

## **Blisk machining of a complex turbine component**

New development for the complete machining of turbine components

## **Reaching the top, step by step**

Overhead gantry milling centre –  
Used by the world's market leader

## **Scharmann ECOFORCE**

Improved production for tailored  
valve machining

## **The key to precision and productivity**

The machine tool manufacturer  
BOMAG invested in a  
Heckert HEC 1600 Athletic

## **A new Star is born**

Interview with Walter Börsch,  
CEO of the Starrag Group



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## LEGAL NOTICE

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**Feimafe**

São Paulo (Brazil)

02.–05.06.2015

**EPHJ**

Genf (Switzerland)

17.–21.07.2015

**IIJS**

Mumbai (India)

25.–29.05.2015

**Metallobrabotka**

Moscow (Russia)

09.–11.06.2015

**MD&M East**

New York (USA)

26.–27.08.2015

**MD&M**

São Paulo (Brazil)

09.–12.06.2015

**MACH-TOOL**

Poznan (Poland)

25.08.–30.09.2015

**Maks Airshow**

Zhukovskiy (Russia)

15.–21.06.2015

**Paris Airshow**

Le Bourget (Frankreich)

05.–10.10.2015

**EMO**

Milano (Italy)

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Walter Börsch  
CEO of the Starrag Group

### Dear reader,

Some of you are probably surprised to also be receiving a new customer magazine from us in the form of the "Starrag Star". I know that, due to the endless number of pieces of information and the ever-present overflow of stimuli, it is difficult to draw attention and then to maintain it. Many of you might know the new lament, "We are overnewsed, but underinformed".

However, the Starrag Group believes that we should provide our customers with a benefit not just in terms of performance, but also in terms of communication. With the "Starrag Star" we want to show where the benefit lies for the user and how our offerings distinguish us from the rest of the market. With this publication, we provide our customers with sufficiently good reasons why there can be only one partner for them: the Starrag Group.

At the centre of the first edition of the "Starrag Star" is the new, consistent focus on three attractive and clearly defined target markets, which I explain in a detailed interview.

In the first "Starrag Star" we also present the creative diversity of the entire Starrag Group and specialties of the "Precision Engineering" business unit: In an interview with the director of the business unit, Jean-Daniel Isoz, the topic is the two traditional brands Bumotec and SIP from the Swiss canton of Fribourg and relocation plans of a special type. Alfred Lilla reports from Mönchengladbach on a highlight of the "Aerospace & Energy" business unit. The Head of Sales of the Aerostructure market segment explains how he and his team, after having conquered South Korea and China, will now conquer the Japanese aerospace industry with a high speed machining centre.

I hope that you will respond positively to the "Starrag Star" and its articles, interviews and reports. I am looking forward to your personal feedback.

Sincerely, Walter Börsch

# “We focus on customer-specific solutions – even in uncertain times”

**Interview** with Walter Börsch, CEO of the Starrag Group

The new strategy of the Starrag Group, from Rorschacherberg, Switzerland is: consistent focusing on attractive and clearly defined market segments. Walter Börsch, the CEO of the group, explains what is changing for customers and why the new customer magazine “Starrag Star” exists.

## **Dear Mr Börsch, why is the Starrag Group now publishing its own customer magazine?**

**Börsch:** In the future, our group would like to increase its focus on current and potential customers and their actual needs. We consider the new customer magazine “Starrag Star” an excellent medium for showing the added value we can provide with our service offering, which has expanded significantly in the past few years, and how we actively live the partnership with our customers every day.

## **In the digital age, is the new print magazine a medium that is at all suitable for explaining the new strategy to customers?**

**Börsch:** Of course we know that today, due to the endless number of pieces of information and the every-present overflow of stimuli, that it is difficult to draw attention and then to maintain it. Many readers might be familiar with the new lament, “We are overnewsed, but under-informed”. That is why we want to

provide our customers with a benefit not just in terms of performance, but also in terms of communication. Therefore, we have to generate relevant content for the customer. The new direction of our group is only one topic among many. In the end the point is to give customers enough good reasons to understand why there can only be one partner for them: the Starrag Group.

## **And what message do you want to communicate to readers with the first issue of the “Starrag Star”?**

**Börsch:** At the centre is our new, consistent focusing on attractive and clearly defined market segments, which we have selected to fulfil our customers’ basic needs for safety, profitability and growth in the best possible way in the currently very volatile environment with its world-wide crises: For this purpose, the Starrag Group has defined eleven market segments and summarised them in three target markets: “Aerospace & Energy”, “Transportation & Industrial

Components” and “Precision Engineering”. One business unit director will take responsibility for each of the three target markets. This service offering complements our excellent global customer service under the leadership of the Customer Service business unit.

## **How does this reorganisation affect the sales approach?**

**Börsch:** The customers in the respective target markets and market segments have specific needs. The focus of our communication is how we fulfil these needs with innovative machine concepts, leading technology and our excellent global customer service, which I have already mentioned.

## **Mr Börsch, what challenges does the Starrag Group and its brands have to meet at the present time?**

**Börsch:** Despite fundamentally positive economic indicators, we sense that uncertain times are causing customers to hesitate sometimes before making



**Dipl.-Ing. Walter Börsch** (1959) studied Mechanical Engineering at Rhineland-Westphalian University Aachen and completed advanced training in marketing at the University of St. Gallen. From January 2012 to the end of 2013 the German graduate engineer was the head of former Business Unit 1 with the Starrag brand in Rorschacherberg (Switzerland) and the technology subsidiary TTL in Haddenham (Great Britain). He has been the CEO of the Starrag Group since April 2014 and Director of Starrag Regional Sales since January 2014.

investments. The greatest challenge for us lies in making clear in all forms of communication that our customer-specific solutions, which are tailored to long-term partnership, are the best choice in uncertain times. However, for a long time only talking about the advantages of Starrag has not been enough. Instead, in the future we must do an even better job of entering a dialogue with our customers, listening to them and understanding what they really care about. Because that is the only thing that puts us in a position to develop solutions to our customers' problems.

**What aspect of the Starrag Group are you particularly proud of?**

**Börsch:** Our group consists of different companies, each with many years of tradition. However, the merging of companies is not an easy process: First of all it requires the right selection, and, after the acquisition, the appropriate integration process for the respective case. This has gone very well for us.

## “The Starrag Group has an **individual** solution for you”

Now – connected with the internationalization of the group – there is a combination of diversity and commonalities that is having a very positive effect. To realise the resulting synergies and advantages in an ideal way, in the next step the individual communication activities need to be integrated and harmonised, because, as is well known, the whole is more than the sum of its parts.

**Mr Börsch, do you have anything else important to say to the readers of the first edition of the “Starrag Star”?**

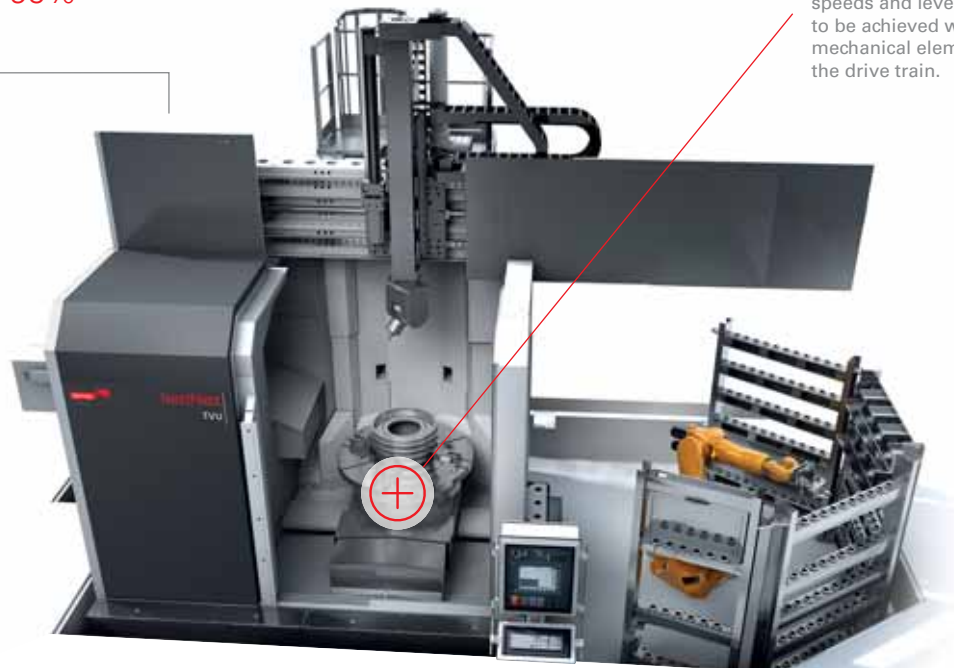
**Börsch:** In discussions with potential customers I am surprised again and again to find out that they are not aware of the depth and breadth of our service offering. Perhaps we are simply still too reserved in our communication. Therefore my message to readers in all eleven market segments – from machine operators and production managers to entrepreneurs is: The Starrag Group has an individual solution for you that can meet your needs regarding safety, profitability and growth. Come to us and we will have a personal conversation. ▀

# High-speed innovation

## Berthiez TVU with torque motor

+ High machine availability > 95%

Torque motors are electrical direct drives that enable high speeds and levels of torque to be achieved without any mechanical elements in the drive train.



