

TRUMPF

THE MAGAZINE FOR SHEET METAL EXPERTS

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From steel traders to sheet-metal pros:
digitalization has transformed Leann into one of
Poland's most exciting companies

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Ambitious goals:
Jordão plans to double its turnover by 2026

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Over 100,000 images manually labeled:
TRUMPF uses AI to teach machines to see



Chinese martial arts are rooted in an ancient philosophy known as **Wu De.**

This code of conduct is based on various virtues, one of the most important of which is loyalty.

Wu De defines loyalty as the **basis of trust and relationships** within a community.

It encourages practitioners to follow the principles of the code of honor and to act in accordance with

them, not just in the context of martial arts, but also in their everyday life. In the business world,

loyalty can help shape a corporate culture based on respect, honor, courage, honesty and trust.

These principles can help improve a company's productivity and competitive edge – for example,

through long-term relationships with customers, employees and partners, and through

a willingness to break new ground and create **innovations.** ■



In the 1920s, Japan was captivated by the heartwarming story of an Akita dog called **Hachikō**.

Every morning, the dog accompanied his master Professor Ueno to Shibuya Station, where Ueno would board the train to Tokyo Imperial University. Hachikō would then head home alone, before returning to the station in the evening to collect his beloved owner. In 1925, Ueno died unexpectedly at work and never returned to Shibuya. Hachikō spent the next ten years waiting in vain for his master, continuing his vigil until the day he died. This tragic tale became

famous right across Japan. Hachikō became a symbol of **fidelity and loyalty**. His story encompasses perseverance, resilience and loyalty – characteristics that are also important in the corporate world.

Persistence, tenacity and the **hope of success** can help us overcome difficult obstacles

and establish a long-term competitive edge. ■



Many soccer clubs claim their fans are the most loyal in the game. There's no doubt that many supporters demonstrate **impressive loyalty** to their club. They proudly display their solidarity, accompanying their team to away games, singing their hearts out, wearing their club's merchandise, and staying loyal even if their team gets relegated. Nothing seems capable of breaking their bond with their club! When things get tough, companies can also benefit from having customers who are willing to **ride out the storm together**. Just like those soccer fans, loyal customers can help support companies through turbulent times. ■



This image was generated by the Google AI deepdreamgenerator. It shows an abstract rendering of a TRUMPF machine.

IMAGE: TRUMPF / deepdreamgenerator

Future-proofing through loyalty ■



Dear readers,

This issue of TRUe explores the topic of loyalty. As a family-run company, this has been a defining value for TRUMPF over the course of its 100-year history. Thanks to the loyalty of our customers, we have become a global market leader in machine tools for flexible sheet-metal fabrication, in industrial laser technology, and in the generators produced by our Electronics division. Of course, loyalty works both ways. We demonstrate loyalty to our customers in various ways: for example, by keeping spare parts available even after a product's end of life, or by making our new machines backward-compatible with older large-scale storage systems and other legacy equipment. Our determination to uphold this value also fosters sustainability by ensuring that investments keep generating value even beyond their normal useful life.

Our manufacturing solutions are based on key technologies such as digitalization and automation. On page 46, you can find out how our smart factory consulting team is helping a company to maximize production efficiency by harnessing digital connectivity. What's fascinating about these kinds of projects is how businesses can make significant productivity gains in their existing facilities without making huge investments. Once again, loyalty plays an important role, because these kinds of complex systems require employees with many years of experience, especially in development and service. Success stems from mutual trust and loyalty, values that lie at the heart of TRUMPF's family business.

To enhance our status as a market and technology leader, we are embracing new approaches such as artificial intelligence (AI). For example, our computer vision team is training an AI to use real-world feedback data to make production more robust when it comes to tasks such as sorting parts. Companies benefit from solutions like this by improving their OEE, or overall equipment effectiveness (page 30). Some of TRUMPF's AI-based solutions are already available on the market, including a software product that recommends suitable jobs for unattended night shifts. Other

AI-based solutions from TRUMPF will be launched soon. (We also have AI to thank for the image on the left!)

Slovakian customer Martus offers another example of how digital connectivity can achieve impressive efficiency gains on the shop floor (page 20). Martus has incorporated automation and TRUMPF's Oseon production control software in many areas of its business. This has helped it overcome the shortage of skilled workers while boosting its turnover by 20 percent year-on-year. Martus also regards loyalty as a key value – to its customers, to its employees and to its partners.

When it comes to offering companies like Martus a tailored solution from a single source, strong partnerships are essential. We need reliable partners in fields such as robotics, storage-system solutions and automated guided vehicles, which is why we work with market-leading companies such as STOPA, Kuka and Jungheinrich. The tube process chain is a great example of this strategy in action: solutions from our partners have enabled us to fully automate the entire process – from loading and laser-cutting to bending and sorting (page 38).

Our goal for the future is to continue to be a loyal partner to you, our customers. As well as artificial intelligence, we are therefore exploring approaches such as the industrial metaverse, which is likely to play an important role in many production facilities in the coming years. On page 40, you can find out more about the business benefits that come from fusing the world of manufacturing with virtual reality.

I very much hope you enjoy reading this issue of TRUe.

DR.-ING. STEPHAN MAYER
CEO Machine Tools and Member of the Management Board

TRU[®]

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However much you automate, production still relies on people. But managers still need to give their employees a reason to get excited about what automation offers. Slovakian job shop Martus shows how it's done.



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03 ... in Guimarães

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Jordão believes in treating employees with respect. Based in Guimarães in Portugal, this successful company is run by CEO Isidro Lobo, who displays composure and drive in equal measure.

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Reflective sheet metal is hard for cameras to work with. The TRUMPF computer vision team is teaching artificial intelligence to classify camera data correctly. They will do whatever it takes to train their AI – including manually labeling 100,000 images.



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01

POLAND

Loyalty in Słupsk

TRUE TO THEIR ROOTS

IMAGES: Klaus Schwaiger



Teamwork: Automation transforms how processes work. Thanks to its experienced team, this family business is ready to make the transition.

