starrag

Starrag
Magazine
01–2025

star

With XXL efficiency into the future of wind power

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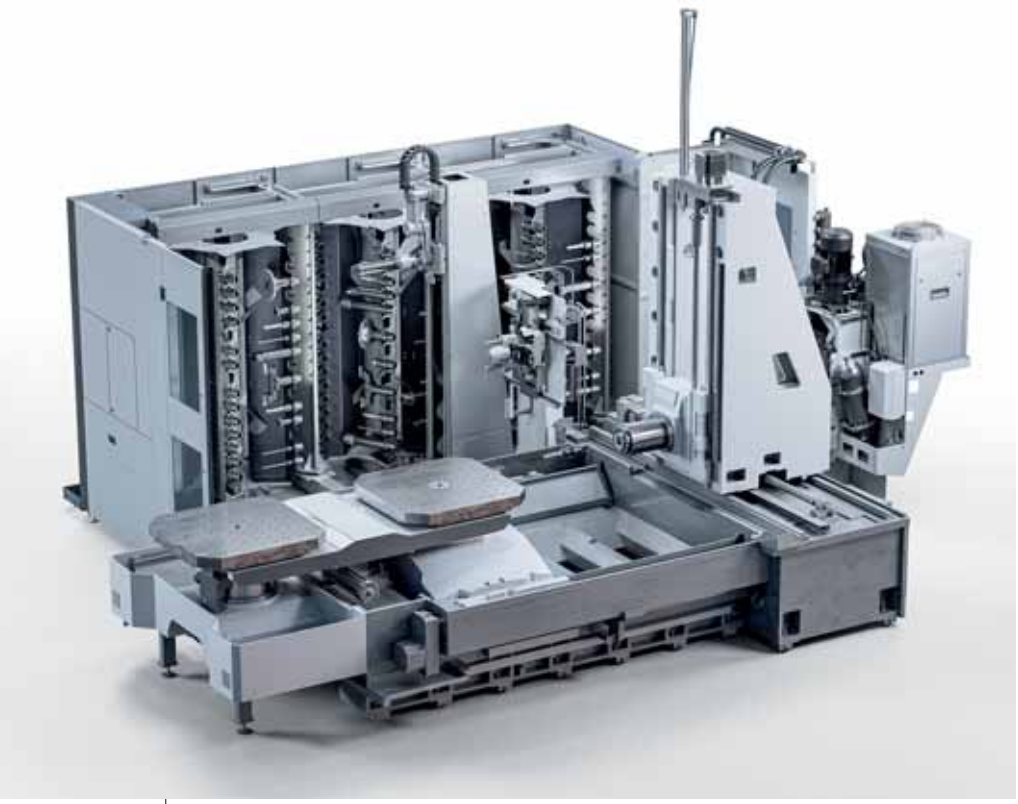
10 star



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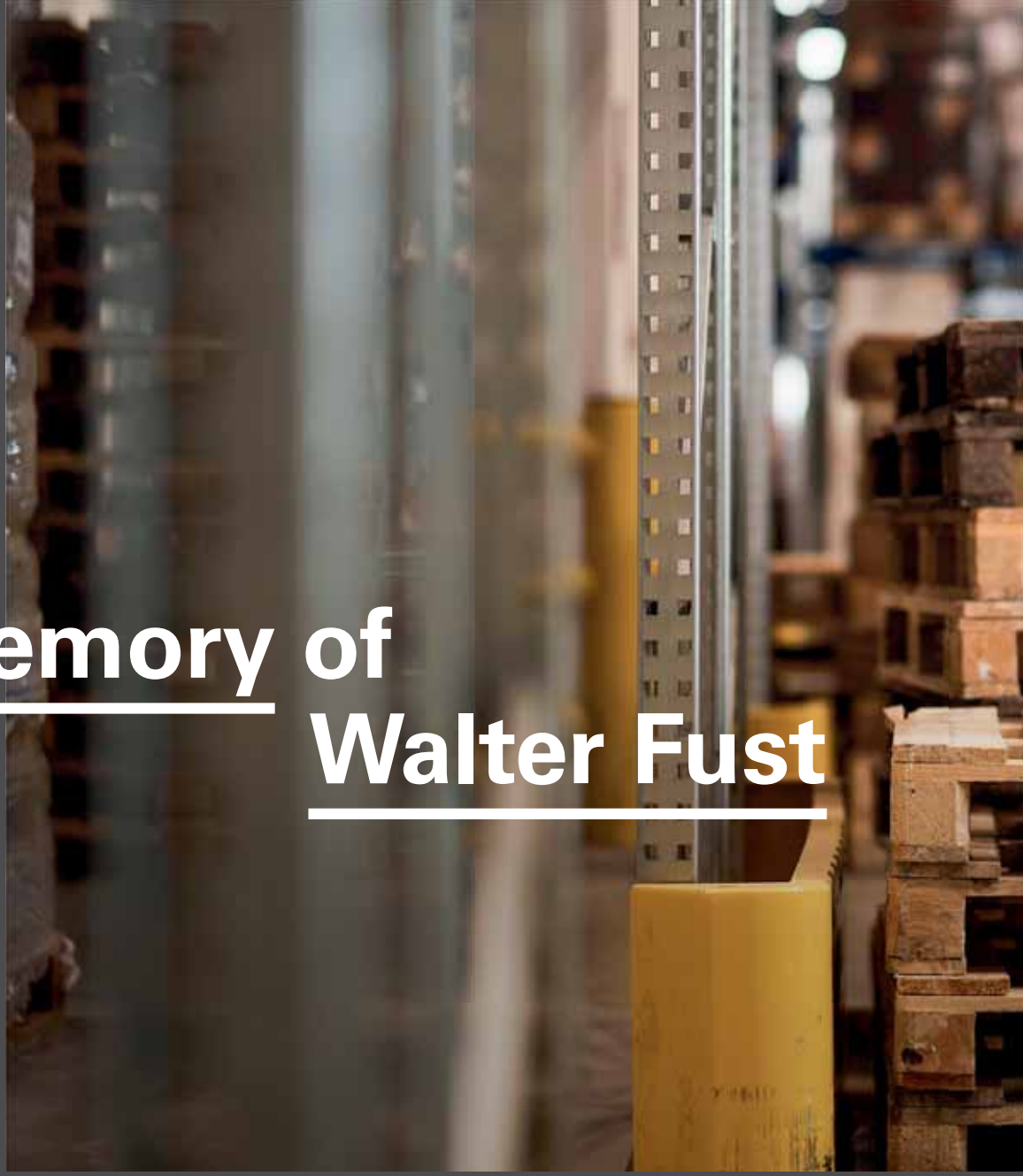
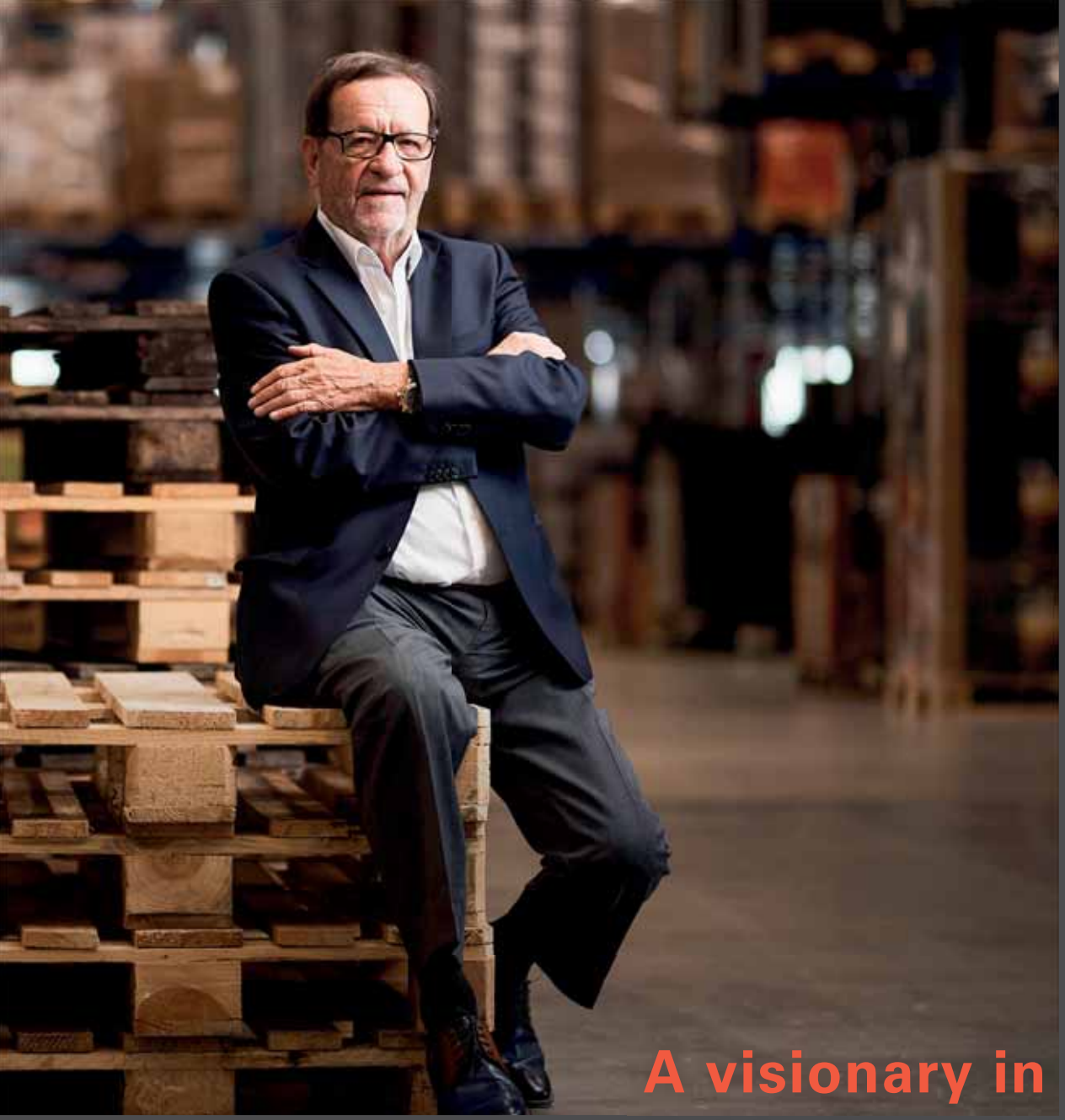


