

Working hard to create a secure future

Industria Metalli, Italy was able to take the next step towards becoming a system supplier

Omni Aerospace sees blue skies with addition of Starrag ECOSPEED F 1540 machines

Omni has two ECOSPEED F 1540 machines integrated into an automated Flexible Manufacturing System

Machining around the clock

JORNS commissions a five-axis Starrag machining centre with four-pallet automation for large part machining

Back to the roots!

A 1928 SIP High Precision Machine is back home

Sustainable power generation: six vertical lathes at thyssenkrupp rothe erde® produce bearings for wind turbines



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Star – The Starrag Group
magazine

Publisher:
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Picture credits:
© Photographs and illustrations:
Starrag Group 2020
© Page 12–23: Ralf Baumgarten

Design:
Gastdesign.de

Printing:
Druckhaus Süd, Cologne

Reprinting:
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may not be copied without
written confirmation.

Star – Starrag's magazine –
is published twice a year
in German (in official Swiss
spelling), English and French.
Despite careful editing, no
guarantee can be made.

www.starrag.com



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Dr Christian Walti
CEO of the Starrag Group

Dear reader,

It seems to me that collaboration is becoming an increasingly key concept. I'm happy the observation I made at the beginning of the COVID-19 pandemic has been repeatedly confirmed. Although the pandemic has kept us apart, we have faced it together in spirit.

Since July 2020, Alexander Attenberger has been supporting our virtual efforts, and I'm impressed by the way our new Chief Sales Officer (CSO) is bringing together our highly motivated sales colleagues to provide solutions for the customer rapidly and 'on point'. Success depends on a major project: the further digitalisation of distribution.

The same impetus is also being applied to each of the projects discussed in this edition. For an excellent example of mettle, I recommend reading the report on traditional foundry Industria Metalli in Lombardy, Italy, which used the involuntary break in production to build a mechanical manufacturing facility. In spite of the pandemic, the company's Heckert machining centres were commissioned without any notable delays thanks to intensive support from Starrag.

Another company that made a bold investment in its future was Swiss-based bending machine manufacturer JORNS: Its new Starrag five-axis large-scale machining centre has drastically reduced the machining process for thick welded structures from four hours to two and a half hours. By introducing an unmanned shift, JORNS can now take on additional external orders. Another traditional company bravely breaking into new markets is Omni Aerospace in the USA, which is using two ECOPEED F 1540 to machine aluminium wing ribs up to four metres in length. According to the company's founder and CEO John J. O'Neill, these rapid twin machines are providing "unrivalled performance, previously unachievable levels of precision and excellent surface quality".

We have a special business relationship with German slewing bearing manufacturer thyssenkrupp rothe erde*, which has been producing gigantic bearings using Starrag machine tools for decades – predominantly XXL slewing bearings for wind turbines with a maximum diameter of six metres.

However, anyone who thinks that the only way to achieve maximum power and performance is to use the latest high-tech equipment is very wrong. In 1928, SIP, now a subsidiary of Starrag, sent an MP4 optical precision measuring machine from Geneva to the USA – and thanks to its volumetric accuracy of 0.001 to 0.002 mm, the machine has been used there as reliable measuring equipment ever since, by various companies including General Electric.

I hope you enjoy reading the 2–2020 edition of Star and that it inspires you on your path to a collaborative future.

Christian Walti

A salesman who knows his stuff

Sales people are ice-cold, calculating number geeks who will do anything for profit? Alexander Attenberger, the new Chief Sales Officer (CSO) of Starrag, fights against this stereotype every day. A portrait of a top salesman who knows his stuff and has always liked to get stuck in.



"It is now up to us to provide solutions for the customer rapidly and 'on point'."

"We have dedicated sales staff and good products."

Alexander Attenberger, CSO

"It's a heart-stopping moment when you attend an airshow or are at a stadium and the US military conducts a flyover with the F-35", enthuses CSO Alexander Attenberger in Aerospace Manufacturing, a British industry magazine. His pride and excitement are understandable, as this is a flagship project: Starrag manufactures around 60 machine tools that are used to produce important components for the F-35 Lightning II stealth supersonic jet.

The 43-year-old originates from the Altötting region, east of Munich, and has extensive experience in precision engineering, as well as a palpable enthusiasm for technologically challenging projects. "While working as a production manager, I also acquired a qualification in business administration," says Attenberger. "So I come from a very practical background –

I've always liked to get stuck in." He then went on to learn about sales from the ground up, finally becoming part of the management team at a large German machine tool manufacturer, where he played a significant role in expanding international sales.

The mountain biker and skier is equally at home in the mountains as he is in production departments on management teams. After eight years at his previous company, he made the move to the Starrag headquarters in Rorschacherberg in the summer of 2020. Despite the lockdown, Attenberger quickly became acquainted with the Swiss company and its ten different product ranges. "I didn't need any kind of secret recipe to motivate the salespeople for the various Starrag product ranges," the CSO recalls with

satisfaction. "We have dedicated sales staff and good products. The challenge now is to bring the whole "family" closer together." To achieve this, he aims to provide the sales department with the necessary tools and to arm the team for success, "particularly in this period of tough competition." He considers the further digitalisation of sales to be an important means of achieving this goal. "Nowadays, when customers have placed an order, they want a response faster than ever before", says the CSO. "It is now up to us to provide solutions for the customer rapidly and 'on point'".