Family-run Polish company Leann started out in steel trading soon after the collapse of the Soviet Union. Since then, the business has gone from strength to strength, achieving a level of **versatility and vertical integration** that is second to none. Yet the company has remained true to its roots thanks to its owners. Their philosophy is not to replace what they have, but to expand it.

Loyalty is important to Łukasz Stańczyk, and no one epitomizes that better than his head of production, Arkadiusz Jarosiewicz. Łukasz refers to him as his right-hand man, one of the company's 160-strong workforce. Originally hired in 2008 as an engineer, Arkadiusz was soon promoted to head of repair and maintenance. "He's been part of this production journey from the outset," says Łukasz. "Any little hitch with our machinery or equipment, he's the one to ask!"

Łukasz is full of praise for Arkadiusz, who now spends his time tracking every aspect of the manufacturing process as head of production. He is also in charge of setting up the new smart

factory, working with TRUMPF's new Oseon software, and putting theory into practice, says Łukasz. "And he's also someone who checks every last detail and focuses on getting things done." With complex production orders in multiple areas of specialization, there's always lots going on at Leann.

A business starts to expand

Słupsk, where Leann is located, is a city of 90,000 people some 130 kilometers from Gdansk in northern Poland. It's only a short trip from here to Slowinski National Park, a popular holiday destination and UNESCO World Heritage Site with a landscape of



shifting dunes and breezy forests. Leann’s production site lies in an industrial area to the north of the compact city center. Fly a drone high enough, and you can see Poland’s Baltic coastline in the distance. Leann’s production facilities cover a total area of 29,000 square meters. This includes a building inaugurated just last November, which still appears as a construction site on old satellite images. This is where the company has housed its latest investment: a STOPA large-scale storage system connected up to TRUMPF punching and laser-cutting machines. Even here, however, Leann has remained true to its roots: right next to this cutting-edge machinery is the steel storage area. For Leann, steel trading is where the whole story began – and it’s the cornerstone of the company’s success.

Leann already has the family’s second generation at the helm, with Łukasz as vice president and his sister Anna Stańczyk-Pilarczyk as member of the board. Instead of specializing in one field, the company produces high-quality, high-volume products in many areas. It electroplates, laser-cuts, welds and punches a variety of materials, from individual components to complete assemblies. To understand Łukasz’s ambitions for his parents’ business, it’s important to understand its origins.

Leann was founded in 1990. This was a turbulent time for one particular couple, Lech and Anna Stańczyk. It was also a period of upheaval for Poland, which was leaving the communist era behind and moving into a free market economy after the collapse of the Soviet Union. Lech, Łukasz’s father, was in the military, and his mother Anna was working as a lawyer. “They wanted to try something different,” Łukasz explains. So they decided to set up as steel traders and call their company Leann (pronounced ‘le-ann’), an amalgamation of Lech and Anna.

“ As a teenager, I drove forklifts around the factory for fun. ”

Łukasz Stańczyk, vice president of Leann

Into the world of production

The 1990s saw a boom in steel production in Poland. Over 13 million metric tons was produced at the start of the decade, making steel one of the country’s most in-demand resources. Although the market calmed slightly in the following years, demand remained high. Consequently, steel trading continued to be the mainstay of Lech and Anna’s business for many years. It wasn’t until 1997 when they decided not just to sell the raw material, but also to make parts from it themselves.

They invested in welding, bending and cutting machines and started out with simple designs. The first product they manufactured and sold is a familiar sight in any home improvement store: components for the trolleys used by staff to restock flower shelves. Parts fabricated by Leann also found their way into laundry trolleys in hospitals and hotels. The trolley sector proved to be an important stepping stone for the company to hone its expertise and steadily expand its range of services.

True to their roots: Steel trading is etched in the company’s DNA, but it has still added new capabilities every year.

By 1997, it seemed clear that their son, Łukasz, would be joining the family business. “I always knew it was where I wanted to be,” he says. “As a kid, I would run through the factory – and as a teenager I drove forklifts around for fun!” By the time he completed his studies and started working full-time in 2003, his parents had already expanded the company to two production halls and acquired their first laser cutting machine – but their son was keen to take things further.

“I was full of enthusiasm when I finished my degree. I wanted us to make complete products, not just individual parts,” says Łukasz. He started with the trolleys, building up production

capacity so that the company could produce all the parts itself and assemble the final product. His plan worked, and for many years this was Leann’s most successful product. They would go on to deliver several hundred thousand trolleys all over the world.

Building up punching expertise

In 2007, Łukasz shifted up another gear by ordering a TruLaser 5030 and a TruPunch 5000. The company already owned a 2D laser-cutting machine, but the punching technology added a whole new dimension. “It opened up exciting opportunities for new customers, new markets and entirely new products,” he says. Greater efficiency was one of the benefits, but improved punching capabilities also set the company on a new course. “Today, we punch anywhere from 60 to 70 percent of the parts we produce,” says Łukasz.

When things are working well, the Leann management team doesn’t try to replace them; instead, they focus on adding new technologies and innovative expertise. Łukasz believes in the philosophy of loyalty. He is determined to grow Leann by offering existing customers more and more services. Accordingly, he and his family have sought to tailor their services to new customer demands and needs. Individual components have morphed into entire product groups, and the company has tripled in size over the past 16 years. A second production hall was added to the existing site in 2014, and a third in 2023. Just as Leann is

Efficient and automated: The new STOPA storage system has transformed production.



IMAGES: Klaus Schweiger



Loyal companion: Arkadiusz Jarosiewicz is in charge of production at Leann. As the former head of maintenance, he learned everything from the ground up.

On a growth path: The company relies on its loyal customers, expanding its services to meet their growing needs.