+ Reduction of maintenance time by 35%

Over that last decade, **Berthiez** has successfully equipped a large number of vertical grinding machines with these drives. The result is that the disruptive influences of a mechanical drive on the surfaces are no longer a problem during **precision grinding**.

In 2012, the first Berthiez TVU 2000/160 vertical lathes featuring a torque motor drive delivering up to **10,000 Nm and 350 rpm** were sold. Further orders for this innovative concept followed

continuously in 2014. With its **high stall torque and feed torque**, the **torque motor** combines and fulfils the functions of turning, milling and positioning on its own.

This greatly simplifies the drive train concept, as the number of components and mechanical assemblies is significantly reduced, which in turn leads to increased reliability and benefits with regard to maintenance. ▀





A “portable” solution:  
Machine checks possible  
via smartphone, tablet  
or PC

## Starrag connect: Everything under control

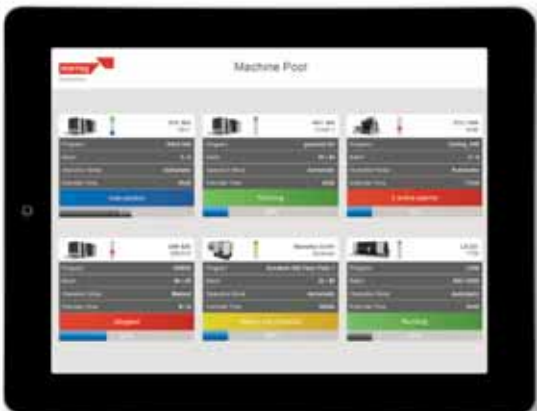
Starrag Group machines are used to produce sophisticated components for luxury watches, extremely long aluminium components for aircraft, robust blades for turbines and gigantic rotor blades for submarines. But despite all of these differences, as of late they now have one thing in common: All Starrag Group machines can be monitored via smartphone, tablet or PC using the new “Starrag connect” system.

**“Trust is good, process control is better.”** In keeping with this slightly modified quote, a universally applicable system has been developed that runs on all common types of computer, mobile device and browser regardless of platform and operating system (including Windows, Apple iOS and Android). Starrag connect can be used as a stand-alone solution for a single machine tool or as an integrated tool within a wider company network. Users can draw on the system – which is easy to configure and maintain – to call up a wealth of important information via Wi-Fi or Ethernet.

**The system** is extremely versatile and boasts a wide range of functions: from displaying the machine condition and providing up-to-date machining figures to supplying data for the system availability analysis (OEE – overall equipment effectiveness). Starrag connect enables a company to centrally manage the entire pool of Starrag Group machine tools it has in operation.

Access rights to the data can be specified on an individual basis. The system also gives users access to all machine documentation. By displaying alarms, error messages and maintenance data, the system enables a preventative approach to maintenance to be implemented more effectively.

**Despite this** vast array of functions, Starrag connect remains simple and flexible to use. The system represents a scalable solution for both individual machines and for a large pool of machines. All that is required to use the system on mobile devices is an HTML 5-enabled browser – no apps or similar software need to be installed. Users can also configure the user interface to suit their own intended purpose. What’s more, system operators are also able to access machine data for their own applications (or, for example, for ERP systems such as SAP) via an API interface. Data is saved on a central server and does not have to be updated manually, as the machine tools automatically report any new data. The load on a company’s network is low, as the machine tools only upload changes automatically once the data has been saved for the first time. A one-way connection, which can only be made from the machine tool to the server, ensures a high level of network security. ▀



- + Up to 20% time savings in the performance of preventative maintenance work
- + No investment costs in new IT structure

# “Introducing: Starrag Group”

Starrag Group – **Creative diversity made to order**

The Swiss-based Starrag Group cannot be described with a few brief advertising slogans: The Group is a large family of ten completely different brands, each with their own very special features.



**However, the** ten brands all have something in common: The bulk of our precision machine tools come into being based on specific modules, developed to meet individual requirements through discussions with our customers.

**“The key message** is: precision and efficiency in a nutshell,” explains Prof. Dr. Frank Brinken, Member of the Starrag Group Holding AG Board of Directors, in Rorschacherberg.

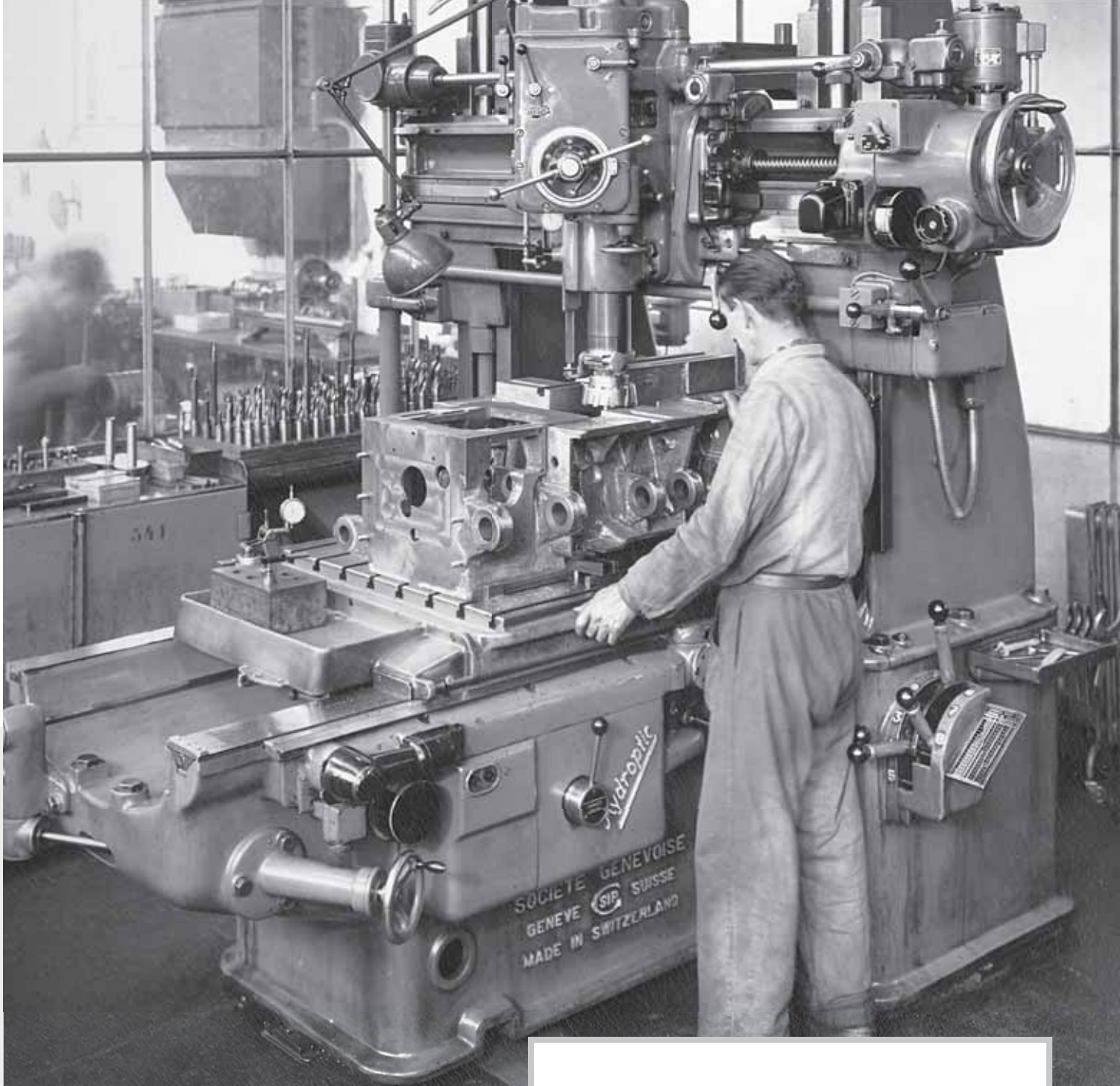
**“Achieving long-term** precision and high levels of productivity are key properties for all our machines.” The ten brands that make up the Group hail from all over the world, including Switzerland, Germany, France, Great Britain and India, and all implement this core message in a variety of different ways for companies for a range of sectors. However, while customers may differ, they all share one thing in common: They all use precision machine tools from the Starrag Group to manufacture components for extremely complex and durable products, not mass-produced goods – from sophisticated luxury watches, ship engines, power

