

## Well-rounded

IDEAS BROUGHT INTO FORM

### **We industrialise additive manufacturing**

*Review of the exclusive live event at HAMUEL Maschinenbau in Meeder*

### **Core parts for flow components**

*High-performance applications do not allow for compromise*

### **Getting to the bottom of a phenomenon**

*Women and technology – do they go together?*



Foreword by Matthias Wolf.

## You rely on us...

Dear customers, business partners and colleagues,

Customer service is always an exciting challenge. As service manager, I bear the responsibility and I can assure you that we all know how important the quick availability of spare parts and competent technical support is for our customers.

Moreover, it is becoming more and more difficult to motivate junior staff to take on the interesting job of a service technician.

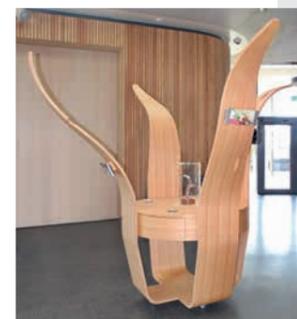
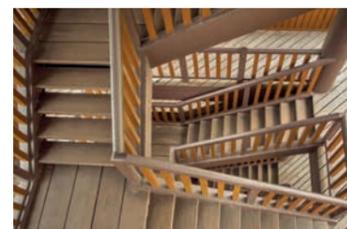
In our opinion, a solution is to enter into partnerships with specialised service companies that score not only with their extensive know-how, but also with their high level of commitment and the use of most modern technology. Local partners are quickly on site and in combination with rapid diagnosis and express spare part deliveries they usually succeed in keeping waiting times as short as possible.

On pages 16+17, we present our partners for Southern Germany and Austria, who enjoy a high level of acceptance among you with their excellently trained staff. As a team, we work together to constantly improve and to become faster and more efficient in order to guarantee production reliability based on high machine availability.

Equally exciting are the report on 'Women and Technology' (18+19), the interview on additive manufacturing and insights into the extraordinary world of Turbocam International, a global company that uses highly complex equipment from HAMUEL to manufacture blisks and other function-integrated flow components.

I hope you will enjoy reading this issue,

**Matthias Wolf**  
Service Manager  
Reichenbacher Hamuel GmbH



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# We industrialise additive manufacturing

Review of the exclusive live event at HAMUEL Maschinenbau in Meeder.

This live event at the end of May 2021 marked the start of a new era for the Reichenbacher-Hamuel group of companies in the field of additive manufacturing. In about two years, we have succeeded in developing a comprehensive product portfolio that is something to be proud of – a strong overall package in which every user will find a solution that suits him.

Additive manufacturing will determine the future, as it implies an immense range of possible applications. The automotive industry and its suppliers, the aircraft, consumer goods and toy industries, mould making (rapid tooling) and medical technology have been using 3D components for quite some time. Interest in these quickly and inexpensively produced components will likewise increase in other sectors, such as art, architecture or landscape design.

Dr. Alexander Kawalla-Nam, Head of Additive Manufacturing Technology, stresses, "Today many processes can be made much more efficient by using hybrid technologies. This gave rise to the idea of offering innovative machine and technology solutions with which, in addition to small 3D components, large-volume components, such as façade elements, formwork for the construction industry or casting/pressing moulds in mould-making industries, can also be efficiently produced by 3D printing."

At the same time, there are no concessions in terms of desired accuracies and high-quality surface finishes. "Thus, we also transfer the norms and standards for dynamics and precision from mechanical engineering to additively manufactured components. Our trendsetting hybrid technology opens doors to new manufacturing approaches. The goal is to produce large quantities in a short time at competitive costs. Our systems are the key to this," adds Dr. Kawalla-Nam.



Dr. Alexander Kawalla-Nam, Head of Additive Manufacturing Technology at Reichenbacher Hamuel, in an interview.



Franz Bayer from Weber Additive (on the right) shows prototypes produced by 3D printing to interested visitors at the live event.



The machine operator checks the continuous additive printing process, which permits the production of extremely resilient components.

Industrial users can choose between the following solutions: on the one hand, there are the **hybrid machines**, on the other hand, the **systems for selective laser melting** (LPBF = Laser Powder Bed Fusion), a process that is part of the group of beam-melting processes.

For the hybrid production of **thermoplastics**, the customisable **ECO-LT Hybrid** combines Fused Granular Fabrication (FGF)-based extrusion with machining.

The plant, which has been developed in cooperation with the company Weber Additive, is based on the direct extrusion of a plastic granulate. The continuous additive printing process permits the production of large-volume and extremely resilient components. After or during printing, 5-axis machining takes place to optimise accuracies and surfaces. This makes the system an ideal choice for the production of rough-shaped components for use as quick prototypes or for the final production of small and large series.



The new **ECO-LT Hybrid** machine concept meets the production requirements for a large number of parts and prototypes. The additive manufacturing technology used is direct extrusion.