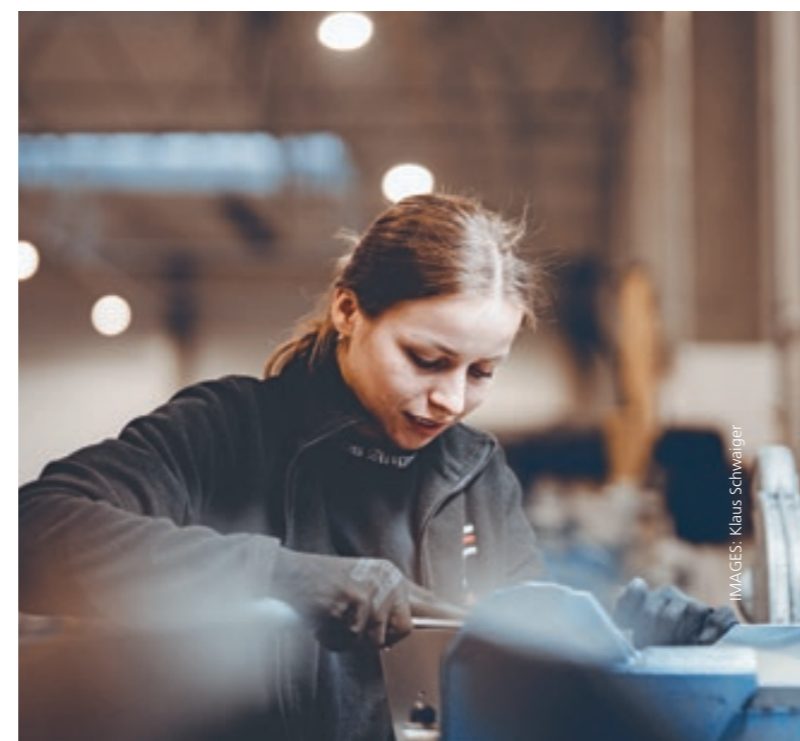
growing, so too are its customers. “Our customers appreciate our willingness to support them and grow alongside them,” says Łukasz.

Software tracks every step

Leann focuses on large-batch manufacturing. Between 2004 and 2020, it invested a considerable sum in developing its welding services, and the company is now seen as a specialist in this field in Poland. Recently, Leann added a TruBend Cell 5000 with ToolMaster to its shop floor. Their latest purchase of a STOPA storage system has two purposes: to expand their portfolio even further and – in combination with the new Oseon software, TruLaser 3030 and TruPunch 5000 – to digitalize their production processes. By investing in digitalization, Leann is once again blazing a trail in the Polish market. “We’re investing a lot of time and resources in this new production method,” says Łukasz.

Leann is transforming the way its processes work. For production manager Arkadiusz, Oseon has revealed a new style of manufacturing, allowing him to keep track of every aspect of the fabrication process – an essential skill when you make as many different products as Leann. The company still makes the trolleys that helped drive its initial growth. But it also makes components for wind turbines, automakers and truck manufacturers. “When your production operations involve hundreds of different individual parts, it can be a time-consuming task to find things,” says Łukasz. In future, this task will be handled by software. Oseon organizes and sorts the metal fabrication process, arranging everything on sheets in the most sensible and efficient way. That gives Arkadiusz the space to focus on other things.

Leann’s new facility covers 9,000 square meters, and the company hopes its new technology will allow it to respond even



IMAGES: Klaus Schwalger



New technology: Leann offers punching, laser-cutting and electroplating – and it doesn’t shy away from new technologies.

more flexibly to customer requirements. The new building also has space for more additions in the future. Łukasz is keen to expand automation over the next few years. This will include using automated guided vehicles between production stations to make work safer and more efficient. He also wants to add to the four existing towers of the STOPA storage system. Łukasz is not ready to reveal what will happen to the steel store that is currently still housed in the new facility, but one thing is certain: Leann will remain true to its roots. Meanwhile, Łukasz’s parents, Lech and Anna, continue to contribute their valuable experience

“ I was full of enthusiasm when I finished my degree. I wanted us to make **complete products**, not just individual parts. ”

Łukasz Stańczyk, vice president of Leann





Pioneering: Oseon software keeps track of every step in complex production processes.



“ Our customers appreciate our willingness to **support** them and to **grow** alongside them. ”

Łukasz Stanczyk, vice president of Leann

to the administrative side of the business while their son runs operations. “We’re a company that offers real stability,” says Łukasz. “For our suppliers, for our customers and for our employees.”



IMAGES: Klaus Schweiger

01

A closer look:

Automated unloading system for tube processing

Polish company Leann aims to focus even more on **automation** in the next few years. One example is TRUMPF’s interface for automated unloading: developed as a solution for **laser tube-cutting machines**, this efficient system automatically prepares cut tubes to be unloaded from the machine.

In brief

TRUMPF turbocharges tube processing

Automated part removal saves time and makes life easier for workers. TRUMPF has already demonstrated that with its automatic unloading system for 2D laser cutting. Now it's set to launch an equivalent system for laser tube cutting at its INTECH in-house trade show: the "automated unloading interface with longitudinal conveyor belt".

How the process works

The TruLaser Tube machine from TRUMPF sets the standard in laser tube cutting, neatly coordinating the interaction of all the various components. It all starts with the production plan, which the operator loads into the machine's software. Next, the TruLaser Tube requests the raw material, measures the loaded tubes, automatically carries out part nesting, cuts the required parts to the exact size and then issues instructions for the subsequent steps. The conveyor belt guides the cut tubes either onto the unloading section ready for manual removal or into the automated system's separate safety enclosure. There, the parts can be automatically removed and sorted, for example by a robot from TRUMPF's solution partner Starmatik. Having received information on the part to be removed, including the desired storage location, the robot activates an appropriate gripper, picks up the part and stacks it in the designated pile.

Improved capacity utilization

The automated unloading interface increases capacity utilization by enabling the TruLaser Tube machine to produce parts through the night without the need for additional staffing. In addition, it reduces the possibility of errors: the automated system always stacks the finished parts in the correct location and never mixes them up.

Tackles shortage of skilled workers

Many companies are finding that skilled workers are in short supply, especially when it comes to physically demanding tasks and shift work. Increasing the level of automation on the shop floor takes the strain off workers and makes the company more attractive to potential new recruits.