plant turbines, aircraft landing gears and steel segments for cable cars to giant propellers for one of the largest submarines in the world.

**At the** Starrag Group, the production technology required for such applications comes as a result of an extremely high level of vertical integration: All core components required to achieve precision and productivity, such as drives, tool heads and foundations, are developed and manufactured by the Group companies under their own steam.

For over **150 years** of tradition:  
**Precision and efficiency**  
**in a nutshell**

**In going about** this process, there is sometimes demand for custom developments – often at the request of the customer – that could not be offered on the market per se. A machine-integrated self-qualification system (SQS) is available as an add-on, for example, which in less than an hour automatically verifies the spatial accuracy of a Droop+Rein portal-type milling machine with fork-type milling head – the process for performing this task manually can take over eight hours. An innovative CO<sub>2</sub> air-cooling system also increases productivity in



the machining of high-strength materials by 70% and more. This added extra for Starrag machine tools came about as part of a productive collaboration with a renowned German tool manufacturer.

**Special features** such as these round off an extensive service offering that ranges from virtual machine tools that can provide assistance in generating a new machining solution to correct retrofitting of large machine tools. ▀

## Safety for the customer:

- + The Starrag Group develops and manufactures all core components that are important for precision and productivity under its own steam
- + Cooperative efforts with renowned suppliers ensures a sustainable increase in productivity
- + Reduction of downtimes as a result of a large service organisation with services from supplying spare parts to retrofitting



# Moulds in sight

Customer service – Retrofit order for a tyre mould manufacturer

All inclusive: With the second vertical lathe, a high-quality, 12-jaw chuck with pendulum compensation was overhauled. If the customer had purchased a new machine, this chuck would only have been available at a significant premium.

“Another solid workhorse of a machine was required; a powerful and durable machine that we can use to develop a greater presence in the contract manufacturing business for companies in the region”

+  
40% cost savings  
compared to a  
new machine

+  
65% time savings due  
to the elimination of  
delivery times





[www.herbert.eu](http://www.herbert.eu)

Wolfgang Stumpf takes receipt of a completely refurbished and newly decked-out Dörries CTE 320 vertical lathe from Hans Jeschke (left), Customer Service Director.

HERBERT Maschinenbau GmbH & Co. KG, a company based in Hünfeld, Germany, relies on high-tech operating materials, and ultimately on retrofitting work performed by Dörries Scharmann. The company produces moulds for tyres for an array of uses, including bicycles, cars, excavators and earth-moving machines. The company also operates as a “job shop,” machining orders for its customers.

**As, unlike** its competitors, the Hess-based company machines its moulds rather than casting them, production with the some 50 machine tools the company has in operation is an extremely important process. In some cases, the machine tools must machine the moulds to precise specifications between 30 and 50 µm. Following on from the excellent experience the company had with Starrag Customer Service for retrofitting work, HERBERT ultimately decided to purchase a Dörries vertical lathe for the economic machining of moulds ranging from 2.6 metres to a maximum of 6.5 metres. “Another solid workhorse of a machine was required; a powerful and durable machine that we can use to develop a greater presence in the contract manufacturing business for companies in the region,” Production Manager Wolfgang Stumpf explains: “The machine therefore also has to be flexible. For example, we want to use it to turn components for wind turbines and wind machines.”

**The perfect** opportunity presented itself for the Hesse-based company in 2013

when a Liebherr factory offered a used Dörries CTE 320 vertical lathe (built in 1983) which had been equipped with a new Siemens 840 D control in 2001. “We weren’t prepared to accept any compromises in terms of retrofitting,” the Production Manager notes in retrospect. “In order to achieve the level of quality offered by a new machine, anything that did not live up to our requirements was ultimately replaced.” The retrofitting work was performed by the Starrag Customer Service. The team completely replaced the hydraulics as well as some of the electronics. The main bearings in the collet chuck were also replaced and all guiding parts were re-shaved.

**However, the** purchase of the used machine was ultimately an exception – the subsidiary of the Starrag Group normally only offers new products. “If we sell a used machine as a general contractor, we only do so as part of an extensive retrofit,” Hans Jeschke Dipl.-Ing., Director Customer Service, explains. “After all, our customers expect to receive the same, extremely high

standard of quality from a used machine from us as they do with a new machine. As such, we completely overhauled the mechanics and returned it to an as-new condition.” The Customer Service also put the refurbished system into operation in exactly the same way as if it were a new machine.

**In this** case, the retrofit was definitely a worthwhile exercise. Hans Jeschke: “With the vertical lathe, we overhauled a high-quality 12-jaw chuck with pendulum compensation. If the customer had purchased a new machine, this chuck would only have been available at a significant premium.” ▀

“We were not prepared to accept any compromises in terms of retrofitting”

# Close to the end customer



## New logistics centre in Seoul/South Korea

Following the opening of the regional logistic centres in China in 2009 and the USA in 2010, the Starrag Group's new Korea Logistic Center was put into operation in 2014. Opening this new centre makes it possible to supply the rapidly increasing numbers of machine tools in South Korea with time-critical spare parts and provide even faster delivery throughout Asia as a whole.



## Secure availability by means of:

- + stable production
- + minimal unplanned outages
- + controlled costs

## Close to the end customer – The right parts on site

Starrag parts are classified empirically and statistically according to risk. Inventory management is performed according to risk classification.

The logistics centre is open 24 hours every day. The Starrag Group guarantees delivery to Asian industrial centres within 24 hours. This is possible thanks to the excellent flight connections from Seoul/Incheon and the storage of parts in the free trade area. Stocks of spare parts in the regional warehouses are continually maintained at the currently required level thanks to the continuous production flow (ramp-up).

With the Korea Logistics Center, the Starrag Group is expanding its already strong presence in Asia. This is an additional component of the existing Asia Service Center in Shanghai, which is the first point of contact for the region and has a network of qualified technicians.

The Asia Service Center provides services such as hotline support, maintenance, repairs and handling of spare parts. ▀



24<sup>h</sup>



# Synergy at its finest

The **Starrag LX 021** is based on a proven and successful product and brings together the expertise of both Starrag and Bumotec in the form of a small, specialised machine for the complete machining of turbine blades.

## 30%

shorter cycle times due to complete machining in a single clamping position



### Première:

The new Starrag LX 021 machine is designed for the complete machining of turbine blades down to 200 mm in a single clamping position.

## Turbine blade production to Swiss levels of precision

**It is** not often that Günter Leitold, Automation Product Manager, will wax lyrical about machines. The new Starrag LX 021 is an exception. "The machine is designed for the complete machining of turbine blades down to 200 mm in a single clamping position," Leitold explains. Up until now, there have hardly been any machines available on the market to cater for high-precision complete machining tasks. This is because previously demand was for turbine blades with rather more simple geometric shapes, which are usually formed from forged or cast blanks. Nowadays, however, turbine blades with more complex geometries are gaining in popularity. These blades are made from highly sophisticated materials that are difficult to machine, and thus exhibit extremely low rigidity and poor damping properties.