In addition to conventional milling, on the **HSTM 150 Hybrid** repairs by 3D laser cladding are possible as an option.

The **HSTM series** from HAMUEL optimises high-speed milling with laser cladding based on laser metal deposition (LMD) for all **Fe-, Ni- and Co-based alloys**.

Initiated in a research lab many years ago, this hybrid machine incorporates additive and machining technologies. The **HSTM 150 HD Hybrid** offers the possibility of extending the service life of complex, high-quality components made from special materials. The system combines milling + 3D scanning + laser cladding + 3D inspection + deburring/polishing + laser marking. Adaptive manufacturing is central to many aerospace applications, including the repair of components, such as aerospace turbine blades, gas turbines or steam turbines.



**AMS 800**, one of the largest 3D printers worldwide. Plenty of room for creativity in view of a printing area of 800 x 800 x 500 mm.

For the powder bed process and other processing based on Selective Laser Melting (SLM) or Selective Laser Sintering (SLS), in cooperation with 3D-Mectronic the special **AMS 800 system** has been developed, which is primarily intended for the manufacture of large-volume **metal** workpieces. This system can be adapted to the specific requirements profile of the user.

Especially when it comes to large construction volumes, some of which are impossible to realise in the conventional way, with the AMS 800, we have a unique solution on offer. Sustainability and safety are top priorities given the integrated powder preparation and inert gas system (nitrogen N2). The handling of the components takes place outside the printing area and the subsequent transfer between the individual machining processes is fully automatic. Our objective was the development of an open system, which can be interlinked with various CAD/CAM interfaces and machine controls. Thus, the customer determines the research and development project he wants to carry out.

In addition, so-called **universal machines** are available that - subsequent to cleaning processes - permit 3D printing with different materials. We are concentrating our efforts on ensuring that **thermoplastic, ceramic and metal** can be processed flexibly one after the other in the future.

Dr. Kawalla-Nam, "As far as I know, we currently have an absolutely unique selling point with our solutions. We bring the highest level of expertise in mechanical engineering to the table, and our partners do the same in 3D printing. With our customer-oriented solutions, we are breaking completely new ground."

## Core parts for flow components

High-performance applications do not allow for compromise.

The last two years have shown that nothing lasts forever. The aviation industry in particular has had a hard landing, and with it suppliers of all stripes. What remains is the insight that in such unstable times only the will to change is a way out.

Although not in the headlines like the big names in the industry, TURBOCAM International, founded in New Hampshire, USA, in 1985, is without doubt an important brand in the world of manufacturing core parts for flow components of turbomachinery for the aerospace sector, the automotive industry and power generation. The company employed 900 people worldwide until SARS-CoV-2 caused a large drop in orders and exposed them to the greatest threat in their 35-year history.

Closely associated with this company is HAMUEL, located in Meeder, where they produce material-optimised CNC machining centres for the processing of workpieces from high-strength steel, cast materials, titanium and Inconel. The collaboration began some years ago, when TURBOCAM put out their feelers to find a machine manufacturer whose systems could revolutionise single-blade production.

As a leading supplier of flow path components and innovative manufacturing solutions, TURBOCAM has highest demands on the quality of the components it produces. As parts for high-performance applications, in particular, require closest tolerances and high-precision surfaces. No wonder that the company is also a sought-after partner in space and rocket technology, because its impellers for refrigerant pumps make the ISS space station habitable in the first place.

Millions of flow components for automobiles and aircraft engines and hundreds of blisks and stationary blades for engines and turbocharger components for heavy vehicles, including radial compressors, radial turbines and diffusers, leave their manufacturing facilities all around the world. In addition, they supply the most renowned turbine manufacturers worldwide with the essential blade parts for the increasingly sophisticated gas and steam turbines in the energy industry.

Accuracy is of the essence. In 2017, HAMUEL impressed with a test demonstration that focused on the milling of turbine blades for the power generation and aerospace sectors. "The requirements for the machine in the project planning phase were: powerful, precise, stable, repeatable, reliable. Those for us as manufacturer: quick response times, flexibility, competent and fast after-sales support," explains Rico Bertzick, Key Account Manager at HAMUEL, and adds, "We were convincing all along the line: in terms of speed and excellent surface accuracy as well as of good tool life for materials that are difficult to machine." "HAMUEL is a fantastic addition," says Savio Carvalho, General Manager of TURBOCAM India, "because as a division manufacturer, this company not only supplies custom-fit machines, but also turnkey solutions. In addition, they have enough manpower to provide prompt assistance based on their extensive know-how."



Blisks: components where functions have been integrated to a high degree to replace the fitting of individual blades. The word blisk combines the terms blade and disk.

Manufacturing a blisk means the milling of blade profiles from a forged disk using a CNC-milling machine.