In memory of Walter Fust

It is with great sadness that we have to inform you of the death of supervisory board member and majority shareholder Walter Fust. He passed on 4th February 2025 after a short illness. His entrepreneurial vision, his passion for precision and his tireless commitment have left a lasting impression on the StarragTornos Group.

An entrepreneur with vision and foresight

Walter Fust was not only an exceptional entrepreneur in the retail and property sectors, but also a formative figure in the machine tool industry. He was quick to recognise the importance of technological excellence and strategic partnerships. With his long-term investment in Starrag and the groundbreaking merger with Tornos in 2023, he laid the foundations for today's StarragTornos Group, which is now the fourth-largest machine tool manufacturer in Europe. Walter Fust was actively involved in the company until the end, supporting its strategic development as a member of the supervisory board and instigating key changes through his keen understanding of innovation and market potential. His deep connection to Starrag was evident not only in his investments, but also in his feel for technology, sales and customer relations.



Walter Fust was actively involved in the company until the end, supporting its strategic development as a member of the supervisory board and instigating key changes through his keen understanding of innovation and market potential.

A visionary in the field of machine tool construction

Ensuring continuity and stability

The StarragTornos Group will continue and develop in his spirit. The company shares will remain fully owned by the family in order to ensure stability and continuity for the future. The joint heirs have every faith in Chairman of the Supervisory Board Michael Hauser, who, as a long-time confidant of Walter Fust, stood by his side and, together with the management, will continue to grow the company in Fust's spirit.

His legacy lives on

Walter Fust was a role model for many young engineers and managers – an entrepreneur who brought about innovation through courage, strategy and unwavering dedication. His guiding principle that "precision is the key to success – in technology and in entrepreneurship" will continue to guide us in the future. We are focused on continuing on the successful path of the StarragTornos Group and shaping the future together with all our employees.

Martin Buyle

Starrag at trade shows 2025

17.–21.01.2025
T.Gold Vicenzaoro
Vicenza (Italy)

21.–24.01.2025
NSSF Shot Show
Las Vegas (USA)

23.–29.01.2025
IMTEX
Bangalore (India)

27.–28.02.2025
PBExpo
Miami (USA)

05.–07.03.2025
MECSPE
Bologna (Italy)

11.–14.03.2025
Global Industrie
Lyon (France)

21.–26.04.2025
CIMT
Beijing (China)

13.–15.05.2025
EASTEC
West Springfield (USA)

03.–06.06.2025
EPHJ
Geneva (Switzerland)

11.–12.06.2025
GTMA
Limerick (Ireland)

16.–22.06.2025
Paris Air Show
Le Bourget (France)

17.–19.06.2025
OMTEC
Chicago (USA)

22.–26.09.2025
EMO
Hanover (Germany)

29.09.–02.10.2025
CMTS
Toronto (Canada)

07.–10.10.2025
MSV
Brno (Czech Republic)

21.–23.10.2025
WITS
Wichita (USA)

22.–25.10.2025
CAEE
Xi'an (China)

17.–21.11.2025
Dubai Airshow
Dubai (United Arab Emirates)

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Martin Buyle
Division CEO Starrag

Dear readers,

With the passing of Walter Fust, we have lost a formative entrepreneurial personality. His motto, "precision is the key to success" will continue to guide us – in the true spirit of Nicolas Hayek's words "you don't really die as long as you leave behind an idea that lives on".

However, precision is not the only key to our success, but also an unwavering focus on the needs of our customers. For the past ten years, we have been explaining our approach not only in face-to-face conversations, but also in our customer magazine "Star". In the first issue, back in 2015, Starrag CEO of the time Walter Börsch summed it up neatly: "We have the custom solution you need to fulfil your safety, profitability and growth requirements." The application examples taken from Starrag's diverse practical experiences back then demonstrated that this message was not merely grey marketing theory – for example, in the machining of complex turbine components, high-precision valves or in the manufacture of sophisticated structural components.

In this issue, ten years on, we show how we continue to ensure safety, profitability and growth with our machines even in challenging times such as these: In Portugal, for instance, a Bumotec s181 optimises the manufacture of intricate watch components and high-precision parts for medical technology, while the new Heckert H100 compact machining centre offers tailor-made solutions for highly productive machining, particularly in the commercial vehicle sector and in high-precision mechanical engineering. The focus is not only on machines, but on the innovative processes behind them too. During the Technology Days in Chemnitz, for example, we demonstrated the perfect interplay of digitalisation, automation and precision.

This year, HACO provided the perfect example of what interaction with a regular customer should be. The Danish family-run company is proof that it is not just large corporations that put their faith in our solutions, but also medium-sized companies. HACO manufactures rotor and generator housings for the wind power industry using a Droop+Rein gantry machine and a Dörries portal machine. With this gigantic machine duo in its fleet, the regular customer is able to produce even larger components and thereby meet the growing demands of the wind energy industry.

Happy reading!
Yours, Martin Buyle

IMTEX 2025

The IMTEX 2025 trade show in January attracted a record number of business visitors and cemented its status as the largest exhibition for metal-cutting machine tools and manufacturing technologies in South and Southeast Asia.

In addition to new developments, technological solutions and workpieces, Starrag also presented the Sprint Z3 parallel kinematic machining head from the ECOSPEED series and the Bumotec 191neo turning/milling centre.

Visitors were also able to explore the Starrag world virtually every day using VR glasses.

S Anandan, Founder and Managing Director of Thaai Casting Limited (*right*), and AR Jagadish, Business Head – Transport & Industrial, Oil & Gas – Regional Sales Starrag India, at the foundation stone laying ceremony in Chennai

Successful launch of the new vertical lathe

At IMTEX in India, Starrag sold the first Dörries VT28 to Thaai Casting in Chennai, India. The newly developed vertical turning machine is used to manufacture planetary carriers for wind energy gear units. With a swing diameter of 2,800 mm and a turning height of 2,600 mm, as well as the robot tool magazine for handling heavy milling heads and 108 tools, the customer is ideally equipped for future requirements. Thaai Casting has been selected as the new supplier for Flender and Winergy and is building a modern, air-conditioned plant for this purpose. This customer order confirms that Starrag's decision to invest in the new development of a single-column vertical turning machine with a focus on wind energy components was a successful one. This expansion perfectly complements the existing product portfolio of the LPMS business unit and strengthens its future viability.

Vicenzaoro January 2025, the leading trade show for the global jewellery industry, set new attendance records with participants from 145 countries, significantly exceeding the number of Italian visitors. T.Gold, which presented the latest technological trends in the industry, was held at the same time. Starrag impressed with the demonstration of one of the smallest 5-axis simultaneous machining centres on the market. The visitors were delighted by the quality achieved in record time.

The Bumotec s128 machining centre, which produced a complex ring in a single production cycle in less than 9 minutes.