**A five-axis** machining centre from Bumotec is now available for precisely this task definition. Starrag has also adapted this machine to meet the high demands of materials that are extremely difficult to machine, such as titanium and nickel-based alloys. The Starrag LX 021 rounds off the LX series, which has been specially designed for the high-precision, efficient, simultaneous five-axis machining of turbine blades. "By using this machine, turbine blade manufacturers can now benefit from solid, high-precision machine technology that Bumotec originally developed for the watch and jewellery industry," Leitold notes. The machine is generally suitable for machining turbine blades of all kinds up to a finished length of 200 mm. Example products include turbine blades for gas or high-pressure damping turbines.

**The option** to fit an automatic bar loader unit to the machine is also available. For Günter Leitold, the retaking unit with integrated revolver unit onto which up to three different active clamping elements can be placed is a particular highlight of the machine. He notes that it is this elegant solution that gives users the option of machining from all sides – an essential prerequisite for machining in a single clamping position. What's more, the Starrag LX 021 not only operates as a stand-alone machine, but can also be integrated into a flexible machining system (FMS) thanks to a positioning station (automatic pallet changer). ▀

# Blisk machining of a complex turbine component



When it comes to machining a particular component of a turbine, there is now a new development to consider: the **Starrag NB 251**, a machine tool specially developed for the complete machining of blisks/IBR.

The compact design of this machine is characterised by its high degree of machining accuracy, high cutting performance and high level of dynamism.

The **NB 251** is capable of performing all relevant production steps: from the efficient roughing of components from a single piece of material to the adaptive machining of friction-welded blisks, right the way through to the highly dynamic smoothing of flow surfaces in point contact.

**Now, discussions** are centring around the Starrag NB series, which has been developed and optimised with the process as a whole in mind – that is, the highly efficient, simultaneous five-axis machining of blisks/IBR.

**A prime** example of a machine in this series is the NB 251 with an inclined B axis, on which the tool is practically rotated around the tool centre point. The compact design of this machine is characterised by its extremely high degree of machining accuracy, high cutting performance and high level of dynamism with a low number of moving masses. Compared with a standard machine with swivel rotary table, the strengths of the NB 251 are obvious. When the rocker swivels, the machines with swivel rotary table needs extra time for the very long compensating movements. These compensating movements are necessary to ensure the tool remains on the same machining point.

“**With the** NB series, the tip of the tool is located very close to the centre of rotation. As a result, the compensating movements of the axes are five-times shorter”, Starrag Product Manager Michael Koller explains. “What’s more, the fact that the NB machines can also move and accelerate extremely quickly makes them significantly more dynamic”. Users can even achieve further increases in productivity in what is already a highly dynamic machine by using an NB 252. The “2” at the end of the machine name indicates that the machine tool is equipped with two spindles. In effect, the NB 252 is two machines on a single machine tool bed – the spindles of these machines can simultaneously machine two completely different workpieces redundantly and independently of each other. Adopting this solution allows users to achieve a massive increase in productivity at significantly lower investment costs per work spindle. The outstanding performance characteristics are due to the fact that this new machine has also been developed and optimised with the process, output and level of dynamism and accuracy in mind. ▀

Die NB series (shown here in the form of an NB 251) has been developed for the highly efficient, simultaneous five-axis machining of “blade integrated disks” (blisks).





Tailor made:  
Starrag developed and optimised simultaneous  
five-axis machining back in the 1950s



Titanium blisk of an  
aeroplane engine milled  
from solid material in a  
single clamping position.

- + **25% shorter cycle times**  
due to significantly shorter compen-  
sating movements of the axes
- + **Doubled productivity**  
due to the use of two spindles for  
the machining of two workpieces  
simultaneously

# The Starrag micro-forging process: Hammering at high speed

The micro-forging process developed by Starrag eliminates the need for any form of post-processing work on blades. As a result, ready-to-install components can be produced on a machine tool in a single clamping position.

**Micro-forging** is actually a special method of manually flattening and sharpening the blade on a scythe or sickle through the act of hammering and is commonly used in rural areas. In the process adopted by Starrag, a special, electrically powered tool is used instead of a hammer. Placed within a machining centre, this tool shapes components to the final contour with  $\mu\text{m}$  precision. "In principle, the micro-forging tool is like any normal tool that can be inserted into the machine and subsequently controlled by the CNC," Product Manager Michael Koller explains. "On an LX 051, we can demonstrate how this process can be used to ultimately replace the act of polishing." The fact that roughness values of  $0.2 \mu\text{m}$  (Ra) can be achieved in a reliable process with a high level of repeating accuracy is a point in favour for this alternative to grinding.

**During machining**, a pulsed impact ball hammers rapidly (up to 600 Hz) with high power. Micro-forging compresses the boundary surface layers to a depth of 10 mm. Initial practical tests show that the process is significantly more precise, more targeted and more controlled than the widely used shot-blasting method. "We are currently working hard on retrofitting all machines used to produce turbine blades – in other words, all LX series machines," says Koller. This upgrade will enable all turbine blade manufacturers to replace polishing, frictional grinding and shot-blasting tasks with the micro-forging process, thus significantly shortening their process chain and cycle times. It is astonishing how Starrag has breathed new life into the well-known micro-forging process by drawing on cutting edge technology.

**The view** is shared by the German trade magazine MM MaschinenMarkt, which recently awarded the Starrag Group a prize for innovation for the second time. At the EMO 2013 trade fair, the company was a joint recipient of the MM Innovation Award together with Walter AG from Tübingen, Germany. The prize was awarded in recognition of a  $\text{CO}_2$  air-cooling system developed for Starrag machine tools. In 2014, the Starrag Group was the sole recipient of the award for the high-speed hammering process. "This is the second time that we have won the MM Award," says Walter Börsch, CEO of the Starrag Group, with delight. "The award serves as proof that lateral thinking ultimately pays off and leads to unique solutions being developed for our customers." ▀



- + 30% faster cycle times are achieved with the micro-forging process
- + No investments are necessary, because the system can be retrofitted

“The  
Starrag Group  
has already  
received the  
innovation  
**award twice.**”

**Innovation award for high-speed hammering:**  
Michael Koller and Ulrich Wiehagen from the  
Starrag Group accept the MM Award from  
Frank Jablonski, Editor-in-Chief of MM.



“As a result of  
the micro-forging  
process, the  
cycle time can  
be reduced  
enormously.”



**High-speed hammering:**

In the process adopted by Starrag, a special, electrically powered tool is used instead of the hammer used in manual micro-forging. Placed within a machining centre, this tool shapes components to the final contour with  $\mu\text{m}$  precision.



# Reaching the top, step by step

Overhead gantry milling system – Used by the world's market leader

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Doppelmayr uses a FOGS D40 unit to machine segments of pulley wheels of up to 13 metres.

+ Due to the second working area,  
no unproductive set-up times

“Tell Droop+Rein that  
we might want to buy  
a second one!”

“We purchased a  
custom made product.”  
Karl-Heinz Zündel,  
Production Manager.



[www.doppelmayr.com](http://www.doppelmayr.com)

For five years, a Droop+Rein milling centre in the overhead gantry milling machine series in use near Lake Constance has worked through an astounding workload: The custom-made product manufactures segments of pulley wheels for the world's market leader in cable car production.

**The task** was not without its challenges: A machine for turning, cutting and drilling large segments of pulley wheels (drive wheels) was required. Doppelmayr Seilbahnen GmbH from Wolfurt, Austria, produces an average of 800 gigantic segments each year, from which around 200 pulley wheels of various sizes are constructed. For example, the Hohe Brücke factory builds segments for the Ferris wheel at the “Galzigbahn” valley station in St. Anton am Arlberg. At nine metres in diameter, this wheel is a real record breaker, for more than just Doppelmayr. However, the machine is capable of even more. Department head Klaus Meyer: “If we remove the partition used for set-up, we are able to machine components up to a length of 13 metres.”

**Not just** for this reason: “We needed a much larger and more open machine with a moving column design,” Production Manager Karl-Heinz Zündel notes.

“Since there was no existing model available, we took the risk and purchased a prototype. It was important to me that the machine was also appreciated by users at grass-roots level.”