How exactly does this satisfaction show? By now, seven machines type HSTM 150 S2 are in use worldwide: two each in the UK and in the USA, where the focus is on the milling of components for the aerospace industry, while three machines went to India, where they have specialised in the manufacture of components for complex steam and gas turbines. Above all, the horizontal workpiece arrangement arouses interest, the reason why this machine impresses with its achievable accuracies and surface qualities in particular when machining turbine and compressor blades, blisks and/or radial compressors.

At TURBOCAM, component geometries with maximum dimensions of 600 x 300 mm (L x W) are processed. The HSTM series is also available in an XL version: "Then we are talking about workpieces weighing up to 1,200 kg and up to 1 m in diameter," explains Rico Bertzick. Weight reduction and increased efficiency are of particular importance in aircraft engine production. This demand was the starting signal for blisk machining which enables a closer arrangement of the turbine blades. Here, milling of the blade profiles takes place laterally from a forged disk. The clamping device attaches the disk to the A-axis, where it can be rotated during machining. The milling head performs the necessary swivel movements.

In the aviation industry, the smallest sources of error can cause the greatest disasters - outstanding processing quality and the highest reliability of the individual components are therefore indispensable.

Basically, blisk machining will be possible in all machines of the HSTM series.

# Newel post processing centre PBZ 6S-7000

Highly efficient 6-sided machining with loading and unloading system.

This line revolutionises the cutting and complete processing of large wooden posts/beams up to 7,000 mm in length. It is far-sighted to manufacture newel posts separately from other staircase components, especially so in industrial staircase production, where large quantities are required and cycle times are important. The PBZ 6S-7000 saves valuable production time on other machines and thus reduces costs.



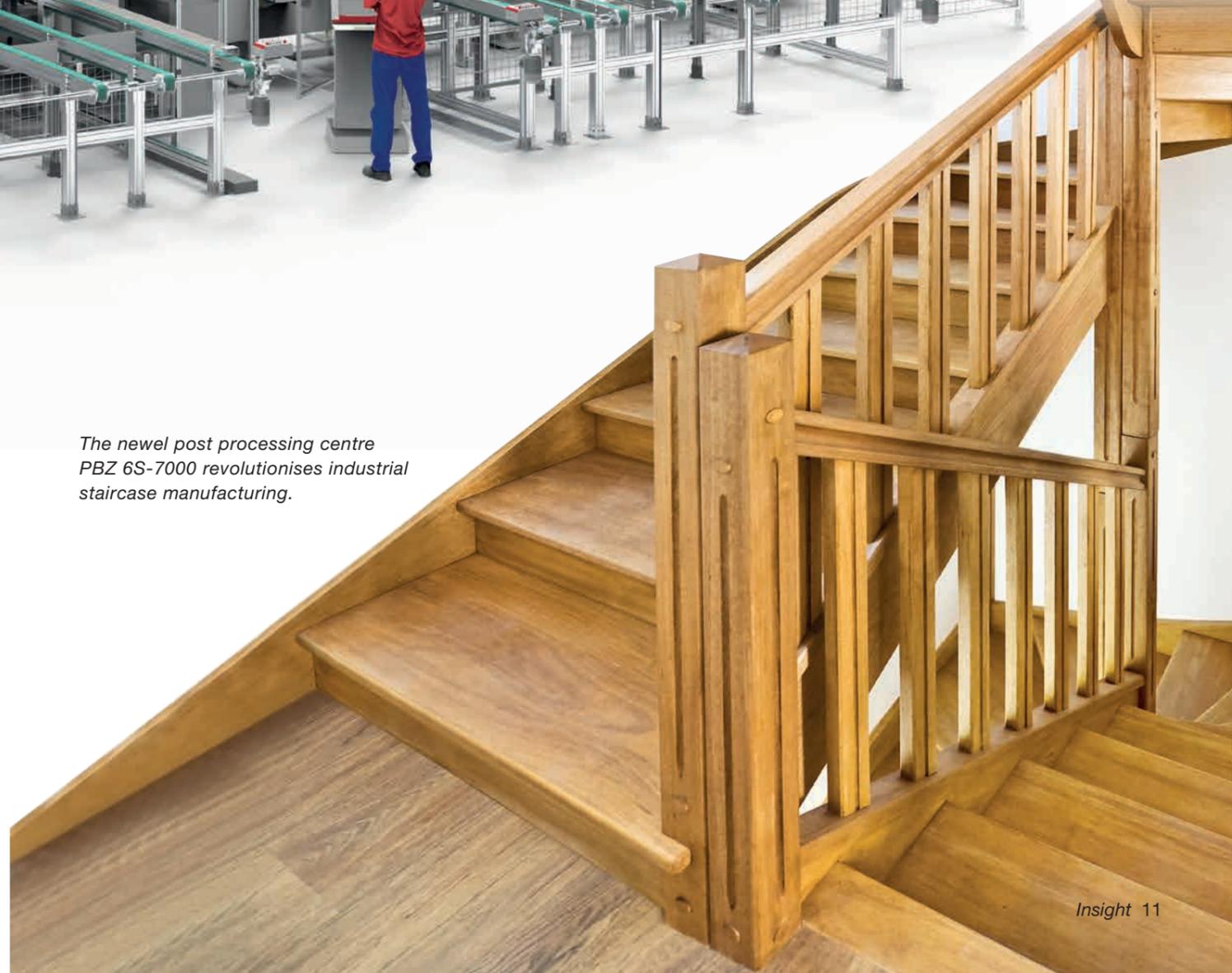
What, however, is so special about this well-thought-out concept, which features a loading and an unloading system and two gripper units? Based on a work list (nesting), wooden rods of 7,000 x 235 x 150 mm can be cut into the required sections and machined by the system, but also the processing of prefabricated newel posts with a machining allowance according to a work list or a bar code is feasible. The highlight: 6-sided processing is possible, since only one gripper and one clamping unit, each, hold the rods first in the infeed area and then after the transfer in the outfeed area.