Benefits for workers

The automated unloading system makes life much easier for workers, especially in high-volume production. Instead of removing one cut tube after the next, the machine operator can spend their time focusing on other tasks. By taking over these previously manual tasks, this solution allows the operator to work on two machines at the same time without feeling rushed or overloaded.

Key points

- Solution available for TruLaser Tube 5000 fiber and 7000 fiber
- Additional process steps can be integrated
- Can be configured for fully automated tube processing
- Can be retrofitted to the current generation of machines

Customer details

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Machinery

- TruLaser 3030 fiber
- 2x TruPunch 5000
- TruBend Cell 5000
- TruLaser 5030 Classic

Automation is essential to survive in today's sheet-metal fabrication market – but it's only one part of the formula. Rock-solid relationships with your employees and suppliers are equally important, says Slovakian fabricator **Martus**. So too is a reliable partner who can provide you with the equipment you need. The result is mutual **trust** – and the **commercial success** that comes from sharing the same goals.



02
SLOVAKIA

Loyalty in Nové Zámky

MACHINES, SOFTWARE AND A PASSION FOR BUSINESS

IMAGES: Klaus Schwaiger



Manual and automatic: Automation helps Martus employees get the job done. Their work would be impossible without robots and modern machinery.

Walking into the Martus factory, you can immediately sense the positive atmosphere. People are smiling and chatting, and they clearly enjoy working together as a team. Clean and neatly organized, the production hall itself is strikingly modern. Many of those working here have encouraged other family members to join the company over the years. As a result, working relationships tend to be friendly and informal. This attitude is encouraged by Martus, which views its employees as a crucial and central part of the business. "Anytime we make a decision, we discuss it with everyone involved, whether that's introducing a new piece of software or adding new machinery," says sales director Igor Kostoláni. "Sometimes that means things take a little longer, but we get better results this way because everyone feels listened to and included." Kostoláni runs the company together with his wife Zuzana Kostolániová and her sister Jarmila Kóňová – joint owners of Martus – as well as technical director Peter Dékany and purchasing manager Jana Urbényiová. Each member of the management team has their own strengths, and they trust each other's ability to do their job. This basis of trust also extends to the workforce: "We all pull together," says Kostoláni. "I know I can rely on the people who work here."

On a growth path

The Martus success story began in 1997 when Kostoláni's father-in-law, Dušan Motus, founded the company at its current site in Nové Zámky. The name came from combining part of his wife's first name, Maria, with part of her surname, Motusová. "When I joined Martus in 2002, we were working in a single 1,200-square-meter production hall. Today, we have four halls – and even with a

"I'm proud that Martus is one of the Slovakian companies with the highest levels of automation."

Zuzana Kostolániová, HR director and owner of Martus

total of 6,500 square meters space is getting tight! We're already renting additional storage space," Kostoláni says. The company plans to expand even further: Martus is currently awaiting permission to build a new hall that will almost double the size of its manufacturing facilities.

Martus started out making a broad range of metal products. "We needed all sorts of different production methods to cope with such a high-variety mix. That made it hard to run the factory efficiently and maintain quality, and the low-volume production runs simply weren't profitable," says Kostoláni. He decided the time was ripe for Martus to take on a more specialist role as a CNC metal fabricator and high-volume producer. In 2007, Martus purchased its first TRUMPF machine, a TruPunch 1000; since then, it has added a new machine every two years. Working with TRUMPF has given Kostoláni the freedom to push ahead with his automation plans and has helped him get his employees on board with this innovative strategy for the future.



Family atmosphere: The company is owned by sisters Jarmila Kóňová (left) and Zuzana Kostolániová (right). Zuzana Kostolániová's husband, Igor Kostoláni, is also part of the management team.

Investing in trust

Martus currently employs 65 people. Finding new skilled workers can be a challenge in Slovakia, as in so many other places. In Martus' case, word of mouth has proved to be an effective recruiting tool. "We're always keen to listen to our employees' recommendations when we need new people," says Zuzana Kostolániová, who heads up HR at the company. Martus also runs its own training programs. "By investing in people and putting our trust in them, we earn their trust in return," says Kostoláni. This helps explain the company's extremely low staff turnover rate. "We need to be sure that our employees are satisfied with their work," she adds.



Martus also scores highly for its impressive array of machinery. "Among Slovakian companies, Martus has one of the highest levels of automation," says Kostolániová proudly. The sheet-metal fabricator automates everything it can to minimize errors. As well as production, this also includes a transition to digital accounting led by Jarmila Kóňová, which will ultimately pave the way for a smart factory. Automation is particularly important when it comes to large-scale series production, and the employees have enthusiastically embraced this new approach: "We purchased our first automated machine with a robot – a TruPunch 3000 – in 2017. It certainly generated a lot of interest at first, but people were worried about losing their jobs," says Kostoláni. Over time, however,

"Our customers **expect a lot** – and we can only meet their needs with **high-performance machinery.**"

Igor Kostoláni, sales director

they have seen just how much they can benefit from automation. When orders spike, the workload is simply too much for workers to handle without assistance. "And at quieter times, we reduce the amount of automation – we don't lay anyone off," says Kostoláni emphatically.

The many facets of partnership

A glance at Martus' machinery reveals a clear preference for TRUMPF. "We have very demanding customers, so we need top-notch machinery," says Kostoláni. TRUMPF checks that box, while also offering advantages such as high part quality, minimal downtime and vital support services. "We may be very different sizes, but TRUMPF and Martus are partners working on an equal footing. Their customer advisors continue providing support even after the sale." Ordering spare parts is easy, even for machines that are 15 years old – a clear sign of the durability of TRUMPF machines and the quality of after-sales service.

The partnership has also been good for Martus' bottom line. "In recent years, we've seen our turnover rise by 20 percent – every single year," says Kostoláni. As well as high-quality machines, this success has also been driven by strong, solid relationships. From TRUMPF to its own workforce, Martus can rely on its partners every step along the way.

Reliable partners: Martus believes in everyone pulling together – both within the company and in their partnership with TRUMPF.