**For the** special application, Doppelmayr ordered a larger and more open version of the FOGS D40 unit with two working areas, the type and size of which (20,000 mm × 9,400 mm × 6,900 mm) had never built before by Droop+Rein. The travel paths of the multifunctional machining centre are 12,000 mm on the X axis, 4,000 mm on the Y axis and 2,000 mm on the Z axis, with a travel angle of ± 200° on the controlled C axis. The floor plate of the 135-tonne machine measures 4,000 mm × 12,850 mm; the rotary table, driven by two 60-kW three-phase motors, has a diameter of 3,000 mm. Doppelmayr had the machine equipped with an eccentric fork-type milling head as well as an angled head and a vertical milling

head (each with an output of 40 kW). In 2009, the Bielefeld team built the prototype in the Hohe Brücke factory, which, due to the marshy sub-soil on which it is built, stands on 2,000 posts. Since then, the machine from Bielefeld has been used to machine segments from solid steel that is difficult to work with – the pulley wheels are constructed from four elements plus a centre section. The various components, which measure up to 13 m in length, must be machined to between 20 and 25 µm with a high level of precision in a single clamping position.

**The FOGS D 40** has gone down well in its five years in operation in Wolfurt. Klaus Meyer is extremely satisfied with the reliability and availability offered by the machine, and his Production Manager had just this to say to the journalist writing this article: “Tell Droop+Rein that we might want to buy a second one!” ▀



# Scharmann ECOFORCE

## Improves production capacity for tailored valve machining


**In light of casting and forging costs of up to 120,000 euros per raw material, care, competence and confidence in the machining and production process are of the utmost importance at Koso Kent Introl (KKI). The company manufactures specialised valve bodies for underwater applications, as well as for the oil, gas and petrochemicals sector.**

**The level** of production capacity offered by the company can be attributed to the installation of the ECOFORCE 1 HT2 horizontal machining centre. The machine from Mönchengladbach is predominantly used to machine custom components for which cycle times of more than 24 hours are common. Lynn Mowbray, Operations Director at the British company, explains: "Processing capacity for custom products can quickly become limited for us. Due to the particular production method we use, the specific requirements of our "right first time" approach for components made from materials that are difficult to machine, and the high level of machining capacity required, only very few machine tools have been able to meet our strict production requirements." In addition, KKI can draw on numerous references from the 25 years of

business the company has shared with Dörries Scharmann.

**KKI produces** highly durable control and throttle valves, one-way restrictors for surface and underwater applications, as well as control valves for underwater applications. Each week, the site manufactures an average of 20 valves with capacities of between 25 and 508 mm from sophisticated materials such as titanium, Inconel, super duplex, duplex and stainless steel. The highly durable valves are used in a variety of outdoor applications, including high-pressure and high-temperature applications, and must withstand the effects of cavitation, high speeds, vibrations, evaporation and dissipation (sound and energy) as well as liquids polluted by suspended matter.

**The machine**, which measures 1,600 × 1,250 × 2,200 mm, is equipped with 1,400-mm double pallets so that the operator (who is present at all times) can set up and prepare the next component in advance. Providing no heat treatment is required, most components are now processed on the ECOFORCE machine in a single sequence of clearing, pre-smoothing and finishing. Lynn Mowbray explains: "We make use of the capabilities and level of accuracy offered by the machine as much as possible in order to adhere to our strict specifications in terms of geometric relationships, size tolerances and surface finishes. We always carry out numerous cuts and perform constant tests, as any error would be extremely costly. Thanks to the repeatability of the process, however, we can make highly



+ 25% shorter cycle times  
due to milling, turning and  
drilling operations in one  
clamping position



Highly durable valves for various outdoor applications are produced on the Scharmann ECOFORCE.

**+/- 0,02 mm** TOLERANCE

precise adjustments using a minute offset – and know the result in advance.”

**The main** areas of the production cycle include turning work for large surfaces and flanges and the drilling of various holes in surfaces positioned adjacent or at an angle to each other. These holes can have a diameter of up to 700 mm and a depth of 600 mm and are drilled using specialised drill rods with a normal tolerance of +/- 0.02 or, in some special cases, an overall tolerance of 0.01 mm. The drawing specifications can even include offset or semi-circular machining. For most components, pitch circle boring cycles are also required.

**The high-quality** ECOFORCE is installed on a specially prepared solid foundation and offers a 4,000-rpm spindle drive with

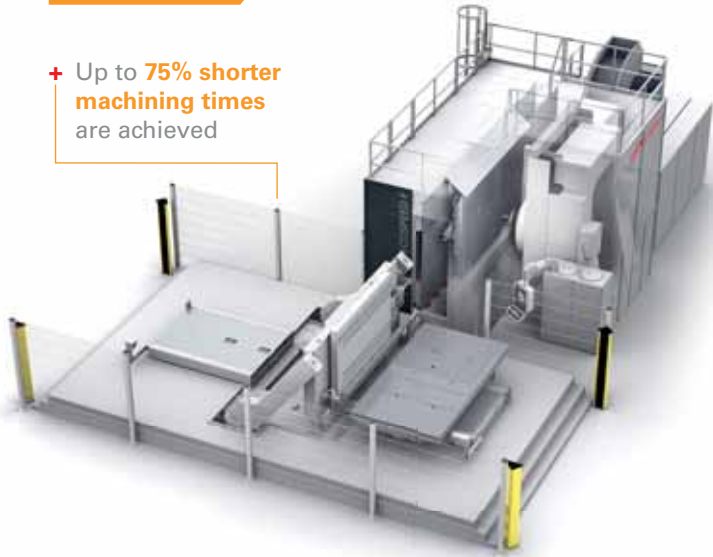
“We make use of the **machine’s precision** to adhere to very strict specifications.”



a 50-kW output and torque of 2,200 Nm. The specification also includes a facing head with a maximum rotation diameter of 1,250 mm. This rotating head offers a speed of 300 rpm and an enormous level of torque of 6,000 Nm. The W axis is 375 mm long, the U axis +/- 100 mm. Questions about environmental protection, such as the installation of energy efficient drives, the recovery of energy, compensation for idle power and energy efficient peripheral devices for hydraulics, hydrostatics and cooling, all played an important role when purchasing the machine. ▀



+ Up to **75% shorter machining times** are achieved



Alfred Lilla, Head of Sales of the Aerostructure market segment at Starrag Group: "I am confident that we will enhance the Japanese aviation industry with our first order and excellent on-site service"

# ECOSPEED goes Japan

**Four times faster than the competition – Boeing supplier orders the first ECOSPEED machining centre in Japan**

Around a third of all ECOSPEED machining centres produced to date have been destined for Asia. This success story is now starting a brand new chapter: The first Starrag Group ECOSPEED destined for Japan has been bought by a major Japanese manufacturer of aircraft components.

"I am 100% certain there is no machine tool out there that can compete with the performance of an ECOSPEED," says Alfred Lilla, Head of Sales of the Aerostructure market segment at Starrag Group. A few years ago at his first ECOSPEED seminar in China, Lilla carried out an experiment that shocked the representatives of all the renowned aviation companies. An ECOSPEED machining centre milled an Airbus frame to the highest level of precision in about 95 minutes. The Chinese hosts would normally do this in around nine hours.

**Since then**, the Scharmann ECOSPEED series has dominated the Asian aviation industry with its high-performance machines: Regular customers include Korea Aerospace Industries Ltd. (KAI) from Sacheon City (South Korea). Since 2009, Korea's sole aircraft manufacturer has placed 12 orders for ECOSPEED machining centres, designed for high-speed machining of large aluminium structural components. KAI has recently extended its contract to include a further two ECOSPEED F models, intended to complete one of the world's largest manufacturing lines in 2016; the line will eventually encompass nine machines, three fitting stations, two transport carts and a total of 60 pallets. Lilla: "This regular customer also has three ECOSPEED machining centres to produce 20-metre long wing panels."

**Thanks mainly** to their Sprint Z3 parallel kinematic machining head, the machines of this series have proven themselves in the highly dynamic, simultaneous five-axis milling

of challenging, aluminium large-scale components. KAI uses this technology for a number of applications, including machining the highly complex supporting structural parts of the Airbus A 350 XWB.