This is in line with Starrag's slogan "Engineering precisely what you value", with the machine taking a rather more backstage role in this instance. Attenberger: "We are able to precisely filter out the things that really hurt our customers. Do they have issues with accuracy or productivity? Then we have the perfect, tailor-made solution for them". ▀



Omni Aerospace
sees blue skies
with addition
of Starrag
ECOSPEED F 1540
machines



Omni has two ECOSPEED F 1540 machines integrated into an automated Flexible Manufacturing Systems.

"The ECOSPEED F 1540 machines perform beyond our expectations."

John J. O'Neill, CEO

With the bright glint of the sun ricocheting off the wide expanse of an airplane's wing as one settles into flight, it's easy to recognise the skill, technology and precision it takes to build these flying machines.

Wichita, Kansas, is home to those skills. The aero manufacturing hub of the United States is home to companies like Omni Aerospace, which designs and manufactures complex metal components for companies like

Boeing, Bombardier, Gulfstream, Lockheed Martin, Spirit AeroSystems, Textron Aviation and the Department of Defense.

Starrag has played an integral role in the success of Omni Aerospace, a 25-year-old company founded by CEO John J. O'Neill. "We took our company to the next level by investing in technology equipment that can do things other people can't do with their equipment," said O'Neill of

Starrag's ECOSPEED F 1540 in a YouTube feature on Omni. "It's been a game changer for us. It's a unique piece of machinery that is unmatched for speed and accuracy."

Omni has two ECOSPEED F 1540 machines integrated into an automated Flexible Manufacturing System (FMS). Machining operations include surfacing, pocketing and drilling. Example parts are wing ribs, which are made from aluminium or aluminium/lithium alloys.

1

> CHALLENGE:

Omni Aerospace needed to produce large, flight-ready parts within the design tolerance and surface finishes in a time-sensitive manner.

2


> SOLUTION:

Starrag's ECOSPEED F 1540 provides unmatched throughput for complex aluminium structural parts with payloads up to three-tons and unparalleled accuracy as well as an extremely high surface finish that requires no hand finishing.

3

> RESULT:

Omni Aerospace expanded its product offerings triggering a significant sales increase. Starrag opened new markets for Omni because of the speed, power and accuracy of the ECOSPEED F 1540.



“Finished components can have as much as 95% the metal removed.”

Each individual wing rib starts life as a billet, weighing up to 2,700 kg with dimensions of up to nearly 4,000 mm in length, 1,500 mm in width and up to 152 mm thick. Finish machined components can have as much as 95% the metal removed.

The ECOSPEED's main spindle motor performance plays a key role in complex machining performances.

Rated at 120 kW, it can run nonstop at 30,000 rpm in S1 mode – coupled with the machine's high dynamic capabilities (acceleration of up to 1 g in all axes and jerk up to 200 m/s³). While roughing, the ECOSPEED F 1540 machine can fill a 55-gallon drum with chips in less than a minute.

Each of the ECOSPEED F machining centres features a Sprint Z3 parallel

kinematic machining head, which boosts the machine's ability for highly-dynamic, simultaneous five-axis/ five-sided milling. The head uses three parallel linear axes drives mounted radially equally spaced in the headstock. The spindle platform is connected to each drive via rigid levers with a pivot at one end and a ball joint at the other. When all three axes move equally and



"It's a unique piece of machinery that is unmatched for speed and accuracy."

simultaneously, the spindle is moved in a straight line in the Z-axis. If the three axes move differentially, the spindle platform will be tilted in the A/B kinematic, allowing the spindle to follow any path within a spherical

cone of ± 45 degrees at a maximum of 80 deg./second. Each machine has an integral C-axis and is equipped with the automatically loaded and tool changeable right angle head, which operate at any spatial angle between

± 135 degrees. The ECOSPEED F 1540 machines "perform beyond our expectations," said O'Neill. "No matter what the challenge. No matter the part. No matter the complexity of the part, Omni can now exceed their customers' expectations." ▀



Precision is mandatory: Even with slewing bearings, the angular error in the surface is only 0.001°. The outer centring has an H6 holder with a tolerance of 0.16 mm.



Win-win situation at its finest

thyssenkrupp rothe erde®,
Lippstadt: six Dörries
CONTUMAT vertical lathes
in operation

A manufacturer of slewing bearings and a machine manufacturer have been turning things to their advantage for decades: thyssenkrupp rothe erde® has been using Starrag machine tools since the 1980s, while Starrag in turn installs thyssenkrupp rothe erde® slewing bearings in its vertical lathes – for example, in the new Dörries CONTUMAT VC 6000/500 for Lippstadt.

“Flap, flap, flap”. In Sauerland, the wheels are turning smoothly at one of the many wind farms. But the sight is deceiving; it is not always this calm. In January 2007, the wind turbines even had to withstand Hurricane Kyrill, which brought gusts at speeds of up to 225 km/h. The constantly changing weather situation is highly demanding not only for the wind turbines, but also for the drive technology. For example, the slewing bearings must last 20 to 25 years, despite tough operating conditions that change constantly depending on the weather. Many manufacturers in the wind power industry rely on customised drive technology from the East Westphalia region. We are

talking about thyssenkrupp rothe erde® Germany GmbH in Lippstadt. Only a few kilometres away from the wind farms in the Sauerland region, the company produces slewing bearings at what is probably the largest rolling bearing machinery park in Europe. The amount of machining is very high, as 20,000 tons of chips are produced. More than 350 machine tools handle turning, grinding, cutting and polishing.