IMAGES: Klaus Schwaiger

02

A closer look:

TruMatic 5000 with new SheetMaster

Slovakian company Martus is embracing the benefits of **automation**. The combination of a **TruMatic 5000** and the new SheetMaster is a big step forward on its path toward connected manufacturing. We took a closer look at the new punch-laser manufacturing cell to discover just how powerful, reliable and energy-efficient this new TRUMPF solution is.

In brief

The highly productive, autonomous punch-laser manufacturing cell

The **TruMatic 5000** and the new **SheetMaster** come together to make a **manufacturing cell** that automates the flow of materials in punch-laser production. From loading and unloading to palletizing and sorting, every step is fully automated. With its six kilowatts of laser power, the manufacturing cell takes productivity to new heights while also improving energy efficiency.

Fully automated, autonomous manufacturing

From replacing nozzles to changing tools, the TruMatic 5000 operates smoothly and reliably around the clock thanks to its wealth of **automation components**.

Productive, efficient, energy-saving

With its powerful and highly efficient **six-kilowatt TruFiber laser** – combined with the new **universal cutting unit**, DeltaDrive and SheetMaster – this manufacturing cell achieves **maximum throughput** on the shop floor while cutting energy use by up to **65 percent**¹⁾.

¹⁾ Compared to hydraulically driven punching machines and TruFlow CO₂ laser

Efficient and reliable loading

The new SheetMaster from TRUMPF loads raw materials into the TruMatic 5000 quickly and efficiently. Sheets are pre-separated in parallel to production before being placed in the machine. The smooth flow of materials is perfectly coordinated with the production process.

Flexible unloading and palletizing

The SheetMaster can automatically remove finished parts using individually controlled suction cups. The GripMaster then handles the removal of the scrap skeleton. A new feature is the ability to move the SheetMaster in the vertical axis, which makes palletizing even more flexible.

Highly productive solution for punching, forming and laser-cutting

The TruMatic 5000 is all about top-notch productivity in punching, forming and laser-cutting. Its descending die ensures high part quality and greater flexibility. The machine sorts small parts efficiently while the ToolMaster automatically sets up the right punching tool – without halting production. Laser-cutting jobs are particularly productive thanks to the six-kilowatt laser. And the TruTops Boost programming software takes overall processing efficiency to a new level.

Wide variety of materials

The TruFiber solid-state laser eliminates the problem of **back reflection**, which means it can even tackle highly reflective materials such as copper and brass. Using the same cutting head, the laser can handle both standard materials and various thicknesses of nonferrous metals. This **reduces idle time** and boosts productivity.

Simplified tool handling

Users can load the ToolMaster's magazine with the required tools **without interrupting the punching and cutting process**. Production continues even if tools need to be removed for sharpening.

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Machinery

- 3x TruBend Cell 7000
- TruBend Cell 5000
- TruPunch 3000
- 3x TruPunch 5000
- TruLaser 5030 fiber with TruStore
- TruLaser 5040 fiber
- 2x TruBend 5170
- TruBend 5085
- TruBend 7036
- TruMatic 6000

Loyalty in Guimarães

COOL COMPANY WITH A WARM HEART



Over the past 42 years, Jordão has established itself as a leading manufacturer of **standard and tailored refrigeration equipment**. Its success has been fueled by family values and a sense of continuity. The Portuguese family company is now aiming for significant sales growth through 2026. To achieve this goal, Jordão is investing like never before – with a major emphasis on **automation and digital connectivity** from TRUMPF.

IMAGES: Eduardo Martins



Isidro Lobo pauses mid-sentence and turns around to search for something. The question that prompted this was about the values that drive his company. Moments later, the CEO of refrigeration equipment manufacturer Jordão plunges enthusiastically back into the conversation. In his hand, he's holding a small plaque emblazoned with the following values: positivity, ambition, team spirit, integrity and excellence. It also includes the company's mission: "Creating the best food preservation and display solutions, transforming challenges into solutions, and respecting the environment." Everybody gets one of these plaques when they first join the company, and Lobo's point is clear: Jordão doesn't simply preach its values, it proudly displays them to its employees from their very first day at work.

The company was founded in 1982 by José Júlio Jordão in the city of Guimarães, in northern Portugal. What started out as a team of 22 people has since grown more than tenfold to a workforce of 250. Today, Jordão is one of Europe's leading manufacturers of standard and tailored refrigeration equipment for food retail and the hospitality sector with customers all over the world and a most recent turnover of 21.5 million euros.

Making space: Two production facilities weren't enough. To provide capacity for further growth, Jordão has built 10,000 square meters of new production space.



Jordão stands for innovation and for uniting technology and sustainability. The company offers digital, efficient and environmentally friendly solutions that help clients to reduce their energy consumption and to display food items. Last fall, one of its products even won an innovation award at one of the world's most important fairs for the gastronomy and hospitality industry.

In 2021, the company entered into a partnership with TRUMPF. Jordão was looking for a machine to automatically bend small metal parts for refrigerated counters more quickly, and the TruBend Cell 7000 from TRUMPF proved to be the perfect fit. As well as their shared business interests, the two companies are both family-run enterprises and enthusiastic drivers of innovation. These common traits laid the foundations for a long-term partnership. Recently Jordão added a TruLaser 3040 fiber 2D laser-cutting machine, followed by a TruStore compact storage system. Paired up with the LiftMaster Compact and the PartMaster, the system cuts parts fully automatically in Jordão's refrigeration equipment production facility.

Both the TruBend 7000 Cell and the TruLaser 3040 are easy to program and offer high productivity and part quality – and that's a combination Jordão values. As well as saving the company time and money, the new system also requires less manual rework thanks to the high part quality, which eases the pressure on workers.

“ We don't simply discard people when things get tough. ”

Isidro Lobo, CEO Jordão

Yet long-term success does not depend on modern machinery alone. "You need people to be in a good mood when they come to work," says Lobo. At Jordão, management helps foster this positivity by demonstrating consistency in everything they do. This Portuguese family business is not one for making rash or hasty decisions. It's all about continuity, a value embodied by Lobo himself. He has been running the business for over 40 years. In future, the company will remain in the hands of an experienced team.