1862

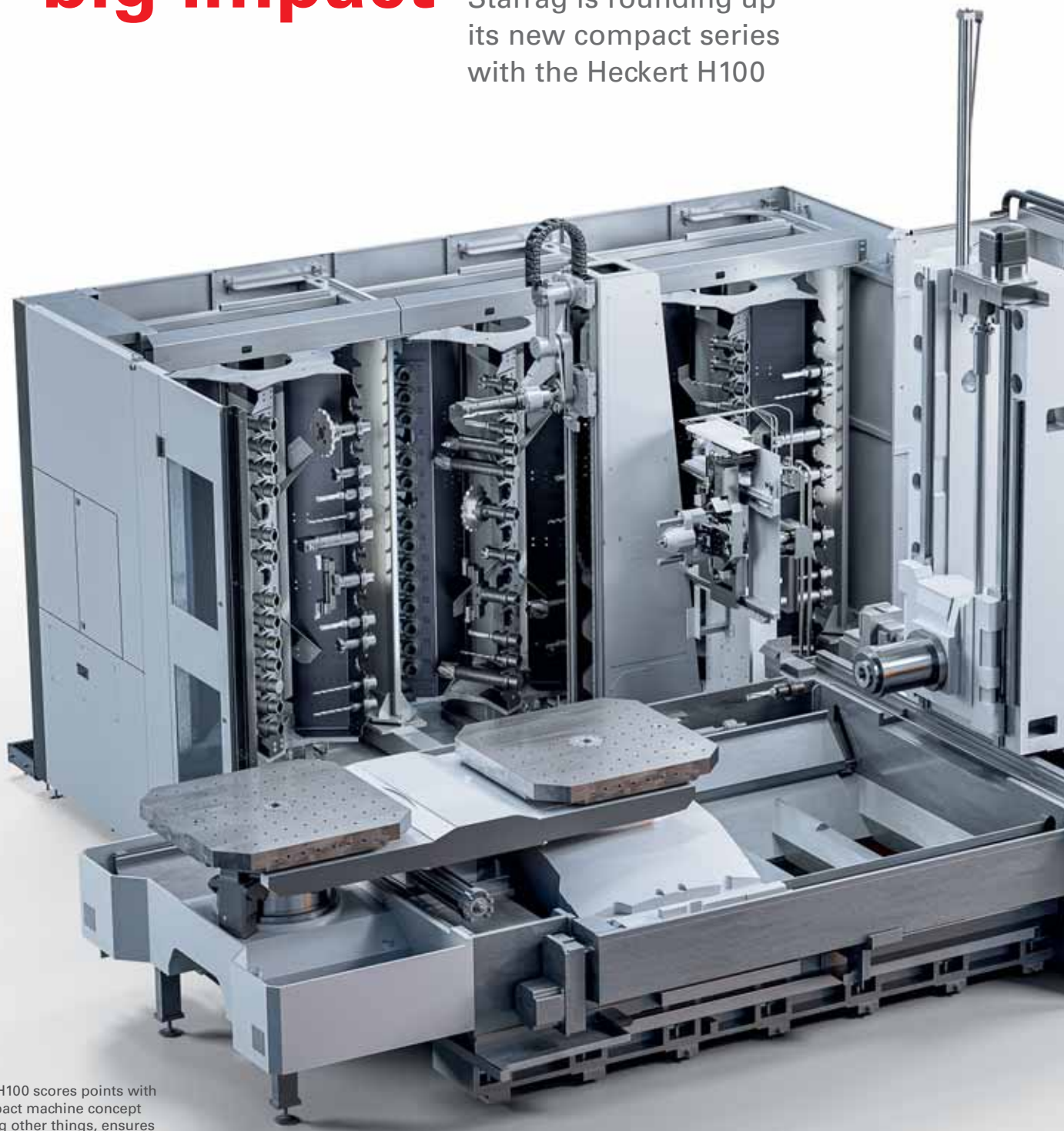
Over 160 years of highest precision with SIP

In 1862, physicist Auguste De la Rive and botanist Marc Thury founded the Société Genevoise d'Instruments de Physique (SIP), building scientific instruments that could measure to an accuracy of a hundredth of a millimetre, which was revolutionary at the time. In 1921, the company successfully entered the global machine business with the "Machine à Pointer" jig boring machine. It was the world's first mass-produced machine tool.

SIP is the oldest product division of the StarragTornos Group and has thrived on precision from the very beginning.

Small dimensions – **big impact**

Starrag is rounding up its new compact series with the Heckert H100



The Heckert H100 scores points with its new compact machine concept which, among other things, ensures simple automation – with extended clamping hydraulics and simplified interfaces to pallet storage systems and robot cells.

With the new Heckert H50 to H100 compact machines, Starrag is continuing the success story of the Heckert HEC series. The new machining centres offer maximum precision, performance and speed in minimal space – and, of course, with the long-term quality that is typical of Heckert machines.

Developments beyond the predecessor

- Extended clamping hydraulics and simplified interfaces to pallet storage systems and robot cells make automation easier.
- Central connections for technological cold water, cooling lubricant and data exchange ensure improved integration into the customer's infrastructure.
- The Heckert H100 offers a large selection of spindles.

Footprint
8,900 mm × 4,600 mm

Travel paths
X: 1,750 mm
Y: 1,300 mm (optional 1,400 mm)
Z: 1,400 mm (optional 1,800 mm)

Interference diameter
2,000 mm

Maximum loading weight
4,000 kg

Potential for savings compared with a large machining centre
- Investment costs
- Transport costs
- Foundation
- Footprint
- Machining process

The new Heckert H100 compact machining centre is an economical alternative to many large machining centres. It can even be used to machine large and heavy parts with a relatively small footprint.

Smaller in area, greater in productivity

Anticipation is the greatest joy – and Starrag wants to share this joy with customers and interested parties. That's why the machine manufacturers from Chemnitz unveiled their new large machine series in November 2024, even though the four planned models will only be launched on the market in stages from 2025.

An important advantage of the new machines is the improved productivity.

New Heckert large machine series celebrates preview

Starrag's HPMS (High Performance Machining Systems) business unit, which includes the Chemnitz and Rorschacherberg sites, has developed a new large machine construction kit from which new machining centres can be derived. For example, a Heckert large machine presented at the Open House in Chemnitz will replace the successful Heckert HEC Large Athletic series in the future, making its case with good reasons. For example, proven Heckert principles, such as rigidity and precision, continue to enjoy the highest priority and the movement sequences have remained the same. The advantage of the latter is that the effort involved in transferring an existing technology is limited. Operators of the previous Heckert HEC Athletic series will soon find their way around the new machine. They can also transfer devices and NC programmes without any problems.

When redesigning the Heckert large machines, the developers took the latest technical aspects into account. For example, the frame components – i.e. beds, columns, etc. – were optimised in terms of thermal symmetry. If the ambient temperature changes, they grow or shrink evenly in all directions. This is behaviour that is predictable and correctable. The chip fall in the area between the work spindle and the workpiece has also been further improved so that hot chips barely have the chance to transfer heat to the workpiece or the machine.

An important advantage of the new machines is the improved productivity. The decisive factor here is an increase in the diameter of the ball screws from 63 to 80 mm and a further stiffening of the structural components. As a result, the user can now achieve even higher cutting values, realise a larger chip volume and ultimately reduce the machining time. The machine has also become faster: Instead of 40 m/min rapid traverse, it now enables 50 m/min, resulting in shorter non-productive times.

In view of expensive floor space costs, the approximately 20 per cent smaller footprint is another interesting argument: This is mainly due to the repositioning of an energy chain, which allows the chip