**So far**, a total of 35 ECOSPEED orders have come from South Korea and China. But the icing on the cake of this success story is order number 36: The first order from Japan, received by Starrag in the summer of 2014 based on the references from Asia and after a very convincing testing process by a Japanese Boeing supplier. "The ECOSPEED machined a mid-sized structural aircraft part for Boeing four times faster than any of its competitors," reports the Head of Sales Aerostructure. The well-known aerospace company will commission an ECOSPEED F 2040 in 2016, first using the high-performance machine to make structural components. The company will then almost certainly go on to place orders for further machining centres.

**The Sales Manager** is confident that he and his team will enhance the Japanese aviation industry with this order and excellent on-site service. To be able to serve Asian customers to particularly high standards, Starrag has built up a consignment stock for the rapid supply of spare parts in Seoul and Shanghai. Lilla: "Besides the technology, this is one of the reasons why we have had such success in Asia. The performance and robust technology of the ECOSPEED series speak for themselves – no responsible manager can ignore that!" ■





+ 20% higher  
productivity due  
to reduction of  
set-up times

Boasting a market share of more than 40%, Mahindra is the leading manufacturer of tractors in India, and the demands the company makes of its suppliers are equally high.

## WMW IWK for Indian tractor production

Starrag India has received a large order from Mahindra Nagpur for its IWK 7000 horizontal machining centre. The company is part of the Mahindra group, which, in addition to producing pick-up trucks and light commercial vehicles, produces bullet-proof vehicles for the Indian government, as well as agricultural vehicles such as tractors.

**The new** machining centres are intended for the production of two-cylinder, three-cylinder and four-cylinder engine blocks for tractor engines. The sales and application team made a targeted bid for this contract and is rightly proud to have inspired Mahindra to become the first major customer for the new IWK series. Boasting a market share of more than 40%, Mahindra is the leading manufacturer of tractors in India, and the demands the company makes of its suppliers are equally high: from project planning and pre-acceptance tests to installation and commissioning – Starrag India impressed from start to finish. Approval for compo-

nent designs and tool designs, processes and quality specifications was obtained in carefully carried-out steps. The mechanical engineering work was undertaken in parallel with the technical preparations to ensure that all elements were available for pre-acceptance tests. Factory approval by the customer was given according to plan, at which point the last process adaptations could be started.

**The IWK four-axis machining centres** are produced at Starrag India's state-of-the-art factory in Bangalore. When machining complex workpieces, these machining centres meet the customer's

requirements in terms of flexibility, accuracy and cost efficiency with impressive style. The unique technological concept eliminates downtime during set-up.

**By having** Mahindra as a reference, WMW hopes to firmly establish itself in the Heavy Duty Vehicles & Engines/ On-Road Vehicles market segment with the IWK series and ultimately generate more orders. Not least for this reason, the team is dedicating itself to impressing customers across the board with the reliability, technology and productivity they offer. ▀

# Size makes all the difference

For MAC Maschinen- und Metallbau GmbH (MAC), a company based in Chemnitz, Germany, that has specialised in the machining of castings of over two metres, quality and reliability are two essential properties.

**MAC Maschinen- und Metallbau GmbH** was founded by Peter Rottluff back in 1990 and today employs a staff of around 40. Peter heads up the company together with his son, Uwe Rottluff, who as an additional Managing Director of the business is primarily responsible for purchasing. The Rottluffs explain their strategy: "We seek out elements of our market that go beyond what any company can offer and set ourselves apart through the level of quality and reliability we offer." As a result of its many years of experience, MAC is able to offer customers a comprehensive range of services. But it is the company's employees that the Rottluffs are particularly proud of; employees with whom they maintain a close relationship: "Many of them have been with us for over 15 and 20 years. They form the foundation for delivering the flexibility and the high level of quality for which we are known."

**The second** pillar in the company's business development strategy is modern CNC production capabilities. The Chemnitz-based company, which is medium in size,

has adopted a strategic position in this respect: "Our focus is on milling large castings. That is why we use CNC machines that offer us the scope to precisely machine rough castings of over two metres to within an accuracy of  $\mu\text{m}$ ."

**The pool** of machines in the production hall is clearly dominated by Heckert machinery that is also based in Chemnitz. The close partnership the company shares with this long-standing machine manufacturer is something that MAC holds dear. Peter Rottluff himself even took on service tasks for Heckert machinery during the transitional period in Germany's history known as "die Wende". "I was well aware of the high level of quality offered by these machining centres, and being in close physical proximity to suppliers is always an advantage," the Managing Director notes.

**While the** Rottluffs initially used a number of the smaller CWK 630 horizontal Heckert centres in their business operations, in 2009 they dared to take the step up to larger dimensions. They invested in a Heckert HEC 1250 P Athletic

horizontal machining centre equipped with an additional quill, which can extend to up to 500 mm. The machine, which also features a double pallet changer, offers travel paths of 2,200 mm on the X axis, 1,500 mm on the Y axis and 1,850 mm on the Z axis. The maximum diameter of the workpiece interference circle is 2,400 mm. An NC rotary table accounts for the valuable fourth axis, which, when used with skill, significantly reduces the number of clamping positions required. "Thanks to the HEC 1250 P Athletic, we are able to cover a significantly wider range of products and services," explains Peter Rottluff. "For example, we can pack all axles for construction machinery into the machine and machine these down to the  $\mu\text{m}$  range in a rough or precision process."

**The fact** that the company bosses have ordered a second machine after just two years is testament to how impressed the duo are with the Heckert HEC 1250 P. Peter Rottluff explains: "With the HEC centres, Heckert has retained proven features such as the robust, durable construction of the machine, but also brought essential details to the cutting edge of technology." At the beginning of the year, MAC extended its track of success even further and ordered a HEC 800 horizontal machining centre. ▀



To help deliver quality and reliability at MAC, the company uses two HEC 1250 horizontal machining centres, among other equipment.



"Thanks to the HEC 1250 P, we are able to cover a significantly wider range of products and services."

+ As a result of the option of complete machining of entire axes, MAC's range of products and services is expanding

**Double pallet changer:**  
During the machining time, the clamping, transforming and unclamping of the workpieces is performed on the load-unload station. This allows for significant reduction of set-up and non-productive times.

2009

2014

2015

HEC 1250 P > HEC 1250 P Athletic > HEC 800

[www.macmittelbach.de](http://www.macmittelbach.de)



# Heckert HEC 1600 Athletic – The key to precision and productivity



A BOMAG tandem roller, as  
used for asphalt compaction.

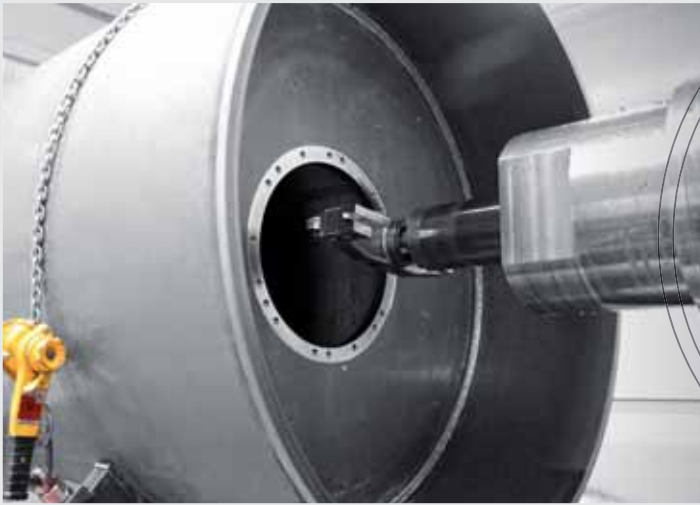
**The term “drum” refers to the roller body of compacting equipment, such as the kind used in road construction.**

The drum forms the very heart of this equipment – so much so that world market leader BOMAG, or Bopparder Maschinenbau-Gesellschaft mbH, pays special attention to the production of drums. Around 15,000 drums are produced each year. In order to optimise the machining of the side panels, the company invested in a Heckert HEC 1600 Athletic horizontal machining centre.

**To ensure** the best production conditions, the company built a new hall – the “drum factory”. Production Manager Kai Riedel explains: “The drum factory is what we would call a production cell: Ready-to-install drums in various forms and dimensions are manufactured within this cell”.