IMAGES: Eduardo Martins



Innovative high-speed bending cell: The TruBend Cell 7000 is a compact system that offers highly dynamic, cost-effective bending solutions for small parts.

Continuity and loyalty on all sides

Lobo takes a pragmatic view of this family set-up. This continuity of management over many years is also reflected in the relationships Jordão has with its employees and customers, which is based on loyalty, respect and the belief that solutions can be found even when things get difficult. This was put to the test in 2008 and 2009, for example, when the economic and financial crisis pushed many companies to the edge. Jordão was caught in the shock waves: orders plummeted, and the company had to let some people go. Suddenly workers faced an unsure future, including older workers, who had been working for the company since it was founded. Fortunately, Lobo and his team were able to arrange a smooth transition: "We came up with a solution that allowed these workers to retire early," says Lobo. These events left their mark on everyone involved, he says: "The way we acted also showed our younger employees that we won't simply discard them when things get tough, and that we

don't just treat them as cogs in the system". Lobo insists that people deserve to be treated fairly after a lifetime working for the company. "Jordão has a long memory," he says, neatly summing up his belief that people deserve respect for their past commitment.

Such values have played a big part in Jordão's success, and they also underpin the company's professional relationships with its customers. There are some customers, including one in Norway, that Lobo has been working with since the very beginning. Once Jordão has established a relationship, it's almost always a long-term thing. "Customers know that they can always give me a call, and we're always ready to step in," says Lobo.

Equally long-term is the company's partnership with TRUMPF. Jordão quickly realized that the high-tech company could not only help them make high-quality products, but could also offer

Quality check: A specialist in refrigeration technology uses food simulant probes to check cooling performance.





An experienced team: The company is managed by Isidro Lobo (center), his daughter Joana Jordão Lobo, Director for Research, Development and Innovation (right), and his son-in-law Joao Almeida, Commercial Director (left).

them a productivity boost. Just like in Germany, Portuguese companies are struggling with a lack of skilled workers. Automating processes with TRUMPF machines is therefore essential in order to remain competitive. Jordão is now also planning to introduce TRUMPF's Oseon software for production control. This will help the company take automation to the next level and improve the flow of materials.

Ambitious goals

Jordão has set itself ambitious goals for the future. "Our goal is to double our turnover between 2022 and 2026," says Lobo. Jordão is already on course to achieve that. It has purchased two buildings next to its existing site which provide 10,000 square meters of new production space – the biggest investment in the company's history. This was important to align with Jordão's growth strategy.

Customers are showing increasing interest in the company's tailored refrigeration equipment solutions. "The retail food

“Jordão understands we have the skills to **meet challenges head-on.**”

Carlos Silva, TRUMPF sales engineer

sector has taken on particular significance recently," says Lobo, while emphasizing the continued importance of customers from the hospitality sector such as hotels, restaurants, and cafes. Jordão has also been building capacity to kit out smaller supermarkets.

As a major supplier and user of digitally connected manufacturing solutions, TRUMPF offers everything Jordão needs to achieve new heights in productivity through automation, providing the right high-tech support to help the Portuguese company grow. The benefits are neatly summed up by TRUMPF sales engineer Carlos Silva: "Jordão understands we have the skills to meet challenges head-on".



Vision: For 40 years, Isidro Lobo has been on a mission to produce outstanding refrigeration equipment.

IMAGES: Eduardo Martins

03

A closer look:

Laser cutting with FlexLine

Portuguese **refrigeration-equipment specialist Jordão** produces parts on a **TruLaser 3040 fiber**, a powerful 2D laser-cutting machine from TRUMPF. At its INTECH trade show, TRUMPF will be launching a new function for laser cutting called FlexLine. This ensures **optimum cutting results** when using structural steels of different qualities and properties. The type and quality of the surface and material is no longer an obstacle – even when cutting delicate contours in thick sheets.

In brief

Laser cutting goes all-terrain

What do an all-terrain vehicle and laser cutting have in common? Not much, you might think. But when it comes to moving easily across a variety of surfaces, a laser system equipped with **FlexLine technology** is up there with the best of them. Its all-terrain performance increases **material tolerance** and **flexibility** in production while maintaining consistently high part quality.

Many types of steel are available on the market, and they differ significantly in terms of their quality, carbon content and mechanical properties. To get the best results when processing different kinds of surfaces and materials, users need to adapt their processes for each job. This wastes valuable time when the machine could be working. A further complication is that sheet-metal fabricators are increasingly resorting to materials that are not optimized for laser cutting, in part because of rising steel prices, but also due to availability issues and high minimum-purchase quantities set by steelmakers. Tailoring the parameters to these alternative materials can be extremely time-consuming. Fortunately, FlexLine makes it easier for companies to use the same laser-cutting machine to process different materials and surfaces.

FlexLine can also help users fabricate a wider assortment of parts on their laser-cutting machine. For example, construction machinery

requires certain mechanical properties that can only be obtained using highly robust steels. FlexLine makes laser-cutting machines less sensitive to these heavier grades of steel, so users can enjoy the advantages of laser cutting – such as higher accuracy and productivity – for applications that were previously only viable using different technologies.

FlexLine's robustness is based on an innovative flame-cutting process with optimized cutting data and an improved nozzle design. FlexLine parameters are inherently more tolerant and robust when it comes to dealing with different materials and surfaces and variations between different batches and suppliers. As a result, machine operators spend less time adjusting process parameters, and more time getting the job done. This feature is available for TRUMPF's 2D laser-cutting machines in the TruLaser 3000 fiber and TruLaser 5000 fiber series.

Patent-pending nozzle design

The novel cutting process generates a lot of heat. To ensure reliable results, the new FlexLine nozzle is cooled by compressed air during the cutting process. The longer nozzle is also compatible with the nozzle changer.