The system as a whole is ingenious: the bars placed on a cross conveyor in the loading area are buffered one behind the other. A gripper system singles the rods out before feeding. Then, their alignment and measuring in width, height and length takes place. Comparison of the results to the programme follows.

A swiveling milling unit carries out all relevant milling and drilling operations, which permits the processing of newel post cross-sections from 235 x 150 mm to 60 x 60 mm. The star-shaped head in the unit, which is equipped with four tools, eliminates tool change times. The saw blade 550 mm in diameter cuts the rods to length. Then follows the transfer to the outfeed gripper. Once the final working steps at the bottom side of the newel post are complete, another cross conveyor pushes the finished posts from the outfeed area for manual removal.

We are committed to developing systems specifically designed for the needs of the customer. This is why we have optimised the technology package of the PBZ 6S-7000 for newel post processing, in particular. Thus, every staircase builder can be sure that he will get a sophisticated overall package.

*The newel post processing centre PBZ 6S-7000 revolutionises industrial staircase manufacturing.*



## Well-rounded

*Ideas brought into form.*

The purchase of a complex CNC system is also a leap in at the deep end - at least from the point of view of a small joinery business. Kurt Kutschmann (Area Sales Manager Reichenbacher Hamuel), who had the requirements of the Swiss specialists for tricky wooden form parts clearly in mind, was well aware of this.

Bachmann Holz in Form, based in Uznach, Switzerland, has become the top contact for complex round components from wood over the last 25 year - no matter whether we are talking about stair balustrades, handrails, counters, furniture parts, trade fair stands or column cladding. Hardly anyone can do without these experts, as simply copying their knowhow and workmanship will not suffice. Since its foundation, the company's core business of producing round semi-finished wooden elements has grown more and more, and with it the challenges in the production of these elements. Kurt Kutschmann knew this and it was thanks to fortunate circumstances in 2017 that a perfectly suitable CNC system of the VISION-II-H 5-axis type was available for sale at exactly that time.