From a single source: all slewing bearings, rolling bearings and rings for wind turbines

Around 25 Starrag machine tools, which thyssenkrupp rothe erde® has

bought since 1980 and which are still in use, play an important role in the machinery park. These now include six Dörries CONTUMAT vertical turning-grinding machines, which are primarily responsible for finishing the bearings for wind turbines. “We supply blade, tower and rotor bearings for wind turbines in dimensions of up to six metres in diameter”, explains Dr.-Ing. Mattias Töfke, Production Manager at thyssenkrupp rothe erde®. The bearings are produced in an extremely high production depth on the very extensive machinery. “We take on the complete machining, thermal processing, surface treatment and assembly”, says Dipl.-Ing. Jürgen Lange,



Head of Plant Maintenance and Planning, "only a few components such as screws or seals are sourced externally". Production starts at the ring-rolling mill in Dortmund, where high-strength steel special alloys are used to produce rolled rothe erde® rings. In Lippstadt, these rings are then used to manufacture slewing bearings which

"In the final technical bonus-malus evaluation, Starrag has predominantly emerged as the right partner for final processing."

must meet the most exacting demands. For example, during the mechanical machining, thyssenkrupp rothe erde® relies on the electronically controlled coolant supply of the CONTUMAT centres to compensate for temperature fluctuations and ensure constant machining conditions. A larger oil circulation volume with temperature-controlled oil in the base also ensures controlled table growth.

Strict regulations of the wind power industry

This attention to detail is essential for thyssenkrupp rothe erde® to meet the demanding specifications of its

customers, for example from the energy sector, which correspond to those of the aerospace industry. "We have had to develop new processes for these requirements over the years", reports Lange. "In particular, we have optimised the hardening and finishing process using grinding". Before rothe erde® slewing bearings enter series production, prototypes are produced that must pass endurance tests on test rigs. Töfke: "Prototypes undergo an endurance test for six months, in which we simulate typical load cycles, which correspond to more than 25 years of use". What's more, the demands are constantly increasing, as the bearings



Investment in the future of wind power: With the new Dörries CONTUMAT VC 6000/500, rolling bearings with a maximum diameter of six metres and a height of one metre can also be machined.



Dr.-Ing. Mattias Töfke,
Production Manager Series 2

"The great benefit is the programming and the ease of use."




Thanks to these good experiences, thyssenkrupp rothe erde® has ordered a further Dörries CONTUMAT, which will soon be used in Lippstadt to provide the rothe erde® slewing bearings with the finishing touch.

are becoming bigger with the increasing performance of the wind turbines. Lippstadt is currently producing bearings for offshore farms with wind turbines that have an output of 8 to 11 MW each; however, the industry is already planning

plants with a capacity of 15 MW. The constant increase in performance also has an impact on the diameters of the bearings. For this reason, thyssenkrupp rothe erde® invested in a new Dörries CONTUMAT VC 6000/500, which

can process up to 100 tons of payload for components with a maximum diameter of six metres and a height of one metre. Two powerful, water-cooled 89-kW drives move the rotary table with a torque of 461,900 Nm and a speed



Powerful: A 60-kW spindle is used for grinding in the left support, which operates in the speed range of 1,500 to 3,500 rpm.



“Particularly in the area of grinding finishing operations, we have been able to build up shared expertise in recent years upon which we are happy to rely.”

of 75 rpm. In this new, sixth Dörries CONTUMAT too, a rothe erde® slewing bearing ensures smooth, even running with extremely heavy components. The turning, drilling and milling movements are carried out by the right support. For grinding, a 60-kW spindle is used in the left support, which operates in the speed range of 1,500 to 3,500 rpm. According to the Production Manager, the raw performance for finishing rothe erde® slewing bearings could theoretically also

be fulfilled by other machines with regard to rigidity and accuracy. However, the subsequent quality of a bearing largely depends on the finishing. Key for Starrag here is that as the manufacturer, they not only supply the hardware, but also the software. Together with Starrag, grinding cycles have been developed and continuously optimised over the decades. But how does Starrag's promise of “Engineering precisely what you value” meet the demands of regular customer thyssen-

krupp rothe erde® for finishing? The great benefit is the programming and the ease of use”, says the Production Manager. “Particularly in the area of grinding finishing operations, we have been able to build up shared expertise in recent years upon which we are happy to rely”. Thanks to these good experiences, thyssenkrupp rothe erde® has ordered a further Dörries CONTUMAT, which will soon be used in Lippstadt to provide the rothe erde® slewing bearings with the finishing touch. ▀