01

Significantly increases material tolerance

02

Robust at handling fluctuations in material quality from one batch or supplier to the next

03

Reduces miscuts and scrap due to fluctuations in material quality

04

Ensures high part quality with various surface treatment methods

05

Opens up a wider range of materials for laser cutting and broadens the range of potential jobs

06

Reduces time spent on adjusting process parameters

07

Reliably cuts even the most delicate contours thanks to low heat input

10

Shorter program run times (e.g. removes need for steam release)

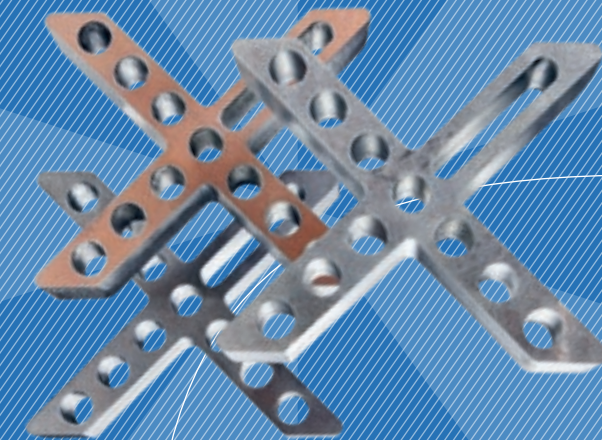
09

Offers major savings on purchases of structural steel

08

Improves part quality in laser-grade material, especially with high sheet thicknesses

Ten FlexLine benefits

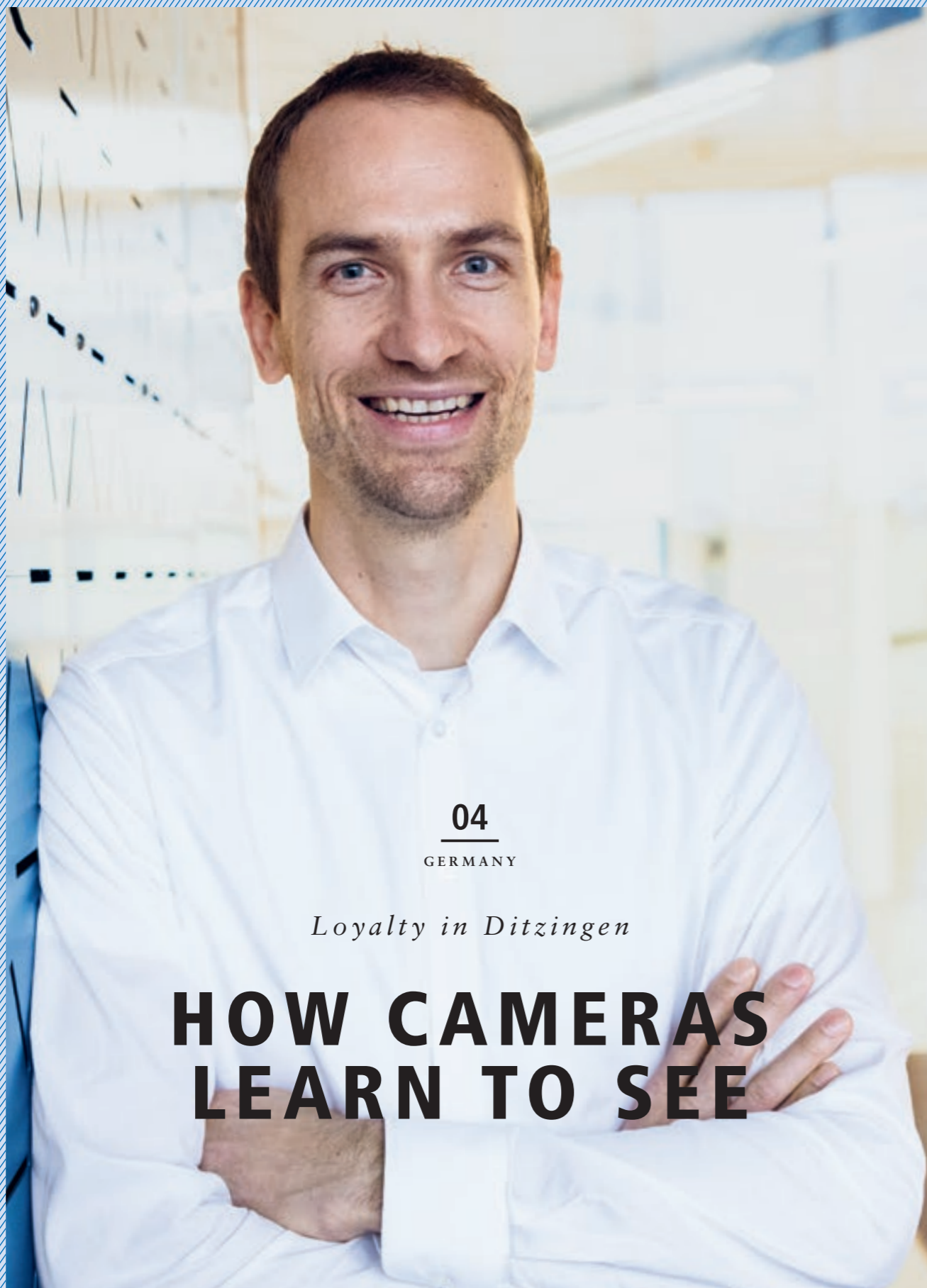


Customer details

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Parque Industrial - Pavilhão F11,
4805-298 Ponte GMR - Portugal
www.jordao.com
Phone: +351 253 470 700
Email: geral@jordao.com

Machinery

- TruLaser 3040 fiber with LiftMaster Compact and PartMaster
- Oseon software
- TruStore
- TruBend Cell 7000



04

GERMANY

Loyalty in Ditzingen

HOW CAMERAS LEARN TO SEE

IMAGES: Stephanie Trenz

The TRUMPF **computer vision team** is teaching artificial intelligence (AI) to classify data correctly. The experts are willing to do whatever it takes – including categorizing 100,000 images by hand. Five years ago, Professor Sepp Hochreiter, a pioneering figure in the field of AI, called on the machine-building industry not to “drop the ball”. Hochreiter, who works at Linz University in Austria, still wants to see more data and faster progress – but he’s full of enthusiasm about recent events in Ditzingen.