*Reception counter for the Swiss municipality of Walchwil.*

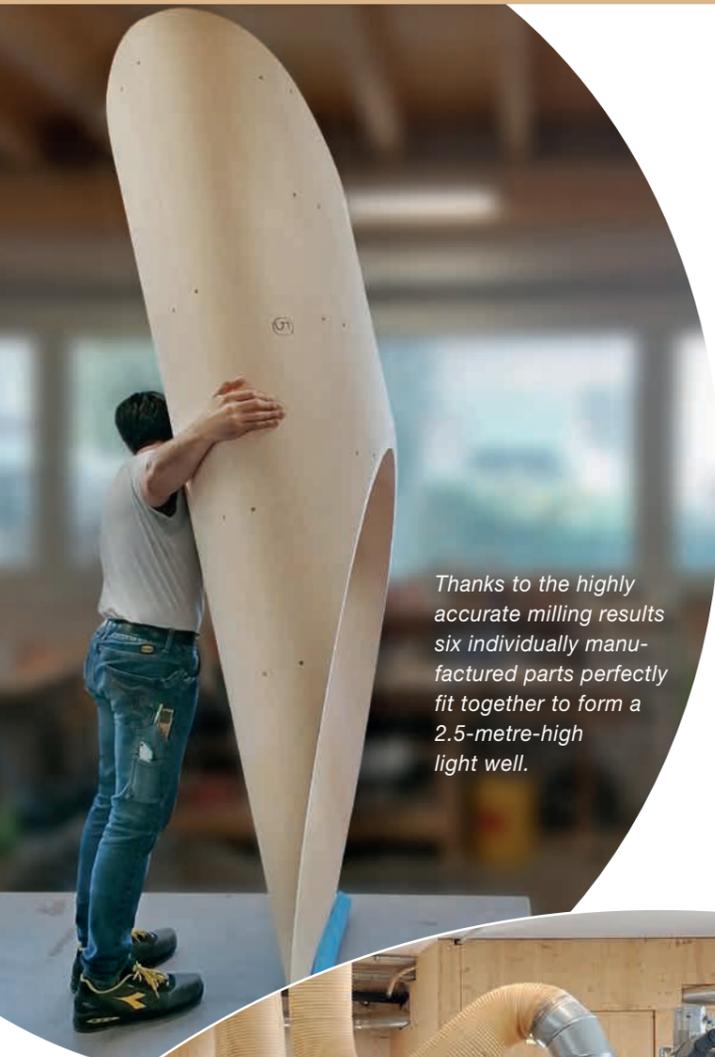


*All formed parts have one thing in common: they are always round and 30 percent of them are flame-retardant components.*

*Tobias von Aarburg takes a close look at the partly tricky curves of the semi-finished components.*

From the very beginning, the company has relied on employees with a passion for modern CNC technology. No doubt, this applies to Tobias von Aarburg, whom fascinate the partly intricate curves of the semi-finished components produced by the company, such as the 2.5-metre-high light well, the shape of which consists of as many as six individual elements. The milling of just one of the pressed wood corpuses takes half a day. This includes the processing of the 3D data, the generation of the design data for the machine and several other tasks. Here, the work steps on the CNC machining centre account for a mere two hours, despite the not exactly small dimensions of 2,600 x 1,200 x 450 mm (W x H x L). In comparison, the few minutes needed to cut round handrails, string wreaths or side sections to size are negligible. There are 24 tools in use while the insertion of individual tools required less often is possible at any time.

All formed parts, whether they are reception counters, wall panelling, furnishing elements for concert halls, hotels, restaurants or airport shops, have one thing in common: they are always round and 30 percent of them are also flame-retardant components. Poplar wood is almost the exclusive choice because of its ease of bending. First layering, then pressing under vacuum or hydraulically, followed by forming and finally machining of the wood takes place. All this is very complex and time-consuming and therefore one of the reasons why other companies are happy to leave the manufacture of such elements to the specialists at Bachmann Holz in Form.



Thanks to the highly accurate milling results six individually manufactured parts perfectly fit together to form a 2.5-metre-high light well.

In the past, CNC machining was outsourced, but this caused a great degree of dependency and also set clear limits to flexibility. This is no longer the case in view of the company's own CNC machining centre with manual beam table. The company is now independent, can guarantee delivery dates and, above all, act very flexibly, as they are now in a position to take in not only larger elements, but also more extensive orders by having the plant work in several shifts depending on requirements. The result is impressive: "In terms of pure CNC machining our turnover has doubled in comparison to the one reached three years ago, as we now organise the capacities ourselves," Hubert Steiner says. This does not come as a surprise to Kurt Kutschmann, because he knows that with its own plant a company can operate at a completely different level economically.

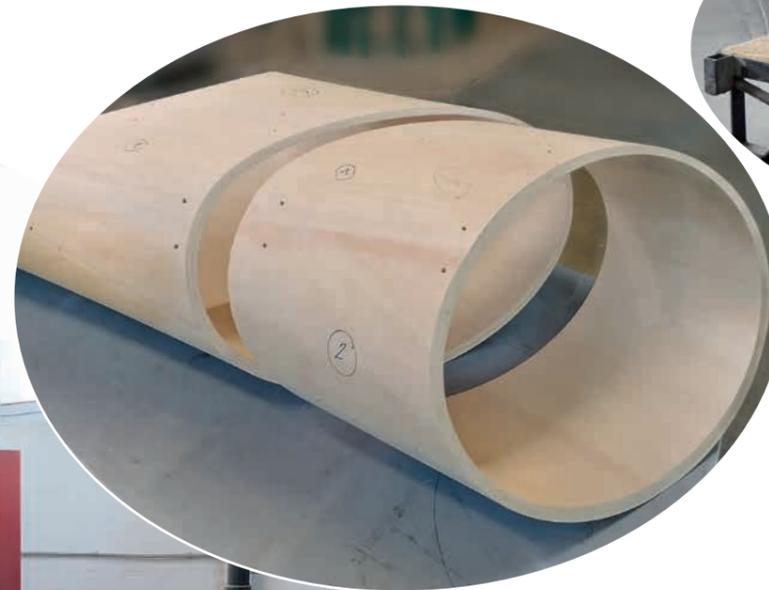
Its technical equipment also makes a major contribution to the plant's success. Thanks to an unusually high Z-axis of 780 mm, the VISION-II-H is ideally suited for the production of components. However, reality also means that this height is not usable with every tool and that the extraction system, too, reaches its limits due to the extensive removal of raw material. The two operators, who do the drawing, create the construction plans and are responsible for the programming, have to keep all this in mind.