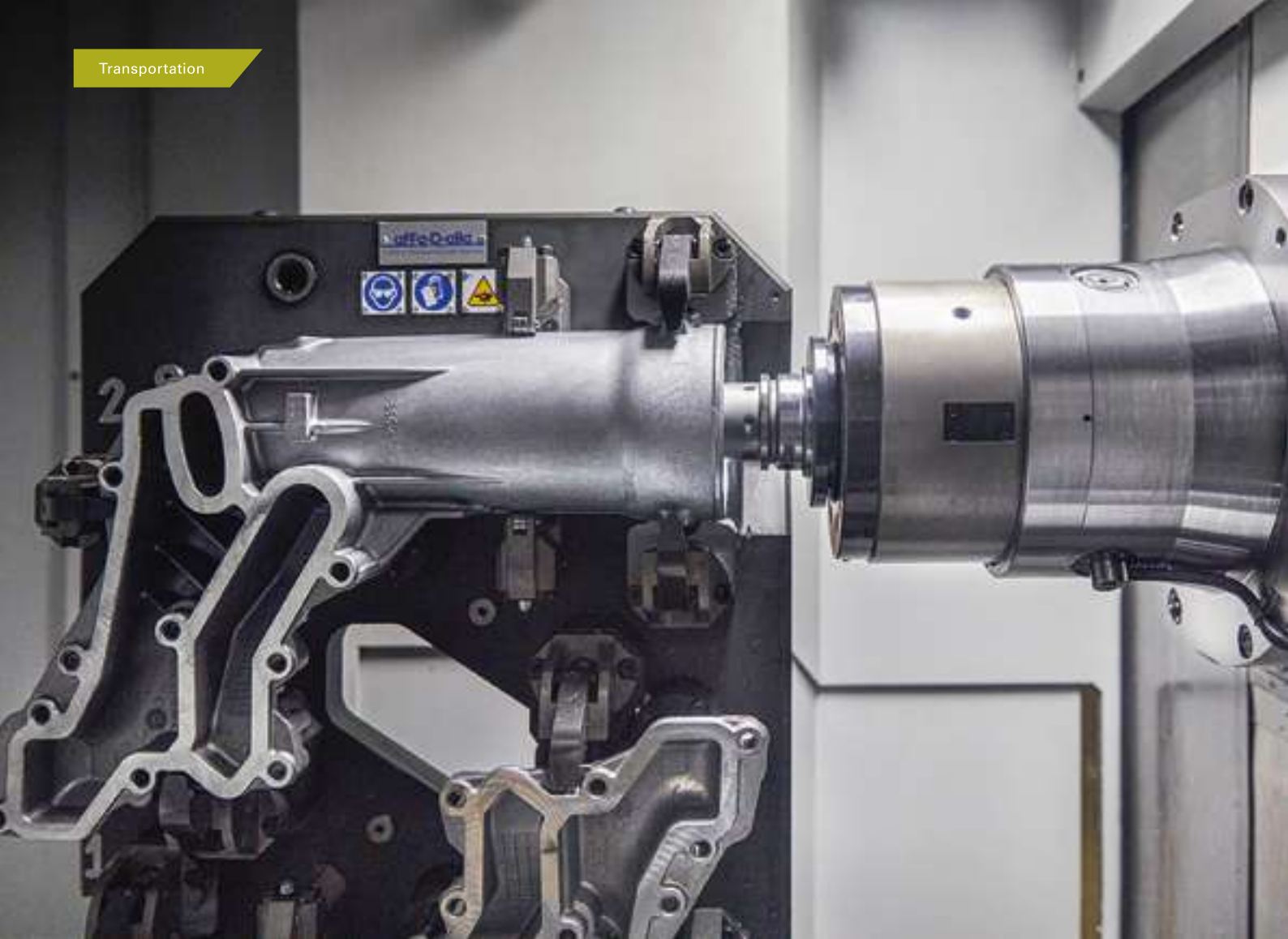


The first step is the melting process, which heats the secondary aluminium up to the ideal processing temperature of 700° C, ready for the die-casting presses.



Working hard to create a secure future

While the lockdown in Italy saw many companies struggle, a traditional foundry in Lombardy used the involuntary break in production to establish a mechanical manufacturing facility. In future, the rough cast parts will no longer need to leave the factory to be finished – instead, they will be finished on-site using two Heckert machining centres. Thanks to intensive support from Starrag, the company was able to take the next step towards becoming a system supplier without any significant delays, despite the pandemic.



“

“At the same time, we can also achieve top quality”.

Fausto Becchetti,
Industria Metalli

A company's choice of pictures can often tell you something about the company itself – and this is also the case in Bedizzole, not far from Lake Garda. In the conference room of Industria Metalli, there is a picture titled “Obiettivi” (goals). The picture shows a hiker standing on a mountain top, gazing at a far-off mountain range. The caption also sounds exciting: “Look to the future and then look even further ahead.”

While hikers can simply enjoy the view, looking ahead is vital for companies such as Industria Metalli as its customers come from the automotive sector – one of the most demanding industries. The company specialises in vehicle components, from supports and brackets through to all manner of housings. With a high level of vertical integration, each year the factory produces more than five million cast aluminium parts for 160 customers

around the world using 8,000 tons of secondary aluminium. The medium-sized company from Lombardy generates 40% of its turnover from the automotive industry, around 30% from commercial vehicle manufacturers and around another 30% from agricultural technology companies.

Learning from the automotive industry

During the tour of the large factory premises, Mr Fausto Becchetti, Managing Director and co-owner, explains to us that he learned a lot from his previous work on the automotive sector management team at ABB and the process-oriented thinking that this required: The factory is divided into three production cells and follows similar principles. All of the production areas are connected digitally via a manufacturing execution system which controls the entire manufacturing



The two Heckert machines are able to achieve a surface roughness (Ra) of 20 µm, meaning that no further processing is required.

process in real time. Every production step is carried out in accordance with Toyota's Poka-Yoke principle, which detects and prevents faults. It is supported by a production-oriented and seamless quality assurance system, which is based on the strict requirements of IATF 16949 (International Automotive Task Force).

In the factory, the former ABB manager proudly points to one of the four gas-operated furnaces in the first production cell. "The aluminium immediately reaches the ideal processing temperature of 700°C, at which point it becomes fluid", explains Becchetti. "The next steps are degassing and transport". In the meantime, the manufacturing execution system fully automatically organises just-in-time transport and assigns a driver via the digital network. The forklift truck is located nearby and features a tablet that informs the

"Although many components have hard-to-reach areas such as holes or pockets, the processing time has been reduced by several seconds per clamping surface compared to that offered by our service provider, as we can run at significantly higher cutting speeds."