**The process** for machining cup washers, which are already permanently welded into the drum, is particularly demanding. In order to operate at the highest technical and economic level, BOMAG equipped this area with a new HEC 1600 Athletic machining centre from Heckert. Kai Riedel explains the reasons behind the investment: “Every production sector must be able to stand up to comparison





The traversable spindle provides stability and enables shorter tools to be used, thus reducing the risk of disruptive vibrations.

+ Highest availability of > 95%

“The HEC 1600 Athletic is the most precise machine in the entire drum factory”

[www.bomag.com](http://www.bomag.com)



with external suppliers, from both a technical and an economic perspective. Therefore, particularly for new purchases, we set high requirements in terms of efficiency and thoroughly compare the offers on the market.” In this way, the new horizontal machining centre in particular should be more productive than the two existing boring mills and have a technical availability of at least 95%.

**Like all** horizontal machining centres in the HEC series, the HEC 1600 sets itself apart through its modular construction, which comprises the main groups, the functional elements for tool and work-piece handling, the work spindle and the CNC control. The powerful main drive ensures a high material removal volume.

Dynamic adjustment axes and a rapid tool change process reduce the amount of unproductive time. “With its 1,600 × 1,250 mm clamping surface, the machining centre also meets other requirements, such as a high level of availability, and is controlled by a Heidenhain iTNC 530 that is easy to programme on-site. Together with the compact, thermally symmetrical design of the machine, the profile rail guides and digital AC feed drives on all linear axes form the basis for precision machining

**Gangolf Wobido**, a member of the management team for the drum factory, is impressed by the Heckert machining centre: “Besides being another new, albeit considerably smaller machining

centre, the HEC 1600 is the most precise machine in the entire drum factory. As a result, we no longer need to finish-bore some fits, rather we can circular mill them. That is more cost effective.” The HEC 1600 also has an NC-controlled traversable spindle at its disposal, which can reach deep into the drums in order to finish-bore the holes for the axle, for example. Wobido is enthusiastic: “Thanks to the traversable spindle, we can use short tools in most cases. If this were not the case, very long tools would be required for internal work. These long tools tend to vibrate strongly, which is particularly detrimental when working inside a resonating body. The results with the spindle are much better and altogether more efficient.”

# Precision with exemplary character

**Interview** with Jean-Daniel Isoz, Business Unit Director of "Precision Engineering" at the Starrag Group

The "Precision Engineering" business unit is characterised by two brands with high standards for precision. Business Unit Director Jean-Daniel Isoz reports on the two traditional brands Bumotec and SIP from the Swiss cantons of Fribourg and Geneva within the Starrag Group.

**Mr Isoz, you have managed the "Precision Engineering" business unit since the beginning of the year: What distinguishes the machine tools from Bumotec and SIP? Where are the differences and where are the commonalities?**

**Jean-Daniel Isoz, Director of the "Precision Engineering" business unit:** Both follow the same path in the fight for the last micrometre. It begins as early as development, in the work on the concept studies. Neither company selects the cheapest materials and components to assemble them in the fastest possible way. Instead, they opt for a "sound" mechanical engineering design at a reasonable price.

**And where is the difference between the two companies?**

**Isoz:** With a view to the preferred machining strategy of its customers, Bumotec puts more of an emphasis on manufacturing productive equipment. In contrast, SIP customers expect first and foremost, if not exclusively, that SIP makes no compromises where precision is concerned.

**What machines are developed under the name Bumotec, and what sectors are they used in?**

**Isoz:** Bumotec is the youngest member of the Starrag Group. The former family company specialises in machines for the machining of complicated parts and has earned a good reputation within almost four decades in the watchmaking industry. Thanks to this image and the company's quality work, its high-precision production systems, which range from the four-axis milling machine to multi-spindle machines with up to 36 axes and a maximum of eight spindles, are also used in the jewellery, eyeglass, medical technology, aero-technology and automobile industry.

**For over 150 years, high-precision machining has been counted among the specialities of SIP Société d'Instru-**

**ments de Précision SA in Geneva, where you were the Managing Director until 2013. What is special about the machines? Who uses them?**

**Isoz:** SIP is considered the symbol of ultimate and uncompromising precision in the construction of machine tools, whose basic concept can still be found in all traditional vertical and horizontal machining centres. The jig boring machines, for example, are suitable for the fine drilling and milling of holes, edges and surfaces and for precision grinding. They are positioned in the range below two micrometres. All machines exhibit a previously unachieved high long-term precision. Due to these characteristics, the SIP machines are preferred for use in aerospace and by competitors in the machine tool sector and contract manufacturers worldwide, who have positioned themselves in the area of ultra-precise machining of high-quality mechanical workpiece parts.

**In the summer of 2014, the foundation stone was laid for the factory in Vuadens in the Swiss canton of Fribourg: What are the advantages of the new plant? Who will be moving in there and when?**

**Isoz:** Thanks to its air conditioning, which ensures a maximum temperature fluctuation of  $\pm 1.0$  degree Celsius, the production facility is suitable for the production of ultra-precise equipment, systems and machines. Therefore Bumotec will be moving all of its operations to the plant in the summer of 2016. SIP and outside tenants are also scheduled to move in.

**Where are synergy effects already occurring between the two companies, both of which are dedicated to high precision?**

**Isoz:** When looking at the product portfolio of the two companies it is easy to see what can be improved and adapted in terms of



Since 1st January 2015, Dipl.-Ing. HTL Jean-Daniel Isoz (1959) has managed the Precision Engineering business unit, which handles the market segments Luxury Goods, Micromechanics and Med Tech with the brands Bumotec and SIP. Before that, from 2013 he managed the former Business Unit 4 in Sâles (Switzerland), and before that, from 2006, he was the Managing Director of SIP Société d'Instruments de Précision SA in Meyrin.

+ Sustainable increases in productivity due to customer-focused machine developments

+ The extremely high precision of the machines makes reworking unnecessary

"I am personally convinced that the Precision Engineering Business Unit will continue the success story in the 'Micromechanics' and 'Med Tech' markets that **Bumotec** has already written in the past **40 years** together with the watch-making industry."

products and where there are possibilities for new developments. Here we see potential on both sides. It is a typical win-win situation, in which each can make use of the advantages of the other – with a view to image, market position, expertise, technology, production capacity and company culture.

**And your assessment of the market segments "Luxury Goods", "Micromechanics" and "Med Tech": What do these sectors contribute to your business unit's commercial success?**

**Isoz:** Some people certainly think, we are lucky, because Bumotec supplies the "Luxury Goods" market. However, that is only partly true. Every machine tool manufacturer can only increase its commercial success if it manufactures the right product, which systematically meets customer expectations. Even if it sounds unbelievable: More and more often we are receiving the same good feedback from customers from "Micromechanics" and "Med Tech" that Bumotec receives

from its customer base from the watchmaking industry. Soon we will have learned how the new markets can be conquered with new production equipment. I am personally convinced that the Precision Engineering business unit will then continue the success story in these markets that Bumotec has already written in the past 40 years together with the watchmaking industry.

**Mr Isoz, what is your strategy for the individual market segments over the next few years?**

**Isoz:** We are focusing on our already proven approach – this means no expensive market studies and no big plans from the latest strategy book. Instead, pragmatism is called for: Listen to your market partners and customers. Make sure that they receive their equipment on time. Nothing more than that! Therefore it is important right now to have the right, highly motivated people on board. Therefore I would like to express my thanks here to all Bumotec and SIP employees: Without my teams, no product and no single machine would leave the factories. ▀

# Precision in movement

Since its early history, the University of Sheffield in the UK has been a world leader in metalworking and engineering research. At the heart of this research is the AMRC (Advanced Manufacturing Research Centre), which combines industry expertise with practical solutions and university innovations in close collaboration with industrial companies.



**+30%** faster cycle times due to an innovative machine concept



**Bumotec sent out** invitations to a customer day at the associated NAMRC (Nuclear Advanced Manufacturing Research Center). The aim of the day was to demonstrate to customers on the S-191 how it is possible to significantly increase productivity and efficiency using a Bumotec machine. Some 80 participants accepted the invitation and took the opportunity to see the innovative Bumotec machine in use and become familiar with the highly effective technology.