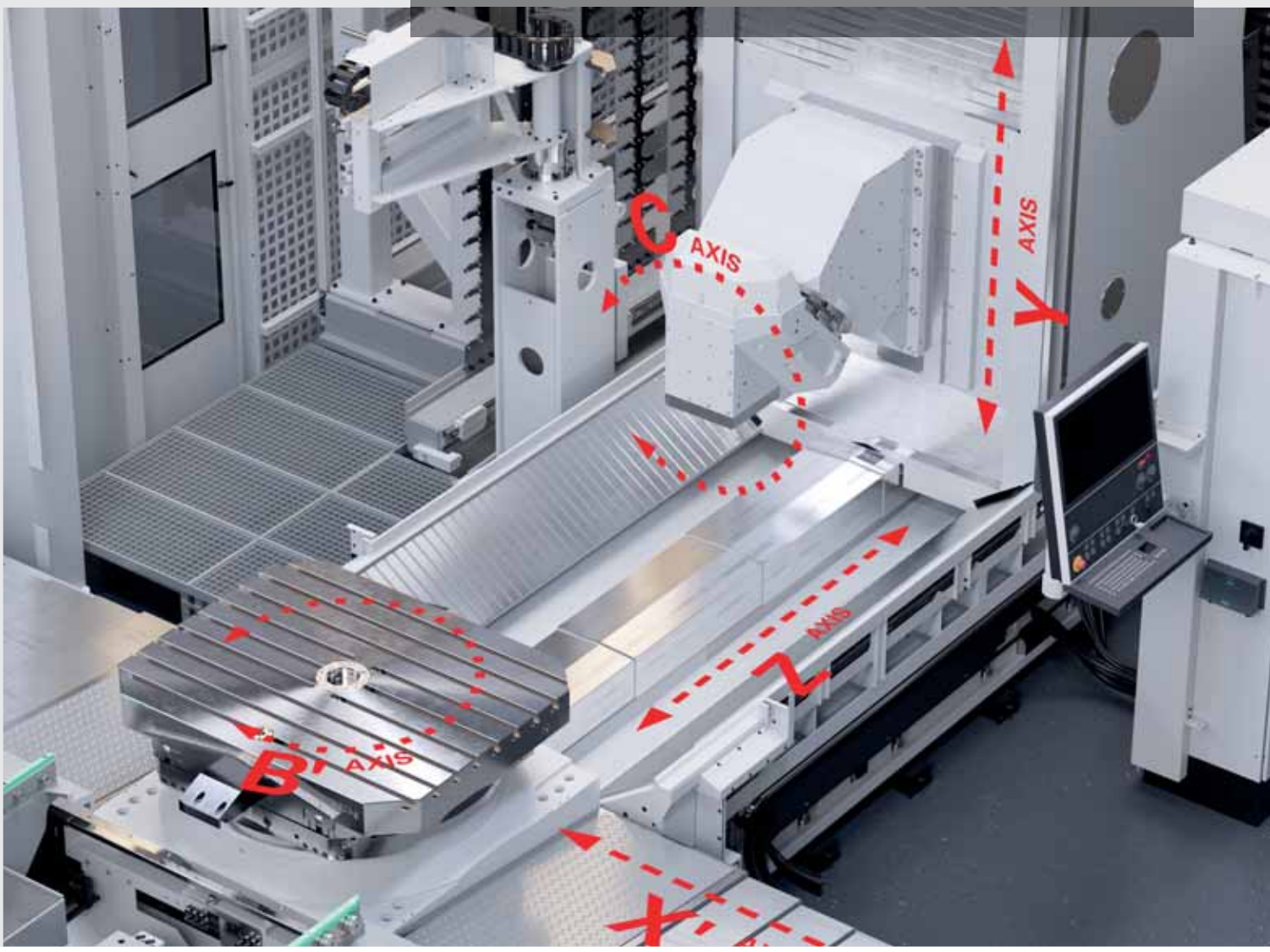
conveyor to be integrated deeper into the machine. Further detailed improvements: Structural changes mean that a payload of 20 tonnes is now possible, which opens up new part families and customer groups. The Starrag developers also redesigned the energy console at the rear of the machine. All maintenance-relevant elements of the machine have now been grouped together there.

Customisable modular system

The new Heckert large machines are designed as a modular construction kit with four predefined sizes, with all structural components being freely combinable with each other. This allows users to put together the optimum machining solution for their needs. The selection of spindle variants and heads is also large – and will become even larger: In the future, it will be possible to fit attachment heads to the quill and fork head that enable different geometries or speed changes.

The selection of tool magazines has also increased with the new machine series. In addition to the existing chain and tower magazines, the Starrag employees in Chemnitz developed a modular rack magazine that offers space for up to 828 tools. These may be up to 380 mm in diameter and 1,500 mm long, weigh 100 kg and have a tilting moment of 150 Nm. The new tool management software ensures maximised packing density, manages a reserved quick-change area near the tool changer and the automated ejection of tools when the tool life is reached. The intervention times of all tools are also documented.

Structural changes mean that a payload of 20 tonnes is now possible, which opens up new part families and customer groups.



A spotlight on manufacturing of the future

Martin Buyle, CEO of the StarragTornos Group, welcomed guests to the Technology Days Chemnitz with promises of technology at its finest.

"Small dimensions – big impact" – the brand new Heckert H100 4-axis machining centre was one of the highlights of the Technology Days.

High-precision, automated and digital – this is what future-oriented metalworking looks like. During the Technology Days in Chemnitz, Starrag presented important building blocks: Machine developments such as the Heckert H100 compact machining centre, which had its premiere, the new large machine series, which was shown as a sneak preview, alongside perfectly coordinated peripherals. The event also gave visitors a glimpse of the newly designed production hall, where the precision-critical components for a wide range of StarragTornos Group machines are manufactured in a highly automated process with µm accuracy.

"The name Technology Days sums up our event perfectly," emphasised Martin Buyle, CEO of the StarragTornos Group, when welcoming the guests. "Because over the next two days you will have the chance to see technology at its finest." On 5th and 6th November 2024, over 200 participants filled the "reception hall" on the Starrag Technology Days in Chemnitz, including representatives of around 100 customers from eight different countries worldwide. The machining specialists from Chemnitz had selected four main topics to present their optimised manufacturing processes – in close cooperation with the peripheral suppliers Blum Novotest, Fanuc, Fastems, Gefertec, Haimer, HandlingTech, Pimpel and Siemens.

Maximum productivity per square metre

The first topic, "Small dimensions – big impact", focussed on the brand new Heckert H100 4-axis machining centre, which rounds off the top end of the current Heckert compact series. It was

In complex components, the generative process often saves more than 70 % of raw material

demonstrated with a pilot application developed for the Czech vehicle manufacturer Tatra Trucks, in which entire V8 and V12 engines are machined in five operations. Starrag application technologist Rico Ullrich explains: "Using a compact machine for such large parts saves a lot of money – in terms of machine investment, transport, foundations and installation space, right through to the machining process itself. Moreover, we also supplied the process design and developed the four required devices – all in close collaboration with the customer, of course." The second topic, the symbiosis of metal 3D printing and 5-axis finish

The participants were split into small groups. This gave them the opportunity to hold deeply informative discussions at the stations.

machining, holds great potential for the future. This was presented in the form of a Gefertec arc80X and a Heckert X50 with turning function. "A highlight of our Technology Days," emphasises Kai Bohle, Director of Sales T&I at the Chemnitz site. "In complex components, the generative process often saves more than 70 % of raw material. This reduces the amount of finishing work required, meaning more parts of better quality can be machined in the same time than with conventional methods. It's still a niche at the moment, but that will change."

Making good things even better

For the third topic "Innovation meets tradition", Starrag presented a large, unclad machine – the sneak preview of the completely new generation of large machines, which will supersede the successful Heckert Large series in the future. As the tried-and-tested kinematics have been retained, the user can adopt fixtures and NC programmes from previous models. Apart from this, the new series has many advantages to offer, as the product manager Carsten Bergmann explains: "We have completely redesigned all frame components – beds, columns, etc. – and further optimised the machine, particularly with regard to thermal symmetry and chip disposal. We have also managed to reduce the footprint by around 20 per cent." Even more rigid structural components and ball screws also allow higher cutting values to be realised, which contributes to reduced machining times.

The new large machines are designed as a modular system with four predefined sizes, two of which will be launched in 2025 and the other two in 2026/2027.

Kai Bohle, Director of Sales T&I: "Our aim is to manufacture all precision-critical parts ourselves. That's why we are massively expanding production here in Chemnitz."

> The symbiosis of metal 3D printing and 5-axis finish machining, holds great potential for the future

A new module has already been presented on the basic machine: a so-called matrix magazine, which has space for up to 828 tools.

Where Starrag machines manufacture Starrag machines

Topic number four: self-made precision. "Our goal is to manufacture all precision-critical parts ourselves," explains Sales Manager Kai Bohle. "That's why we are massively expanding production here at this site." Central to this are two (soon to be three) Heckert HEC 800 X5 with turning function, which feature the Heckert High-Precision Package in addition to the optional extended travel paths. They manufacture pallets and faceplates for B-axes and rotary-drive units, bearing blocks, gearbox housings and much more – fully automated in small and medium series. One important automation element is a Fastems linear storage system with 64 pallet spaces and two set-up stations.

However, the Technology Days focussed less on the Heckert HEC 800 machines

manufactured in Chemnitz and more on the actual machining processes. Using the example of pallet machining, Starrag technologist Jan Wilske explained why precision is so important and what requirements must be met on the machine side. Using measurement logs, he impressively demonstrated that tolerances in the single-digit µm range are maintained across all batch sizes – in terms of the evenness, squareness, straightness of the contact surfaces and positions. A huge concrete foundation could be seen right next to the Heckert HEC 800 machining centres.

See machining in action – without doubt one of the main attractions of these Technology Days

With an area of 22 × 14 metres, it provides the framework for the basic structure of a 12-metre Droop+Rein FOGS HD40 130 R50C high gantry machining centre. With this huge high-speed machining centre from the Starrag site in Bielefeld, the Chemnitz-based company will in future machine all columns, machine beds and other precision-critical large parts for Heckert machines and other brands of the StarragTornos Group to an accuracy of just a few µm.