Fausto Becchetti, Managing Director Industria Metalli

driver which furnace to collect the crucible from and which of the 16 robot-assisted high-pressure die-casting presses in the second production cell is waiting for the liquid aluminium.

Outsourcing slows down the flow of materials

Like most firms in the industry, the company has so far relied on outsourcing: After the die casting process, the

components have a near-net shape and therefore have to be taken to a nearby workshop to be finished. Outsourcing leads to an increase in logistical considerations and cost, while quality decreases. For example, small air pockets known as blowholes can occur in cast parts, but these are often not detected during X-rays and are only picked up during final machining. The late detection of these blowholes by external companies results in significant delays to the production process

The company began using the two Heckert machining centres to machine simple housings for oil filters. Industria Metalli is already machining one in ten of its components in its new production cell.

and increases the cost enormously: There is no immediate quality check after high-pressure die-casting on the machine tool. The result: The process chain becomes slower and the part has to be melted down and poured again. These bottlenecks were a thorn in the former manager's side.

The turning point came with the arrival of a new project manager, who had worked as a machining specialist in the automotive industry and who recommended purchasing a five-axis Heckert X40 and a four-axis Heckert H40 to assist the establishment of a mechanical manufacturing facility. "We ordered the two machining centres in autumn 2019", explains Becchetti. "Despite the lock-

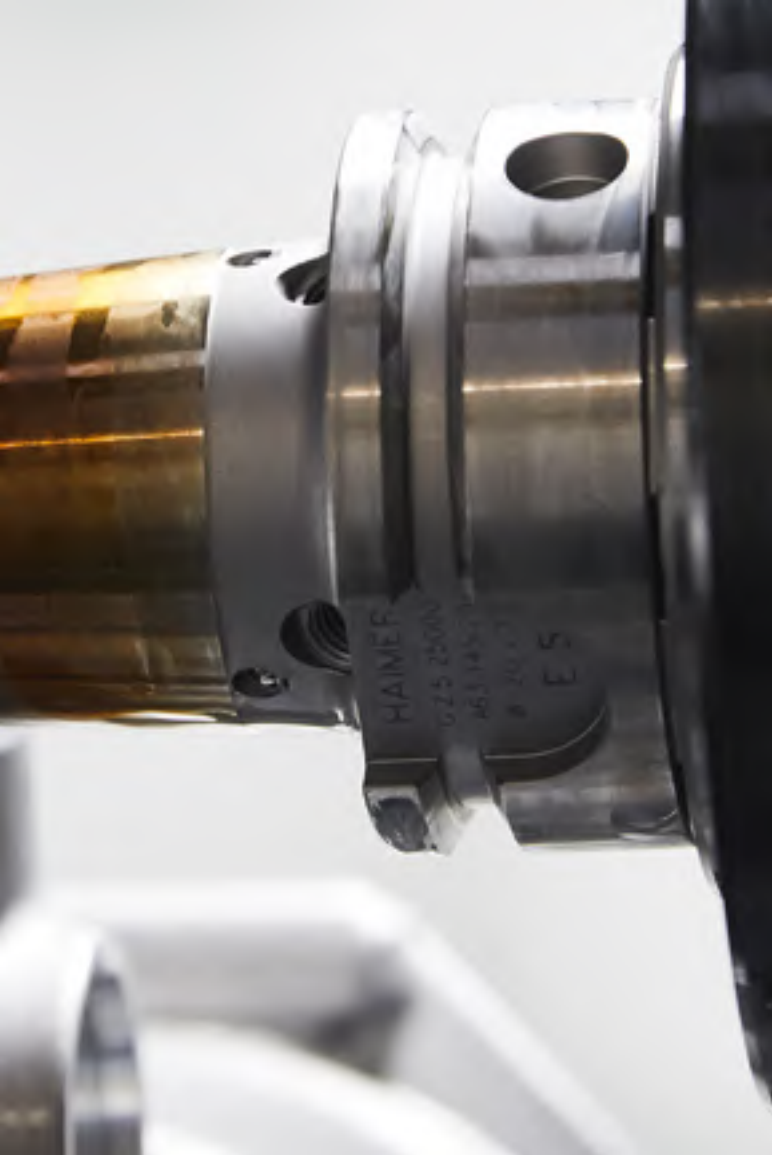
down, we decided to go through with setting up a mechanical manufacturing facility as it is an investment in the future – even though there was no market for our products in the spring".

Support from Chemnitz

Dipl.-Ing. Thomas Kässner was involved in the process right from the start: The Heckert Sales Manager speaks fluent Italian and also helped with commissioning during the lockdown period, which took place almost without any delays thanks to direct contact with the Starrag plant

in Chemnitz. The company decided in favour of the two machining centres because of their robust design, greater swarf removal, continuous precision and the technological performance buffer. All the frame assemblies are deliberately rigid, from the machine bed, column and table to the rotary swivelling unit. "I am particularly pleased about the high and consistent machine rigidity as we use diamond tools to finish the die-cast parts", says the project manager, clearly satisfied with the machining centres. "Even at 20,000 revolutions per minute, the diamond doesn't break when it hits a blowhole".

Fausto Becchetti,
Industria Metalli



“By establishing a mechanical manufacturing facility and incorporating it into our production system, our opportunities to progress to tier one, to become a system supplier, have increased significantly.”