Individual reception desk with partition for a hospital in Zurich.



The milling of just one of the pressed wood corpuses takes half a day. This includes the processing of the 3D data, the generation of the design data for the machine and several other tasks.



Ready-milled individual elements of the six components of the light well before assembly.



The CNC system of the VISION-II-H 5-axis type mainly stands out thanks to an unusually high Z-axis of 780 mm, which makes it ideally suited for the production of components.

The maximum working areas of 6,140 x 1,570 mm for single loading and 2 x 2,600 x 1,570 mm for alternate loading are nearly always sufficient. "But if elements actually exceed the dimensions, plan B will come into effect. That means we divide the component into several individual parts and join them together later, which works perfectly thanks to the highly accurate milling results," explains Tobias von Aarburg. He mentions in this context that his colleague, just like him, likes to check out the limits of what is possible. "For this reason, we carry out a 3D simulation in advance to check for collisions, as some elements need fixing with screws. Without this simulation, some milling cutters would fall by the wayside," he adds with a wink.

Hubert Steiner confirms that his company has gained a lot in autonomy and responsiveness and receives great appreciation from the outside for the quality of its work. "We are gradually realising all the new products that have become feasible thanks to the plant." Kurt Kutschmann is convinced that this has only been the first step, „because now they have the self-confidence to take further steps into the future as a modern service provider."

# All-round service for Southern Germany & Austria



**PRESERV**  
Industrial Customer Care

Cross-border service.

When it comes to providing our customers with the fastest and most efficient technical support possible, Service Manager Matthias Wolf can draw on a variety of resources because he has no less than three reliable partners at his disposal for Southern Germany and Austria.



Team of ELSA cnc service Österreich GmbH.

The competent specialists of **ELSA cnc service** with headquarters in Aschheim near Munich and a subsidiary in Wels, Austria, and **PRESERV Industrial Customer Care** in Dornbirn not only guarantee proximity to the customer but also a professional all-round service. Thanks to the frequent availability of preliminary diagnoses, Matthias Wolf finds himself in the comfortable position that – while keeping in mind the peculiarities of the customer, the machine and the technical focus – he merely has to decide which of these partners will be best suited for the respective task.

Since 1993, ELSA has concentrated on the all-round service for machine tools, and the 16 excellently trained employees in Germany and five in Austria have made it their mission to ensure the functionality and value retention of the systems in their care sustainably. As of 2013, they have been doing this for Reichenbacher Hamuel, too, and it is precisely this focus and commitment that is of enormous importance for any machine manufacturer with respect to customer satisfaction.

Most often, the standstill of a machine occurs unexpectedly and causes far-reaching problems. This makes it all the more important for service technicians to ensure the quickest rectification of the machine malfunction possible so that production can continue. Apart from rapid initial diagnosis and fault identification, express spare parts deliveries also minimise the downtime of the machines.

"All of this is only possible because the expertise of our engineers, technicians and master craftsmen is very comprehensive and includes not only mechanics but also electrical and control technology. In combination with the use of first-class measuring equipment, we thus succeed in thorough fault elimination," explains ELSA Managing Director Bernhard Sander.

The overall package of services is impressive: in addition to the inspection and repair of mechanical components, spindle service, drive technology, pneumatic and hydraulic systems, machine commissioning is also part of the portfolio, as are future-oriented maintenance concepts and modernisation services for the high-quality CNC systems.

A more detailed list of services includes, for example, geometry and laser measurements, 5-axis transformation, as well as consulting, support and the installation of central lubrication systems, or functional extensions, such as measuring probes, laser bridges, magnetic clamping plates, 3D measuring probes, but also hard disc replacement, PLC programming and thermography, are part of the extensive services. The experts at ELSA bring existing systems to the latest state of the art, in particular so by the general or partial modernisation of the control and drive technology or of mechanical components and guides.



