed initial sample processing and more will follow.

What is next?

Marc Lehmann: We will gradually continue to expand the TechCenter to relieve Bumotec in Switzerland. I would like to double the number of team members by the end of 2017. In the long term for medical technology and precision engineering, as well as for the jewellery industry, we are planning special events with presentations by us and by suppliers. ▀

starrag

Starrag Group

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Highest

Precision

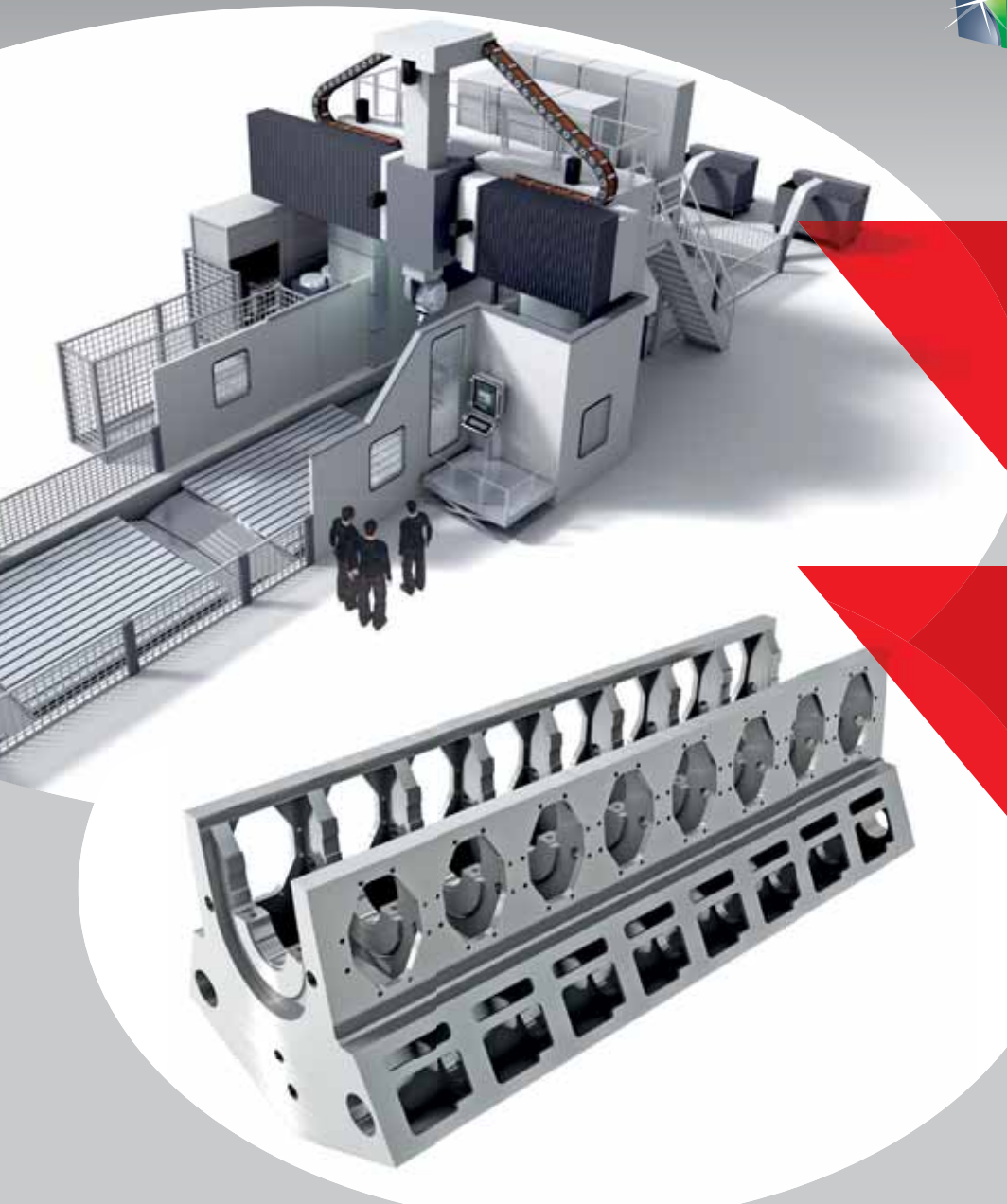
for large workpieces with Droop+Rein portal machining centres



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Machining time

-20%

due to complete machining with a portfolio of over 300 machining heads.

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