Fausto Becchetti, Managing Director Industria Metalli

An intelligent partnership: diamond tools and wet machining

Minimal-volume lubrication or dry machining is generally not an option when machining aluminium components. The Italian company uses an electronically controlled coolant supply, which ensures the temperature stabilisation of the workpiece and the tool, amongst much more. “Without effective wet machining, it would be impossible to achieve optimum swarf removal”, adds the project manager. The removal of the swarf is the linchpin of a clean and rapid process, as aluminium swarf will otherwise easily stick to the diamond and scratch or impair the cast component. The machining expert is particularly pleased with the quality and the very fast processing time. “Although many components have hard-to-reach areas such as holes or pockets, the pro-

cessing time has been reduced by several seconds per clamping surface compared to that offered by our service provider, as we can run at significantly higher cutting speeds”, Becchetti reports. “At the same time, we can also achieve top quality”. The two Heckert machines are able to achieve a surface roughness (Ra) of 20 µm, meaning that no further processing is required.

The effort was worthwhile: Industria Metalli has begun processing simple housings for oil filters. The company is already machining one in ten of its components in its new production cell. “I am optimistic that we will soon be able to finish more products using the Heckert machining centres and that, thanks to the in-house mechanical manufacturing facility, we will also receive orders for completely new components”,

states Becchetti optimistically. “Automation is now the next step”. However, the benefits are obvious, even without this integration: Industria Metalli has considerably increased the proportion of value added for its components – and with better margins too.

The boss is already looking to future, but what are his long-term strategic plans? “By establishing a mechanical manufacturing facility and incorporating it into our production system, our opportunities to progress to tier one, to become a system supplier, have increased significantly”, explains the Managing Director. “Our products are now significantly more competitive in comparison to those from many of our competitors, who do not have in-house machining. The two Heckert machining centres represent the first milestone in our journey”. ▀

Machining around the clock

JORNS commissions five-axis Starrag machining centre with four-pallet automation for large part machining

The columns for the bending machines manufactured by JORNS AG are huge welded structures with a displacement circle of up to 2,300 mm. With the five-axis large machining centre STC 1250 from Starrag, the company was able to make the precision machining of these parts much more economical.



An important deciding factor: Starrag extended the Y-travel distance to the measurement required by Jorns.



Marc Jorns, CEO

Significant productivity increase: The four-fold pallet system of the STC 1250 enables set-up during the machining time and lightly manned shifts.

“In order to be able to survive in an international competitive environment, we need high-quality, highly productive machines”.

Marc Jorns, CEO

JORNS AG – the name stands for bending and double bending machines of Swiss quality, which enjoy the highest recognition worldwide. CEO Marc Jorns explains: “At our headquarters in Lotzwil, we manufacture around 120 swivel bending machines a year of which over 90% are exported. With this volume, we are one of the leading suppliers worldwide of this type of machine”.

Increasing competitiveness with high-quality equipment

The production equipment used must also meet the demands that Marc Jorns places on his products: “In order to be able to survive in an international competitive environment, we need high-quality, highly productive machines”. The most recent investment was the production

of the largest machine components, the load-bearing stand elements. Peter Roth, Head of Production, explains: “Our machines do not have a classic machine bed, but arms and stands, which are screwed onto the base frame. These stands are welded structures requiring a displacement circle of up to 2,300 mm for processing”.

As the previous machining centre used had reached its accuracy and capacity limits, Peter Roth and his team set out to search for a replacement. Both technical and economic factors played a role, with which the Production Manager dealt intensively and competently.

The required travel distance already limited the selection considerably. To operate at JORNS, the machining

“What counts is the TCO, the Total Cost of Ownership. With regard to the overall costs over the entire life cycle, I view the investment in the Starrag machine as good business.”

Peter Roth, Head of Production

centre must be able to handle at least a 1,250 pallet size and travel up to 2,300 mm in height. “A few comparisons later, we chose the Starrag STC 1250”, reports Roth, “whose Y-axis was extended to the length we required”. In addition to Starrag, only one other competitor was able to fulfil this customer-specific requirement. “The fact that we finally opted for the STC 1250 was largely due to the better price-performance ratio and the close geographical proximity to the Swiss company Starrag, as well as our shared mind-set”, explains the Production Manager with a slight smile. He also explains that for him the purchase price is not the sole measure of all things: “What counts is the TCO, the Total Cost of Ownership. With regard to the overall costs over the entire life cycle, I view the investment in the Starrag machine as good business”.

Reliable processing, accurate repeatability and extremely productive

Of course, the decision rests on a broad range of criteria. In addition to the size of the five-axis machining centre, the basic



requirement was process reliability and accurate repeatability. “For example, we need to create deep holes with an H7 fit, which is only possible with absolutely precise manufacturing,” explains Roth. “We have almost fully exploited the high precision of the STC 1250.” The robustness of the machine is also important, which is put to the test by the welded structures – in part a combination of different materials. “No problem for the Starrag STC 1250”, says Peter Roth about his new machining centre, which was originally developed for the aviation and energy industry, i.e. for heavy-duty cutting of steel, titanium, corrosion-resistant steels and special materials, such as Hastelloy and Inconel. “We were sure

that its static and dynamic properties would also be sufficient for our purposes”.