**The S-191 Linear series** represents the highest levels of precision and offers reliable repeating accuracy when machining parts such as watch components made of gold, platinum or silver, or medical implants and instruments. Linear technology, which ensures backlash-free, repeatable precision in the  $\mu\text{m}$  range in the S-191 CNC turn mill centre, plays an important role in this. Thanks to the combination of the rapid linear drive with a high-resolution Renishaw measuring system and the stabilised cooling circuit for all heat-generating elements, the S-191 Linear achieves excellent values – and it is not only regular customers from the watch industry who find them impressive. The machines in the S-191 series are suitable for turning, cutting and other machining operations (such as grinding) for individual parts or from a bar in a clamping process. The series is set apart by a highly versatile modular design, which enables all kinds of machines to be assembled from the standardised kit – including a centre with seven axes and three spindles. ▀





Record breaking:

# Chip-to-chip time < 0.5 seconds!



In developing the **Bumotec s100<sup>multi</sup>**, Bumotec is aiming to revolutionise series production of small precision parts.

**With its** eight high-speed spindles (60,000 rpm), the s100<sup>multi</sup> transfer machine accelerates (3g: 29.43 m/s<sup>2</sup>) and machines extremely quickly thanks to the linear motors fitted in all axes, achieving a record-breaking chip-to-chip time of 0.5 seconds. What's more, the new machine operates without any hydraulic components.

**There is** a growing need within the industry for flexible, ergonomic and easy-to-programme machine tools that deliver a high level of productivity and dynamism when milling from batch size 1 up to series production. Machine tools such as these circumvent the disadvantages associated with having multiple operations on a set of single-spindle machines and the inflexibility of conventional transfer machines.

**The new** machine has been developed with exactly these requests in mind. Thanks to the minimal amount of space the machine requires and the multiple tool magazines that can hold up to 144 tools, the dynamic machining centre is a key solution for manufacturers needing to quickly produce highly accurate, ultra-precision parts up to a maximum size of 80×80×80 mm. Typical applications include components for the watch, computer



Demonstration part, 2.5-minute-long cycle for complete machining from a solid piece.

**+ 250% higher productivity** with the same amount of floor space

**+ 20% higher energy efficiency**

and electronics industry. Customer trials are showing that drawing on this machine concept can deliver a 250% increase in productivity, all while maintaining the same amount of floor space.

**"The Bumotec s100<sup>multi</sup>** offers the ideal combination of a high level of productivity, a high level of precision and improved flexibility". In each case, two milling spindles work simultaneously to achieve an extremely high level of precision within very short cycle times. The exceptional dynamism and interpolation performance is achieved by drawing on the latest technology and specially designed, optimised mechanical elements. In bringing about this development, particular attention was paid to boosting energy efficiency.

**The shorter** cycle times and measures such as energy recovery highlight the efforts made as part of the Blue Competence Initiative.

**Working together** with specialists, special attention was given to achieving an ergonomic design that allows the user to gain easy access to the workpiece. ▀

# Heckert comes runner up

## INTEC Trade Fair Young Talents Award

The fact that the first granite frames were ordered directly from the production drawings demonstrates just how highly machine tool manufacturer Heckert rates the work of the aspiring mechanical engineer.



Thanks to its inherent properties, granite is the ideal material for manufacturing high-precision measurement and production machinery. The damping capacity of granite is three to four times higher than that of cast iron or steel. Steel and cast iron are also subject to a coefficient of expansion that is double that of granite.



Congratulations from the Heckert management to Lars Neugebauer for winning this entrepreneurship award.

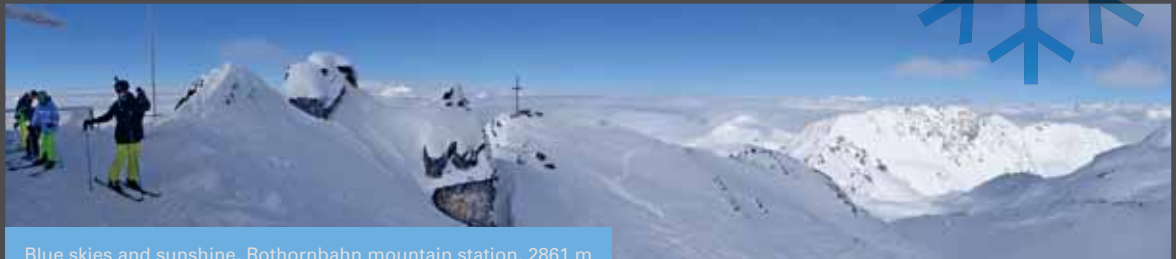
**INTEC**, the international trade fair for machine tools, manufacturing and automation, was held in Leipzig, Germany, back in February. As part of the opening event for INTEC and the accompanying Z trade fair, various competition prizes were awarded on 23/02/2015.

**By handing** out these awards, the Leipzig-based trade fair recognises outstanding developments on the part of exhibitors with regard to machine tools and peripheral devices, or innovative solutions in the field of production and automation technology. The Intec-Award for promoting young talents was also presented; this award is intended to

promote particularly dedicated and innovative young entrepreneurs. The second prize in this category went to Lars Neugebauer from Heckert.

**The prize** was awarded by a panel of experts from the fields of science, industry and politics for Neugebauer's engineering project entitled "Manufacture of granite frames for machining centres offering maximum levels of production accuracy". The fact that the first granite frames were ordered directly from the production drawings demonstrates just how highly machine tool manufacturer Heckert rates the work of the aspiring mechanical engineer. ▀

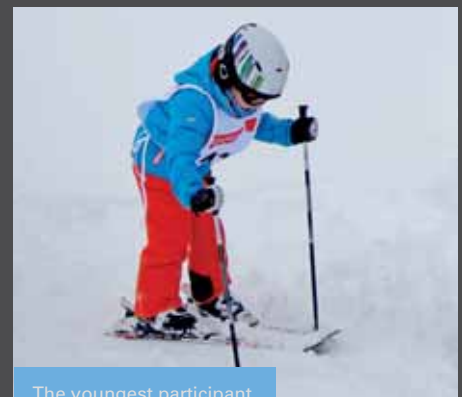
# Starrag out on the pistes



Blue skies and sunshine, Rothornbahn mountain station, 2861 m



Starting off at 2800 m



The youngest participant, Simeon Koller, 6 years

## Results Ski racing:

Fastest man:	Martin Heller	<b>51.17 s</b>
Fastest woman:	Michelle Anliker	<b>58.98 s</b>
Fastest child:	Joel Leuch	<b>1:15.87 m</b>
Fastest boarder:	Raphael Müller	<b>1:05.81 m</b>

**After focussing** on the high-precision, customer-orientated work that is necessary to build our machines, it's sometimes good to have a change of scenery and free our minds for new ideas. And as the beautiful backdrop of the Alps is not too far away, the Starrag Group takes advantage of this ideal location.

**A Group-wide** ski trip offered all employees the opportunity to show off their sporting skills and indulge their passion for beautiful Alpine panoramas.

**In all**, 53 people took part in two runs of the obligatory ski race at the Rothorn/Arosa ski resort. After the race, the weather remained fantastic and there was plenty of time left over to enjoy the ski runs or to admire the view from the Wannerbar, perched 1560 m above sea level. ▀

**starrag**

Starrag Group

Berthiez  
Bumotec  
Dörries  
Droop+Rein  
Heckert  
Scharmann  
SIP  
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WMW

# Ready for take-off!

From turbine elements such as blades, blisks and casings to structural components and stringers to landing gears.

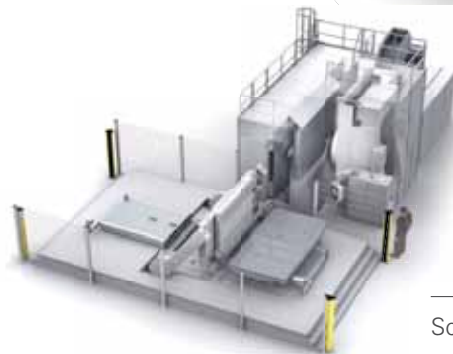


**75 %**

Reduction of part times  
due to parallel kinematic  
machining head

**70 %**

Higher chip removal rates  
due to cryogenic CO<sub>2</sub>  
cooling



Scharmann ECOSPEED F



Starrag LX 021

Worldwide  
service presence

300 service experts in  
more than 60 locations



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