REICHENBACHER HAMUEL  
**SERVICE PARTNER**

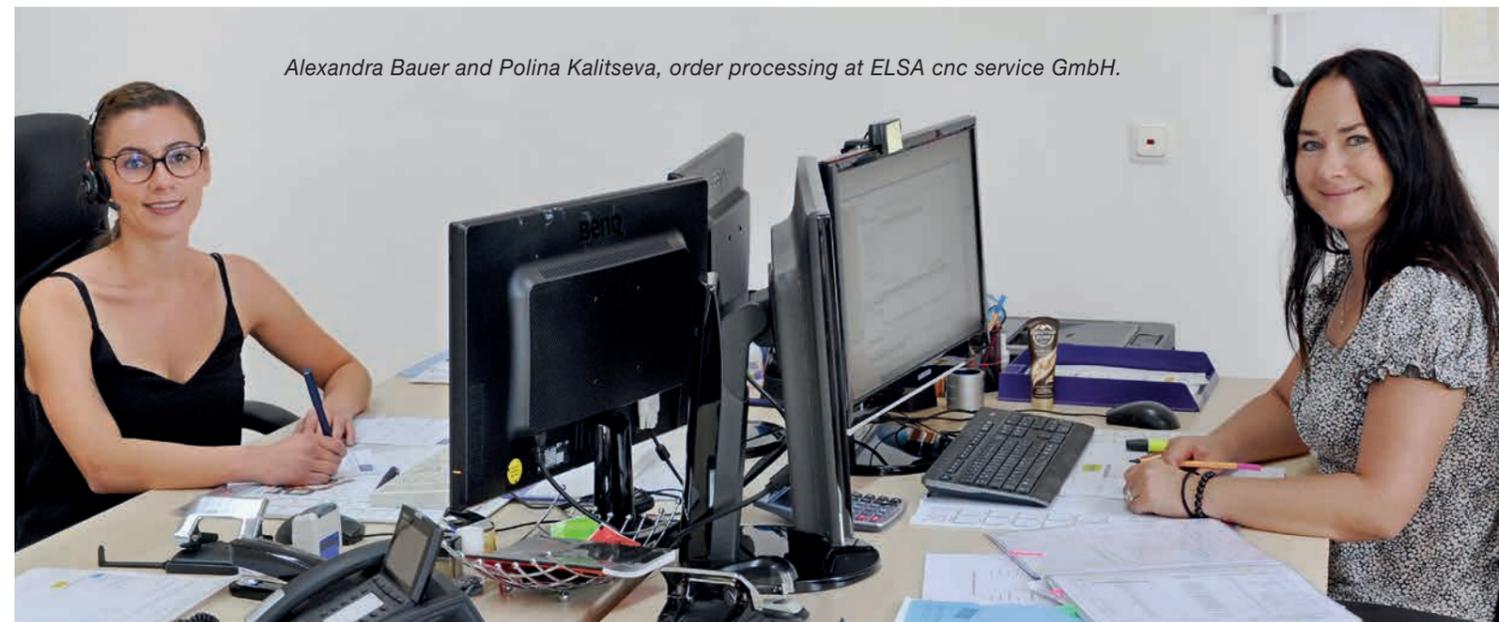
From left to right: Martin Gmeiner (Managing Director PRESERV GmbH), Bernhard Sander (Managing Director ELSA cnc service GmbH) and Alexander Karras (Service Manager ELSA cnc service GmbH).

As of 2018, Martin Gmeiner, Managing Director of PRESERV, has completed the team of our service partners at home and abroad, and he says about himself, "I live and breathe customer service." What exactly does he mean by this statement? Before setting up his own business, he had been working all around the world as a fitter for plant manufacturers for 20 years, four of which in India. Therefore, he can justifiably claim that the installation, maintenance and repair of woodworking machines and industrial plants are exactly his cup of tea. In addition to his extensive experience in carrying out technically demanding work in mechanics, electronics and control systems, his strength is above all his immense flexibility.

One has to enjoy travelling to be the right candidate for this job. "Sometimes, it is also a matter of quick fixes, as is the

case now for two Reichenbacher customers in Pakistan and Slovakia. The former task involves repairing and converting a machine, the latter a machine installation. This is precisely the kind of job variety I like," Martin Gmeiner says. Customer satisfaction is always the focus; this is just as true for him as it is for his colleagues at ELSA.

The fair and open cooperation with the colleagues at our company impresses all of our three service partners. "It is a partnership on an equal footing," emphasises Alexander Karras, Service Manager at ELSA, and adds that, unlike other manufacturers, we even want the specialists, who are regularly on site at the focal point, to communicate suggestions for improvement. After all, this is the only way to develop oneself and the machines further, and this is the goal of everyone involved.



Alexandra Bauer and Polina Kalitseva, order processing at ELSA cnc service GmbH.

# Getting to the bottom of a contemporary phenomenon

## Women and technology – do they go together?

All over the world, female heads of state are in charge of entire countries while other women are at the top of important central banks - but women in technical professions are still a rarity. What are the reasons for this?

The cliché that women and technology are incompatible should be outdated. NASA owes its initial success in space travel to female mathematicians, and as part of the 2021 application process for the new astronaut programme the ESA has launched a campaign intended to attract women in particular.

In 2018, only around 15 % of the employees in so-called STEM professions were female. In mechanical and vehicle engineering, the share of men was even 89 %, and the situation was similar in the IT sector. Yet... companies employing a higher proportion of women are often more successful economically, as researchers at the University of Tübingen proved in 2019. They benefit from diversity, as according to this study it can further innovative thinking, provide a better understanding of target groups and optimise decision-making processes.

That few women are to be found in scientific and technological professions is therefore probably not primarily due to the fact that they cannot do it - but rather that they do not want to. In our company, too, reality reflects this clearly. In production there are currently 2 women and 75 men, in design the ratio is 11 to 2 (one female designer, one female head of service design), and no women at all work as product designers. The vast majority of women holds office-jobs.