Finally, the Starrag STC 1250 also stood out thanks to its efficient five-axis capability. In addition to the three dynamic linear axes, the CNC rotary table acts as the fourth simultaneous axis. It has a high-torque, a high-damping drive and can be clamped hydraulically. The swivel head is the simultaneously controlled fifth CNC axis. Thanks to the robust screw drive and the stable roller bearing on both sides, it is particularly suitable for heavy-duty cutting. To create optimal operating conditions, JORNS prepared a new foundation



“We have almost fully exploited the high precision of the STC 1250”.

Peter Roth, Head of Production



“Our machines do not have a classic machine bed, but arms and stands, which are screwed onto the base frame.”
Peter Roth, Head of Production

for an underground installation. The STC 1250 can thus be ergonomically approached and loaded at floor level. In July 2020, the bending machine manufacturer finally put it into operation, and since the beginning of September, production has taken off.

“In the meantime, we have reprogrammed our parts step by step”, explains Peter Roth. This was necessary because the previous five-axis centre had an orthogonal head – in contrast to the swivel head of the STC 1250. This requires other processes, as the machining specialist Roth points out: “We are enthusiastically getting to know the machine, adjusting to the new possibili-

ties and, if necessary, even changing the designs and the clamping devices”.

Significantly increased capacities

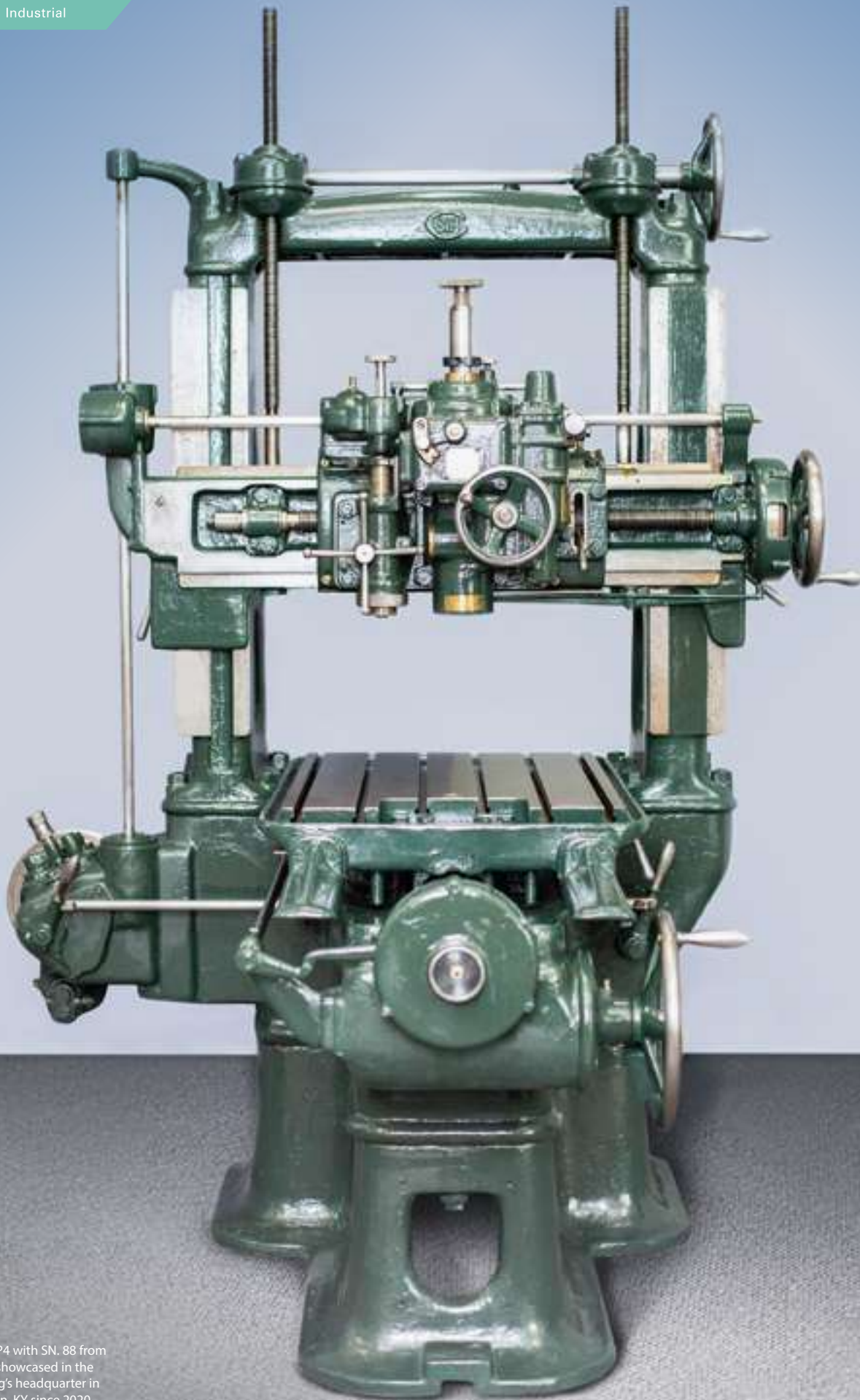
In terms of economic operation, the Starrag machine scores highly in two respects. Firstly, the processing times are shorter. “Until now, we needed around four hours for our large parts”, says Roth. “According to Starrag, we will soon be able to remove them from the machine after two and a half hours. We have not yet reached this level during the start-up phase. But even three hours would be a huge improvement, and we’re very close”.

JORNS achieved the second increase in productivity by configuring the Starrag STC 1250 with a four-fold pallet system, which enables setting up during the machining time. “Our large parts are so heavy that we have to load them with the crane. Together with the clamping and alignment etc., this takes a long time. If the process has to take place – as before – in the machine room, the set-up times become

machine downtimes, which we absolutely want to avoid. After all, a machine is only profitable when it is machining”.