Digitalisation permeates every level

In order to achieve not only precision but also the desired high productivity, it takes more than outstanding machines and peripherals. It is equally important that companies are well positioned in terms of digitalisation. Starrag is fully aware of this. Accordingly, MDE and PDA systems were introduced in Chemnitz and Rorschacherberg and a detailed planning system was put into operation that supplies every workstation with daily data for optimised work processes – not only in production, but also in design, technology and project management.

At the Technology Days, the themes of automation and digitalisation permeated all four of the event's main topics. Starrag itself has a lot to offer in this regard, including digital services such as the online fingerprint and new HMI functions for web applications, camera integration, etc. In addition, the British company TTL, which belongs to the StarragTornos Group, presented its Virtual Machine (VM). This can ensure maximum process reliability in the Siemens NX world, even for demanding five-axis machining operations.

However, process optimisation and simulation using VM solutions and the digital twin were also recurrent themes at the partner booths. The companies presented innovations from the fields of process-integrated measurement technology and robot automation as well. They explained the latest functionalities in CNC control systems and highlighted the benefits of an end-to-end digitalisation solution for tool clamping and presetting.

So much more than just machines

Sofian Regaz, Starrag Sales Manager Aerospace & Turbine Technology

Starrag offers everything from complete manufacturing solutions with its own in-house components through to special tools

The high quality of the Starrag machines developed and manufactured in Rorschacherberg, Switzerland, is undisputed. But these machining centres are just one facet of the diverse portfolio. The production solutions available also include other components made by the company. In addition to technology, software and clamping concepts, the carbide tools produced in-house are often vital to success.

The core expertise of Starrag's headquarters in Rorschacherberg lies in developing and manufacturing high-performance machining centres for use in aircraft and turbine construction. But the company actually has much more to offer. The process knowledge accumulated over many years and through numerous projects, are reflected in the many components developed in-house: from carbide tools to the RCS CAM software for blades, from clamping technology and fixture construction to automation solutions and host computer technologies.

"It is this 'full package' that sets us apart from other suppliers," says Sofian Regaz, Starrag Sales Manager for Aerospace & Turbine Technology. "We don't see ourselves purely as a machine manufacturer, but as a solution provider for production processes in the aerospace and turbine sector. This ranges from standalone plants to flexible manufacturing systems, which customers can obtain from us as a one-stop shop."

Gaining a market advantage from tools adapted to the process

Sofian Regaz is primarily responsible for product management and sales of Starrag tools. "Here in Rorschacherberg, we have spent many years developing and grinding carbide milling cutters for aircraft and turbine components made from difficult-to-machine materials such as titanium, Inconel or high-alloy steels."

"It is this 'full package' that sets us apart from other suppliers"

Sofian Regaz, Starrag Sales Manager Aerospace & Turbine Technology

Though Starrag does offer a small range of standard tools, more than 90 % of the tools the company sells are custom-made products that are tailored to the specific machining process, i.e. to the component, the machine, the material and other considerations.

"It makes a huge difference whether I adapt my NC program to a catalogue milling cutter or whether I design the tool in terms of cutting edge length, corner radius, flank angle, coating, etc. so that I can deliver the optimum machining process. Our customers enjoy great success with this," says Sofian Regaz.

Always available to serve customer needs

As Starrag sells most of its machines as part of a manufacturing solution for a specific component or component family, the corresponding specialist tools are usually supplied with them – together with an explanation of why the tools are designed in this way and the expertise on which they are based. The product manager adds: "The customer needs to know how their tools differ from catalogue tools and the impact these differences have. They also need to understand that the advantages of our tools cannot be found with other suppliers."

This expertise is no coincidence. Starrag maintains a very close, partnership-based relationship with its customers and supports them throughout the entire production process – and even beyond the warranty period. "This means that if, for example, a component is due to be changed and the machine needs to be set up for a new process, we are still by our customer's side to offer new customised tools as necessary," assures Regaz. Machine manufacturer Starrag has a clear advantage over traditional tool manufacturers: Tools are both developed and ground at the Rorschacherberg plant, where the Aerospace and Turbine Competence Centre (ATCC) is

"We achieve incredibly quick response times, sometimes just in half a day."

Sofian Regaz, Starrag Sales Manager Aerospace & Turbine Technology

also located. With 2,000 m², the centre is fitted with all current five-axis machining centres from the Starrag NB, LX and STC series. Sofian Regaz explains: "We use these machines for a wide range of our own trials and trials for our customers, as well as for developing and optimising processes and, of course, for our analyses and tool tests. We even take on small series production on behalf of customers."

For the tool team, this means that they can reproduce the customer's processes 1:1 on original machines and optimise the tools before they are even delivered. Time and again, customers confirm that this saves many transport routes and, in turn, a lot of time and money. "If, however, corrections to the tool are still necessary, we can react and adopt changes very quickly because we have our own grinding shop," reasons Sofian Regaz. "We achieve incredibly quick response times, sometimes just in half a day."

Tool expertise for better machining results

The ATCC is an important meeting place. This is where Starrag technologists, machine operators, automation specialists, tool specialists and customers come together. This is because Starrag offers them comprehensive support in programming the machines, running in the processes and also in subsequent process optimisation.

For the tool team, this is a valuable source of expertise. "This is where we find out how the market is evolving, how materials are changing, what the blanks of the future will look like and what requirements components in the future will have to meet. This allows us to get ahead of the game with our tool developments and offer our customers solutions early on."

Starrag is also well positioned worldwide in tool servicing. In order to save customers time and money, the Swiss company has entered into a partnership with the global company Oerlikon Balzers, who provide on-site regrinding and recoating services for Starrag in America and Asia. This is an important factor for Sofian Regaz. "We do offer a similar service in-house as well, but customers can save themselves the long journeys from overseas by making use of our partner offer."

"Customer feedback on our tools is consistently positive," mentions Sofian Regaz. He received a special confirmation of success from Honeywell Aerospace Ireland, where Starrag had the chance to work as a tool problem solver. Starting basis: Tool wear was very high when machining a titanium turbine blade. No more than ten components could be machined with the milling cutter they were originally using. That's when the engine manufacturer invited important tool manufacturers to get a handle on the problem. The best supplier managed to increase the service life to 20 components. And Starrag? "Our special tools produce 40 components," reports Sofian Regaz. "Honeywell considered

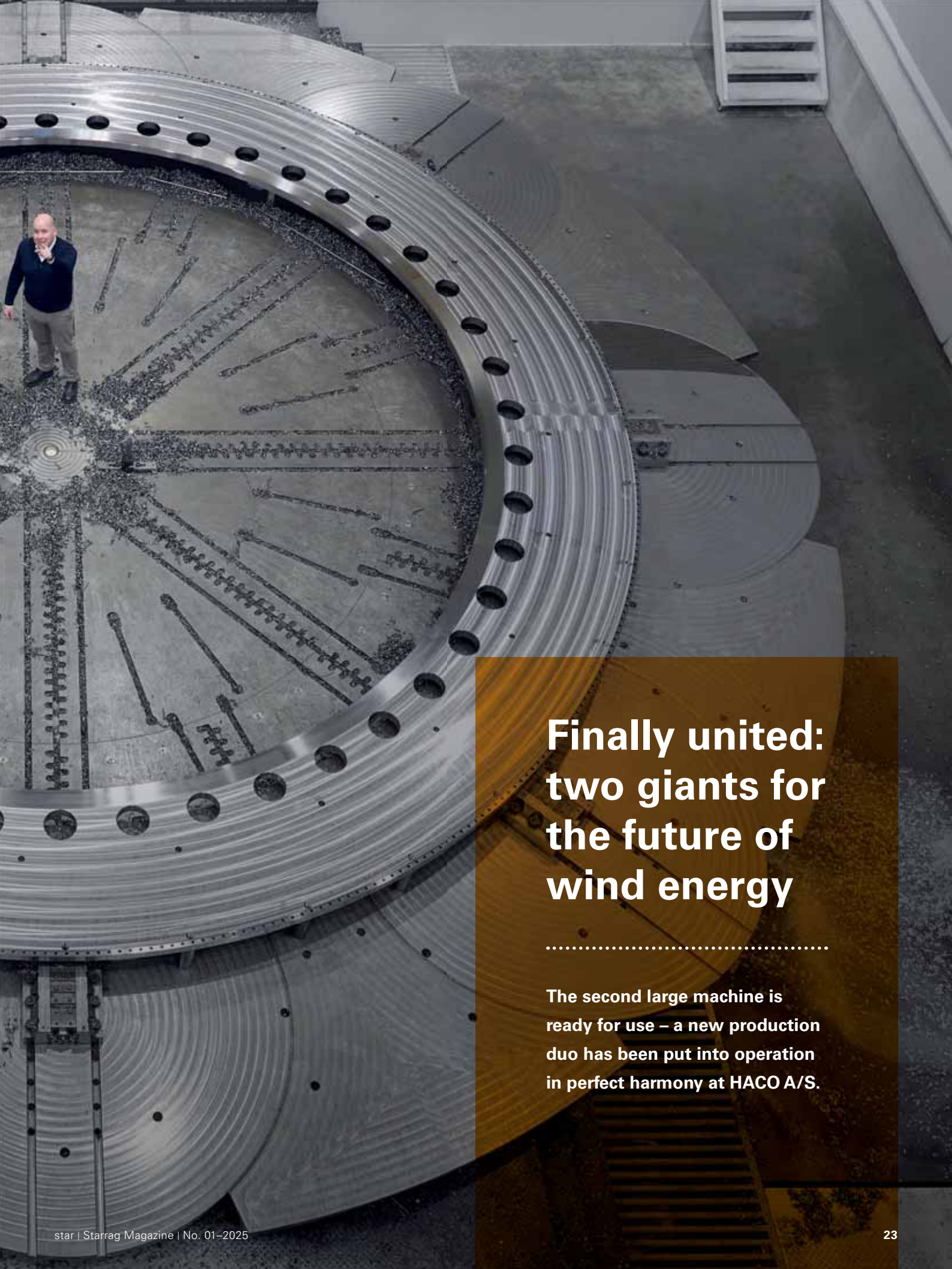
grinds cylindrical and barrel ball nose mills, lollipop, barrel and chamfer milling cutters as well as high-feed, plunge and a wide variety of form milling cutters, for example for turbine blade roots. In order to generate further growth, Starrag will in the future, offer special tools for machining aluminium in addition to tools for materials that are more challenging to machine. Sofian Regaz's team is also strengthening its business development: "Our process expertise in aircraft and turbine construction is so extensive that we can also enjoy great success with our tools on third-party machines. And we are already in talks with other Starrag sites. In the future, we want to utilise their machining centres and their expertise to produce special tools for other industries."