In order to make a clear statement: this is NOT in the interests of the company's management, as **Christian Meier**, Commercial Manager, also expressly emphasises. "For many years, we have attached great value to recruiting not only male, but specifically female trainees and professionals. At recruiting fairs or with campaigns such as "Girl's Day", we want to arouse the interest of young women in STEM professions. In addition, we try to meet the needs of our employees, both male and female, through part-time models, so that work is compatible with family life. But as the Corona crisis has shown, the state must also help to ensure e.g. good childcare."

Two who work in an area dominated by men at Reichenbacher are **Franziska Bender** (23), an electronics technician, and **Christiane Lützelberger** (38), a mechatronics technician.



Franziska Bender

Christiane Lützelberger

**Interviewer:** Why did you choose a technical profession and what particularly fascinates you about your current job?

**Christiane Lützelberger:** In my family, there have been no distinctions; everyone could do everything, whether in sports, at school or as a profession. In grammar school, I chose the mathematics branch with chemistry as a major, and then I wanted to study. However, I quickly realised that pure theory does not suit me. I want to work with my hands. A girlfriend of mine then gave me the idea of becoming a mechatronics technician, and I have to say that it still fascinates me to this day how a pile of individual parts can become something as large and functional as a CNC machining centre.

**Franziska Bender:** My father is a master electrician at KAPP NILES and so I already knew some facts about this profession from him. I was also interested in how you assemble such large machines and especially in how you get them running.

**Interviewer:** Why do you think still so few women choose this career?

**Christiane Lützelberger:** Everyone follows role models, especially from their family environment. As a young woman, you hardly get any encouragement to work as a mechatronics engineer or IT expert when your mother, sisters or aunts are in the caring/social professions or work in an office.

**Christiane Lützelberger:** There should be many more female role models, who share their work experience.

**Interviewer:** It went viral that a little boy asked his father if a man could also become "German Lady Chancellor" like Angela Merkel. This is amazing. Would it not be fascinating for young people if, for example, a female researcher went into schools and told them about the development of the new technology of mRNA vaccines?

**Franziska Bender:** Yes, of course. This would certainly be a great motivation and encouragement. It would also be good to point out that you earn much more in technical professions. Even as a trainee, I got more than my female friends who became preschool teachers or hairdressers.

**Christiane Lützelberger:** Especially in terms of family planning, the situation is much better than in service professions, because we have regular working hours, good health care, many safeguards, a setting that makes a half-day job perfectly feasible. I get the same tasks as full-time employees, or as my male colleagues. As I have technical training, I can do many things at home on my own and do not have to wait for the mechanic or the man around the house. It is great for your self-confidence when you can handle tools on your own.

In order to attract women to STEM professions, social rethinking will be necessary. Women often assess their own competencies far too poorly, even though their grades are better than those of male school graduates. **Mike Beier**, Marketing Manager at Reichenbacher, has been organising our company's presence at vocational recruiting fairs and university events for many years. He thinks that you have to tackle this problem at a much earlier stage.

**Mike Beier:** "You would have to start convincing young girls of their own capabilities as early as kindergarten and school. In any case, early enough to alter their gender-stereotyped self-assessment. Creativity, proactivity, accuracy and the ability to communicate are qualities where many women are strong; regarding dexterity and fine motor skills they are often even superior. We have to get this across. Most professions in the M+E industry require interaction with other people. Teamwork is a key factor. All this should cause women to apply for such positions with keen eagerness. However, young people are still making their decisions at a point in their lives when gender differences in perceived competences are obviously already very pronounced."

A company like Reichenbacher depends on a qualified workforce, which has rendered the urgent question of how to counter the shortage of skilled workers more important than ever. There is a clear consensus within the company group that women play an important role in all areas. The task now consists in setting the appropriate course.

**Interviewer:** In other words, there is simply a lack of appropriate role models?

**Christiane Lützelberger:** Yes, there is. On top of that, we have probably never heard of a multitude of interesting professions. There is a deficit despite the internet, because what exactly should one look for?

**Franziska Bender:** It is normal to take your guidance from your parents or siblings. Boys do the same, but they have male role models with mostly technical professions; there are hardly any male preschool teachers or nurses. Thus, it is „normal“ for boys to become automotive mechatronics technicians, electronics technicians or IT specialists and to earn real money while still in training.

Moreover, there is certainly the consideration that, if you want to have children and work part-time later on, it will be easier to do so in an office job. I also had this way of thinking, but it is antiquated, as Christiane Lützelberger proves that she can work half days as a mechatronics technician even with children. It is just a question of planning on the part of the employer.

**Interviewer:** This means that the reason why only few women choose a technical course is a gender stereotype. Do you have any ideas on how to encourage women to pursue STEM careers?

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