But now the JORNS production team’s wish is set to become a reality and the large machining centre could soon be working around the clock. “We are planning a lightly manned shift for the future”, says Peter Roth. “Towards the evening, we load the four pallets full of long-running parts, which are then converted in the morning by our skilled workers for further processing”.

While up to now the machine capacities have been rather tight, Production Manager Roth expects interim overcapacities: “My calculations have shown that we can currently utilise the Starrag STC 1250 with our own single-layer components to 100%. During other shifts, we could take on external orders and thus achieve further profit i.e. reduce machine hours costs. There are not many service providers in our area that can process such large parts”. ▀



SIP MP4 with SN. 88 from 1928 showcased in the Starrag's headquarter in Hebron, KY since 2020.

Back to the roots!

A 1928 SIP High Precision Machine is back home

The year was 1928, the height of the Roaring Twenties, and the United States was experiencing economic prosperity. It was a decade when people defied Prohibition and indulged in new styles of clothing, music and dance. The Jazz Age featured women in jewel tone flapper dresses and men in black, high-waisted jackets dancing the provocative Charleston.

It was also the year a very special measuring precision optics machine had arrived on a ship from Europe. Its new home was the General Electric plant in Lynn, Massachusetts, a town located 14 miles northeast of Boston. It was the SIP MP4 machine, with serial number 88.

Societe Genevoise d'instruments de Physiques, or SIP, was a Swiss-based manufacturer of products and instruments for physics and optics that was acquired by Starrag in 2006. In the early 1900s, the engineers at SIP built a wide range of machinery, including refrigeration compressors and telescope mounts and other scientific instruments.

All SIP products had three common elements: precision, quality and specialisation. The company's fundamental principle was "above all, aim at precision of quality and work."

The first machine tools built by SIP were thread grinding machines, beginning in 1908. The first SIP industrial machine tool was produced in 1921. Although SIP had little experience in jig boring machine tools, the MP4 evolved from "machine à pointer" or a machine with great precision. It had a 500 × 600 mm worktable and was the first SIP machine that could locate and bore a hole with unparalleled precision. The MP4 was manufactured from 1921 – 1929.

The SIP MP4, serial number 88, has a storied past. After its time at General Electric, it traversed the country in 2009 when Robert Mathews, founder and president of R. Mathews Optical Works, Inc., located in Poulsbo, Washington, acquired the machine from a friend in Massachusetts. Prior to his acquisition he contacted Starrag to ask questions about its origin, capabilities and usefulness in today's times.

Refurbished and still reliable

R. Mathews Optical Works was founded in 1978 with the idea of manufacturing small quantity,

“For all the years that I had the machine and used it for measuring precision optics, it never failed to amaze me the accuracy built into this machine from 1928 using the methods of the time.”

Robert Mathews, founder and president of R. Mathews Optical Works, Inc.

specialisation optical components. The company quickly became a recognised source for being able to make optics that frequently were “out of the box” designs and difficult to manufacture. R. Mathews Optical Works continues operating and has established a long-standing tradition and reputation for being able to take a design from prototype to production with consistency and quality for the past four decades.

“At the time, my company was being asked to manufacture larger (up to 300 mm in diameter) aspheric lenses and mirrors for the commercial and aerospace industry. Unfortunately, we were unable to measure with any accuracy anything over 200 mm,” Mathews said in a recent written interview about the SIP MP4. “We needed something that we could easily retrofit and get the measurement accuracy that our customers required.

Used CMM equipment was somewhat affordable but questionable as to their history and expensive to work on.”

Upon receiving the SIP MP4, Mathews renovated it to get it back into working condition. He soon realized it was worth the time and effort.

“We fitted the spindle with a high-precision Heidenhain electronic probe with a 60 mm travel and ran the table through its entire travel in X and Y with an error of less than 0.002 mm in both directions,” said Mathews. “Further tests found that the original compensated lead screws provided positional accuracy of 0.002 mm. It was then I knew I was onto something with this machine.”

After cleaning, priming, painting and complete lubrication, Mathews’ team ran it through its ultimate test: using a master glass convex spherical surface



manufactured and tested interferometrically to ¼ wave accuracy and 200 mm in diameter; this was centered on the machine using a precision rotary table. It was then measured on the MP4 in four different positions and found the volumetric error to be 0.001 – 0.002 mm. In subsequent use on actual customers’ parts, this accuracy enabled them to fabricate the parts close enough in the



The first SIP industrial machine tool was produced in 1921. The MP4 was manufactured from 1921 – 1929.

All SIP products had three common elements: precision, quality and specialisation.

grinding stage to be able to polish and optically test the components to completion. "In later years the machine was used less and less so I freed up the frozen spindle and brought the machine back to its original operating condition," Mathews said, adding, "For all the years that I had the machine and used it for measuring precision optics, it never failed to amaze me the accuracy built

into this machine from 1928 using the methods of the time."

In 2019, instead of discarding the machine, Mathews offered it to Starrag, the global technology leader in manufacturing high-precision machine tools for milling, turning, boring and grinding workpieces of metallic, composite and ceramic materials. Two successful

companies on two continents, both with reputations for creating the very best quality products for their customers, all connected by one machine.

The SIP MP4, serial number 88, is now home; showcased at Starrag's North American headquarters in Hebron, KY. ▀



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