> "Honeywell considered this worthy of not only a contract, but also an award."
>
> **Sofian Regaz**, Starrag Sales Manager Aerospace & Turbine Technology

this worthy of not only a contract, but also an award. In June 2024, we were awarded the 'Kaizen of the Month' prize."

Success leads to growth

The tool business has seen tremendous growth in recent years. This is not solely down to success stories such as the Honeywell contract. The expanded product range has also contributed greatly to this. While Starrag used to produce only end mills, torus mills and conical ball nose mills, today the company also



Finally united: two giants for the future of wind energy

The second large machine is ready for use – a new production duo has been put into operation in perfect harmony at HACO A/S.

The Dörries large gantry machine has been in use since the end of 2024.

The Danish family-owned company is now equipped for the future of wind energy: It can now machine huge rotor housings and brake discs for offshore wind turbines in the 14 to 15 megawatt class even more efficiently and precisely.

The small town of Rødekro in southern Denmark, near the German-Danish border, is developing into a logistical hub for the offshore wind industry. The proximity to the port of Esbjerg, Northern Europe's leading offshore wind hub, and to the ports of Aabenraa and Sønderborg, enables efficient transport routes for wind energy components. The close cooperation between HACO and SM Industrie A/S, a leading supplier of steel wind energy components, is a current example of sustainable logistics. The new machine duo will be used in a hall on SM Industrie's premises.

Machine duo with standardised operation

A large Droop+Rein gantry machine with a travelling gantry, which can flexibly machine very large workpieces in a single clamping operation, has been in use since the beginning of 2024. It has recently been supported by another very large Dörries gantry machine with a fixed gantry and sliding base. Despite all the differences, both machines are based on the same core components, making maintenance and operation simpler.

The new large gantry machine significantly expands HACO's machining range. Thanks to the improved main drive and the increased swing diameter of the workpiece, it is now possible to manufacture more substantial, welded rotor housings and other large components with precision. "Our two large machines – two true giants – are now in production," says a delighted Hubert Erz, Senior Consultant Sales/Renewables at Starrag, who has been supporting the southern Danish contract manufacturer for more than a decade. "We are setting a new benchmark in the machining of workpieces for

gearless wind turbines in the 14 and 15 megawatt power classes. The focus here is primarily on rotor housings, i.e. generator housings, and brake discs, both of which currently have a diameter of around 9,000 mm and are manufactured with an accuracy range of +/- 0.1 mm.

When the specifications call for high precision …

This is where precision comes into play: The wind energy industry typically demands tight tolerances in its specifications for large components such as rotor housings and brake discs. "Regardless of the size of the machine, it is important to precisely calculate and dimension the main components using modern design tools," explains Erz. "We achieve the first static compensation as early as the moulding stage." In addition, there are precisely adjustable mechanical components and final electronic fine-tuning as well as a precisely designed machine foundation that takes static and dynamic loads into account. Precision stands and falls with automation and control. Yet HACO also prioritises production reliability and continuity. That's why the family-run company deliberately decided against the latest Siemens control system. Instead, Managing Director Henning Albrechtsen favours the tried-and-tested version: "We rely on tried-and-tested technologies. This not only ensures production reliability, but also the flexibility of our employees."

Better safe than sorry: simulation of complex machining processes

Instead, the managing director invested in programming and simulation. New post-processors with an integrated simulation module from the British Starrag subsidiary TTL enabled his team to create NC programmes in the main factory and simulate the machining process, including measuring programmes, in advance – an approach that significantly increases productive machine running time. In addition, the second machine was equipped with a modern magazine concept with automatic loading and unloading of tools as well as six machining heads for turning, milling and drilling, which enable flexible and precise machining of large parts in a single clamping operation.
The two 870-tonne machines required a foundation that could cope with the enormous static and dynamic loads and thus ensure precise machining. Starrag took extensive assembly and handling precautions during the design phase to ensure

> "We achieve the first static compensation as early as the moulding stage."
>
> **Hubert Erz**
> Senior Consultant Sales/Renewables

A Droop+Rein gantry machine with a travelling gantry, which can flexibly machine very large workpieces in a single clamping operation, has been in use since the beginning of 2024.

"Our two large machines – two true giants – are now in production." Hubert Erz, Senior Consultant Sales/Renewables at Starrag.

the transport and precise alignment of these substantial components. A central element is the two-storey basement, which serves as a stable base and facilitates access to central components. HACO and Starrag also tackled this challenge together. The customer is satisfied: "We integrated units into the foundation, so that noise emissions were virtually eliminated – a clear plus point for the quality of work."

Sustainable concepts for the wind energy industry

The new machine duo was created in Starrag's LPMS (Large Parts Machining Systems) business unit – a unit that specialises in innovative manufacturing solutions for large parts and is guided by the strict criteria of the VDMA BLU**ECO**MPETENCE label. This also had a lasting effect on this project.

Modern, energy-optimised components, advanced drive technology and the recovery of surplus energy ensure reduced energy consumption at HACO's plant in Rødekro. These measures lower material consumption, reduce waste and optimise energy use – a competitive advantage for industries that focus on sustainability.

Take two: machine duo sets the benchmark

The investment in two large machines offers excellent opportunities for the machining of current and future large components for the wind energy industry and other sectors. The deliberately chosen flexible design and equipment of both machines set virtually no limits for the machining of large components. Erz: "The courage of Henning Albrechtsen and his team is now paying off. Together, we have created a new plant that will enable our regular Danish customer to manufacture future, larger generations of wind turbine and XXL components sustainably, efficiently and reliably."

Into the future of wind energy with XXL efficiency

Henning Albrechtsen, Managing Director of HACO, meets the high demands of the wind energy industry with three innovative strategies.

Interview with Henning Albrechtsen

Mr Albrechtsen, why do you rely on the combination of milling and turning in one system?

Henning Albrechtsen: For years now, we have been practising complete machining – i.e. production in as few clamping operations as possible, including turning, drilling and milling – with our Dörries machines at our main site in Barrit. The experience we gained there flowed directly into the planning of our systems in Rødekro. The larger the workpieces, the more complex the handling becomes. Reason enough for us to develop a clamping device with which rotor housings, for example, can be finished in a single clamping operation.

With the basement and the new layout, you are breaking new ground in production. How does this structure affect ergonomics and ease of maintenance?

Henning Albrechtsen: There are two main objectives behind the joint, intensive planning and foundation work. On the one hand, to reduce noise emissions and, on the other, to optimise access to all machine assemblies. This enables fast maintenance and repair work and keeps machine availability at a high level – a decisive advantage when production pressure is high. We were also able to integrate units directly into the foundation, i.e. in the basement. This has further reduced noise emissions and noticeably improved the quality of our employees' work.

"This puts us in an ideal position to meet the requirements of the next generation of wind turbines."

Henning Albrechtsen

The wind energy industry is increasingly focusing on new materials: How does HACO ensure that its production is also optimised for future materials?

Henning Albrechtsen: Our machined components – including rotor housings, brake discs and stator laminations – remain predominantly welded workpieces, even though they will be manufactured in larger dimensions in the future. At the same time, our product portfolio has expanded. In addition to traditional parts, we now also machine castings, such as generator housings and adapter components for connecting the nacelle and tower.

This puts us in an ideal position to meet the requirements of the next generation of wind turbines.

Vertical grinding machine from Starrag:

Ensuring final quality for Tianma Bearing

The Berthiez RVU vertical grinding machine strengthens the production of high-precision main shaft bearings for wind turbines

The establishment of Zhejiang Tianma Bearing Group Co., Ltd. (hereinafter "Tianma Bearing") in 1987 coincided with the "golden age" in which the Chinese precision bearing industry was developing rapidly. With its persistent pursuit of technological innovation and strict control over product quality, Tianma Bearing has rapidly risen to become an important player in the global bearing industry.

Tianma Bearing is the only precision bearing manufacturer in the world that has its own steel plant, control the entire industrial value chain from raw materials to finished products and have successfully created its own brand, TMB bearings. The products are used in industries as important as wind energy generation, rail transport and vehicles powered by new energies. In the wind power industry, Tianma Bearing has shown particularly outstanding performance. As a leading company in the domestic market for precision bearings for wind turbines, Tianma Bearing also holds a large share of the global market, especially for azimuth and pitch bearings. But that's not all – Tianma Bearing has also continuously expanded its own strengths in the wind energy sector and set its sights on success in other areas. In 2023, Tianma Bearing's purchase of the Starrag Berthiez RVU 2300/220 vertical grinding machine was an important step towards entering into production of main shaft bearings for wind turbines.

Through its partnership with Starrag, Tianma Bearing is continuously improving its machining capabilities

"The first collaboration between Tianma Bearing and Starrag took place back in 2020, when we purchased a vertical machining centre for grinding (with additional turning function) with a maximum machining diameter of 4,700 mm from Starrag for our plant in Chengdu. After the equipment was put into use, its operation far exceeded our expectations. Not only has it significantly increased machining efficiency, but it also guarantees outstanding product quality for us," reports Mu Bin, Assistant to the Chairman and Technical Director of Zhejiang Tianma Bearing Co., Ltd. smiling as he recalls the first co-operation between the two companies. This successful cooperation laid a solid foundation of trust between the two parties. Therefore, when Tianma Bearing planned to further enhance its research and production capabilities for wind turbine main shaft bearings, it did not hesitate to choose Starrag.

> "After the equipment was put into use, its operation far exceeded our expectations."
>
> **Mu Bin**, Technical Director of Zhejiang Tianma Bearing Co., Ltd.

The main shaft bearings are among the most important components of wind turbines. Extremely high demands are placed on them in terms of precision and reliability. Therefore, machining equipment with excellent performance is essential for the production of high-quality products. As a global leader in the field of machining technology, Starrag and the performance of its machines are undisputed, and Starrag also has extensive application experience in the wind energy sector. Starrag's vertical grinding machine is an important component, not only in production, but also in the research and development of wind turbine main shaft bearings.

Machining time reduced from three to four days to four to five hours

Since the Berthiez RVU vertical grinding machine from Starrag has been in operation, it has proven itself in practice. Its outstanding, stable performance has impressed the technical team at Tianma Bearing, who are full of praise. Mu Bin explains: "The bearings of wind turbines place extremely high demands on reliability and service life. This is particularly true for the main shaft bearings. The vertical grinding machine from Starrag is characterised not only by high reliability and guaranteed machining quality, but also by high precision and great flexibility. It has proven its worth in the machining of new product samples and complex parts."

Firstly, Starrag's Berthiez RVU vertical grinding machine has an extremely rigid machine bed and an advanced control

> "We were deeply touched by the professional technology and rigorous attitude of the staff."
>
> **Mu Bin**, Technical Director of Zhejiang Tianma Bearing Co., Ltd.

system to ensure high precision and stability during the machining process. Secondly, it has a very high degree of automation. The well thought-out design of the turret and tool changing system makes the machining of complex parts more efficient and convenient. At the same time, the machine is extremely adaptable and fulfils all requirements for machining workpieces in a wide range of sizes and shapes.

In practical use at Tianma Bearing, the Berthiez RVU has solved many machining problems where traditional machines failed. The machining time for a sample has been reduced from the original three to four days to the current four to five hours, the machining efficiency has been greatly improved, and the research and development cycle has been significantly shortened.

Ensuring the final quality and serving as an "assurance pill" for customers

The Starrag machine guarantees high final quality for Tianma Bearing. At the same time, the intangible value brought by Starrag's equipment also benefits Tianma Bearing a lot. "Starrag's equipment is like an assurance pill. Not only are we completely relaxed when we use them, but we also have the certainty that the product quality is right. The machine has allayed many customers' concerns about using locally produced products and has strengthened their confidence in Tianma Bearing," said Ma Xingfa, Chairman of Zhejiang Tianma Bearing Group Co., Ltd., frankly.

According to Ma Xingfa, Starrag's machine is not only easy on the nerves by allaying customers' concerns, but it is also a driving force for further innovation. In order to meet the high standards of the wind energy industry, Tianma Bearing is constantly improving its own workpiece machining capabilities.

The co-operation between Tianma Bearing and Starrag is a strong combination of two leading companies in the industry. By introducing Starrag's Berthiez RVU vertical grinding machine, Tianma Bearing has not only enhanced its own technical strength and product quality but has also injected fresh impetus into the industry to promote the manufacture of precision bearings locally in China.

When talking about future cooperation, Ma Xingfa did not hesitate to say: "As the ultimate guarantee for the product quality of Tianma Bearing, Starrag makes us feel very at ease. When purchasing new equipment in the future, we will still give the priority to Starrag." Liu Xin, General Manager of Starrag China, said: "Tianma Bearing is an outstanding company that attaches great importance to product innovation, efficiency improvement and cost management. I am very pleased to be able to utilise Starrag's equipment, knowledge and experience to help Tianma Bearing achieve high quality and efficient production. At the same time, we look forward to further future cooperation between the two parties in order to jointly drive forward the innovation and development of high-quality bearing production technology!"

The purchase of the Starrag machine has not only raised standards in a specific process step, but has also created a positive dynamic that has optimised and improved all production steps. This has significantly increased the level of equipment at Tianma Bearing and strengthened the development of high-quality precision bearings. From installation and commissioning to after-sales service, the professionalism and rigorous attitude of Starrag's staff have left a deep impression on Tianma Bearing. Mu Bin recalls: "During installation and commissioning, two French engineers travelled thousands of kilometres to Tianma Bearing to supervise the work on site. The machine was assembled in perfect quality within the planned time. We were deeply touched by the professional technology and rigorous attitude of the staff."

"When purchasing new equipment in the future, we will still give the priority to Starrag."

Ma Xingfa, Chairman of Zhejiang Tianma Bearing Group

A fast-growing European key player from Portugal

Bruno Correia, CEO Art in Vogue SA / Daniel Fernandes, Director of operations

Art In Vogue (AIV) is a small and dynamic company installed next to Porto in Portugal, composed of two entities; AIV Metal Solutions for metal treatments and forming and AIV Metal machining to produce high precision components. 35 specialists are actively involved to bring to life customers expectations. The company claim "You imagine, we create" is born on the vision that customer's creativity must not be curbed by production solution limitations. Find the right way to produce is their value added.

AIV headquarter in Gondomar

An unusual business development
(by Bruno Correia)

40 years ago, the company was involved in the production of components for bags in the leather good segment. In the year 2000, this typical industry from Portugal began an economic crisis which has constraint us to imagine new market opportunities. We jumped into shoe production business with a large volume of exportation, before entering the precision part machining business. In 2018, we decide to invest in CNC machines, we were already equipped with turning machines. Today we have 11 CNC machines and the first turn/mill centre fully equipped from Bumotec installed in Portugal.

The strategy concerning this new investment is to strengthen our position in the luxury goods market, especially in the watchmaking industry where doors are already opened to us, to confirm jewellery activities, and to develop Medtech and defense markets opportunities. We export 30% of our production to France, Germany, Switzerland and sometimes Italy.

The first step in the turn/mill machine environment (by Bruno Correia)

When we started with the machining parts, we thought that investing in a Bumotec machining centre from Starrag was out of our financial possibilities. It was a goal which seemed inaccessible. Then the business grew along with the customers expectations for accurate and complex parts to produce. We were used to engineer solutions ourselves to adapt our production means to reach customers goals. But we reached the limit, and we

Machining area of a Bumotec s181 machining centre

needed to invest in high-end solution to be efficient and reassure customers. Personally, I knew about Bumotec machining centres as a few customers were already equipped with their technology, I convinced our Operational Director Daniel Fernandes, who was not accustomed to this mind set, that it was the right solution to work 24/7 without interruptions by just loading bars and get finished parts produced. Today he changes his mind and only wants to work this way and he thinks that it is the most efficient and productive production solution. When the decision was made to invest, we contacted Tornos Iberica which is the Bumotec agent in Spain and Portugal, we discussed our project and then we visited Strarrag Vuadens, home of Bumotec in Switzerland and we became the first Portuguese company equipped with a Bumotec s181, the most complex dual working station 9-axis machining centre from Bumotec.

> "Thanks to the counter spindle, we were able to reduce the production time slightly by 40%."
>
> Bruno Correia, CEO Art in Vogue SA

The choice of the Bumotec s181 has been done considering 2 parameters, first the efficiency of the machine due to the counter spindle working in hidden time, we could easily cut production time by 40%. Then even if this machine is one of the most complex machining centres by Bumotec, it offers incredible possibilities in terms of production being cost effective as stable in production and equipped with a bar feeder, it works autonomously 24/7 even during weekends.

A profitable investment to stick to the fast-changing European market demands (by Daniel Fernandes)

My first contact with a Bumotec machine was at a customer facility in Switzerland. I did not know about this technology but then after our visit at Starrag Vuadens

Bumotec s181 installed at AIV Machining Solutions

> "Nowadays the Bumotec s181 is considered as a star in our shopfloor."
>
> Daniel Fernandes,
> Director of operations

I discovered an amazing machine concept working with efficiency. Nowadays the Bumotec s181 is considered as a star in our shopfloor. We were used to have turning machines as well as some milling machines from other brands and this is our first turn/mill centre.

The concept of the machine was totally different from what we used to know. We had to learn the philosophy of programming. To do so, we had an efficient training from Bumotec applications team which allows us to feel at ease rapidly.

The result is clear, the part which is currently being produced on the Bumotec s181 was initially done on a turning machine with multiple setups. We gain 50% of production time and the quality of the finish are far much better now.

The training session by Starrag Vuadens SA was provided in 2 steps. The first one during acceptation process of the machine produced and the second one done here in our factory when the machine was installed. Whether we need support from Bumotec headquarter in Switzerland for process or from their Portuguese partner for mechanical support, the response is fast and efficient.

Our whole team is now confident to work with this technology. We have specialists who are able to deliver parts which are often of better quality that the one submitted by the customer as a reference model. In the past we sometimes were constraint to decline a contract proposal as we did not have the capabilities to produce complex parts. Now we can handle most of the machining parts projects

> "We gain 50% of production time and the quality of the finish are far much better now."
>
> Daniel Fernandes,
> Director of operations

Bruno Correia, CEO Art In Vogue SA (left) Daniel Fernandes, Director of operations Art In Vogue SA (right)

in all market segment. The current part being produced on the Bumotec s181 is an attachment in the leather good segment. We had a contract for large quantities we started to produce before acquiring the Bumotec machine, which was estimated for 6 months of production time. Now working 24/7 and reducing cycle time by 50%, we know that we can do the whole production in around 3 months.

In addition to that we did some test to machine with different raw materials such as cobalt, stainless steel, titanium or brass, and the result was qualitative, and the tools lifetime was increased. As we acquire the Bumotec recently we still need to learn about life tool limits.

As simple as a morning routine

(by Daniel Fernandes)

The daily routine is quite simple: when we arrive in the morning, we control the parts produced during the night, then we check the tools and clean the machining area. Fortunately, we have some spare tools in the tool magazine in case of breakage during the night so that the machine will automatically control and replace the tool, if necessary, without manual intervention. Finally, we add some bars in the bar feeder, and we launch again the production for the day. We do a check before leaving for the night and we repeat the routine in the morning again.


New Building for AIV Machining Solution in Gondomar

The vision of the evolution

(by Bruno Correia)

My vision for the next 5 years is to become a sub-contractor reference in Portugal in precision machining before reaching the same status in Europe. My strategy is to diversify in the Med-tech industry and defense segment with connectors while expending in the luxury world. On the other hand, we are expanding the galvanic process of anodisation to give a complete solution on raw material as well.

We built this new building extension for machining division; we have surface space available to welcome a new Bumotec machine in the future when the business will reach a crucial point.

Zirkonzahn: tradition and innovation for modern dentistry

Zirkonzahn Srl from South Tyrol, Italy, is much more than just a manufacturer of dental equipment. The company was founded by Enrico Steger, a passionate dental technician, and embodies the perfect combination of traditional craftsmanship and technological innovation.

> **"With our equipment and expertise, we have turned technical limitations into opportunities."**
>
> **Enrico Steger**, Zirkonzahn Srl-Founder

A vision born in the mountains

Zirkonzahn's story begins with a bold idea: to transform zirconia into a revolutionary solution for dental laboratories. Enrico Steger, inspired by his surroundings and his roots, developed the Zirkograph, a groundbreaking device for processing zirconia. Since then, the company has continued to grow and become a major player in the dental industry, with a comprehensive product range that extends from titanium bases to advanced software solutions for the computer-aided design/computer-aided manufacturing (CAD/CAM) workflow. "Modern dentistry requires precision solutions and constant innovation," Steger explained. "With our equipment and expertise, we have turned technical limitations into opportunities."

Products tailored to the needs of dentistry

Zirkonzahn excels in the production of dental components such as titanium bases and multiunit elements that meet the highest standards of biocompatibility and precision. "We combine all processes under one roof, from the development of the tools to

the production of the parts," Steger emphasised. This complete control allows the company to respond quickly to customer requests and ensure consistent quality.

Zirkonzahn products are not limited to mechanics: The company also offers innovative diagnostic systems, such as the PlaneSystem®, which can be used to capture and measure the individual information in the patient's jaw area to produce functional and aesthetic dentures.

A strategic partnership with Tornos

To achieve the high standards required for the production of complex dental components, Zirkonzahn relies on Tornos. With a fleet of 27 Tornos machines, including almost the entire EvoDECO range, the company is able to produce customised parts in large quantities with impeccable quality. "The EvoDECO is a machine that has transformed our production capacity, particularly for the most challenging parts," said Andreas Kessler. With its 10 axes and ability to work with multiple tools simultaneously, the EvoDECO is ideal for machining highly complex dental components. Its versatility allows Zirkonzahn to reduce cycle times while ensuring consistent quality, which is crucial for critical applications such as dental implants. "It excels at multi-process operations such as turning, milling and drilling with high precision," the technician added. Andreas Kirchler also highlighted the longevity of the machines. "Our first machines, such as the DECO 13, are still in daily use after more than 15 years. This is a testament to their reliability," he said. With a renewed focus on innovation, Zirkonzahn is exploring new ways to meet the changing needs of its customers. Its collaboration with Tornos continues.

Regionally rooted excellence

With around 350 employees working mainly at several sites in the Puster Valley, Zirkonzahn remains firmly rooted in South Tyrol. This decision, motivated by the proximity to a local ecosystem of training and technical skills, enables the company to ensure exceptional production quality.

"Our region is a driving force for innovation," Steger emphasised, "and we are proud of the fact that we have the best

"The EvoDECO is a machine that has transformed our production capacity, particularly for the most challenging parts."

Andreas Kirchler, Zirkonzahn

skilled workers in South Tyrol. We benefit from highly qualified employees, which is crucial to maintaining our commitment to perfection."

Education as a strategic pillar

Zirkonzahn provides far more than technical solutions. The company has also invested in training with its worldwide network of training centres. These centres offer customised courses on CAD/CAM systems, milling techniques, and the advanced use of dental materials such as zirconia. "Educating our customers is essential to ensuring their success," Steger explained. The training not only enables them to master the tools, but also to innovate and push the boundaries of modern dentistry.

A mission: to change dentistry

Zirkonzahn embodies a vision in which tradition and technology are intertwined to push the boundaries of modern dentistry. With its unwavering commitment to quality, innovation and customer service, the company is positioning itself as an indispensable partner for dental laboratories around the world.

Although Zirkonzahn's heart beats in South Tyrol, its commitment extends beyond its borders. The company is always active in providing technical and logistical support to its customers around the world. Its international team guarantees fast deliveries and personalised support so that dental laboratories can operate without interruption.

Discover Tornos' success story video.

"We benefit from highly qualified employees, which is crucial to maintaining our commitment to perfection."

Enrico Steger, Zirkonzahn Srl-Founder

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