“ **Ninety-five percent is data**, and just five percent AI. It’s about collecting data, curating and labeling it, and compiling datasets to meet problem-solving goals. ”

Korbinian Weiß,
R&D Team Manager Machine Vision & AI at TRUMPF

Remote Control: The numerous cameras in the machine feed data to the control monitor, allowing Korbinian Weiß to see exactly what’s happening and to intervene as necessary.



“Sheet metal is an absolute nightmare for cameras!” says Korbinian Weiß. He has spent years trying to make the two things more compatible. “Sheet metal is thin and bendy, it reflects light, it can be wobbly – and it comes in endless shapes and sizes,” he says. Cameras struggle to even recognize a metal surface – but artificial intelligence (AI) is offering new solutions to these problems.

Data provides the key

Weiß heads up the AI image-recognition team at TRUMPF in Ditzingen. His preference would be to have at least 24 cameras installed in machines such as the TruLaser Center 7030, TRUMPF’s first fully automated laser system. But right now the system has to make do with 12 cameras, which deliver huge quantities of images and video clips. These and many other types of data provide the key to continuously improving existing machines and developing entirely new products. This data forms the foundations of the computer vision team’s work. But what role does AI actually play in the TruLaser Center 7030 as it slices

its way through one sheet after the next? And how do we define AI in this context anyway?

AI is a research field with numerous sub-specialties, one of which is machine learning. In order for machines such as the TruLaser Center 7030 to “learn” – in other words, to get better and more efficient at what they do – they need tools and methods in the form of appropriate software. Computer vision is one of those methods.

Sorting Guide solution

Thirty-seven-year-old Weiß trained as a mechanical engineer, but he began developing software-driven initiatives not long after joining TRUMPF. One of the projects he led was the TRUMPF Sorting Guide, which did not originally include AI in its plans. The project team initially thought the Sorting Guide would work on the basis of conventional algorithms. “Everything seemed great in our test facility, the results were fantastic,” says Weiß. But then they took it to the test customer, “and nothing worked”.



Korbinian Weiß is training the AI with over 100,000 images captured in the TruLaser Center 7030's enclosure.

The problem was the lighting. The algorithms were overwhelmed by the mix of light and dark materials, the reflective surfaces, and all the objects in the visual environment. "Without AI, we wouldn't have been able to cope," he says. To train the AI, the computer vision team had to manually classify and label 100,000 images. By telling the system whether a sheet-metal part was visible or not in each image, and using the corresponding algorithms, the team was able to teach the software to continuously improve the accuracy of its predictions in multiple training loops.

Explaining AI: The TRUMPF computer vision expert is happy to explain how AI can improve sheet-metal cutting.



AI isn't everything

"Ninety-five percent of the solution is data, and just five percent AI," says Weiß, explaining where the team had to focus their attention. "The challenge was collecting the data in the first place, curating and labeling it, compiling datasets to meet different problem-solving goals and getting the right balance within the data." Sometimes traditional algorithms are all that are needed to solve a customer's problem – but often it takes more.

A lot has happened in the field of computer vision since TRUMPF launched its Sorting Guide in 2020. As well as improvements in the technology and algorithm databases, there has also been a shift in people's mindset. "Nowadays, we're thinking about data from the moment we start developing a product," says Weiß. That's why the TruLaser Center 7030 contains cameras. And it's also why TRUMPF now has access to entirely new business models – one of which is Pay per Part.

Remote night shifts

In this business model, TRUMPF's fully automated flagship is located at the customer's site, where it produces the desired parts; but control of the machine lies in the hands of a TRUMPF team at the Neukirch site in Saxony, which operates in three shifts, including at night. The cameras keep the team updated on every aspect of the machine's operation and deliver a non-stop stream of data. If a sheet-metal part gets stuck, the cameras record a short clip starting a few seconds before the event and ending a few seconds after. This helps the AI learn how to avoid such errors in the future.

AI offers numerous potential benefits and uses, some of which are still in their infancy. Examples include more-efficient machine utilization, longer running times, higher part quantities, savings on materials, predictive maintenance and assistance systems. "There's a lot happening in computer vision at the moment," says Weiß. He is excited about 2024, which will introduce

IMAGES: Stephanie Trenz

features such as smart cameras – some even with AI functions – to TRUMPF machines.

A new take on robotics

He and his team are partnering with other companies on a number of research projects, including Google Intrinsic, a project that aims to completely rethink robotics. Weiß's most ambitious dream is probably to create an autonomous machine. This is still some way off, but the current step they're working on is predicting the likelihood that a particular sheet-metal part might cause a problem in a machine. Once this can be confidently predicted, the machine could be set to produce easier parts at night and more problematic ones during the day when a specialist is on hand to help. "But making that distinction is incredibly complex," says Weiß.

Wake up!

Five years ago, Professor Dr. Sepp Hochreiter gave a presentation at Hannover Messe in which he called on the German mechanical engineering industry not to "drop the ball". "You have a real edge in building machinery, so don't throw it away!" he implored. Machine builders work blind, he said: they don't have constant contact with their customers like Facebook or Apple, and even if they have customer data, they don't tend to analyze it. "Machine builders and users need to wake up!" he says.

.....
" Sheet metal is an absolute nightmare for cameras. It's thin, it reflects light, it can be wobbly – and it comes in endless shapes and sizes. "

Korbinian Weiß,
 R&D Team Manager Machine Vision & AI at TRUMPF

Machine data collected by TRUMPF in its smart factory helps the computer vision team to train the AI.



Hochreiter is regarded as one of the world's pre-eminent experts on artificial intelligence. Originally from Bavaria, he heads up the Institute for Machine Learning and the Artificial Intelligence Laboratory at Johannes Kepler University Linz. Last year, he received the German AI Award from the Axel Springer Group's news brand Die Welt, the most generous award of its kind in Germany. His current projects include his own language model, which is said to be far superior to ChatGPT. Five years after Hochreiter's summons to arms, he insists that his wake-up call is as urgent as ever. Mechanical engineering companies may be making good progress, especially in south-west Germany, but he says that nowadays it's not just about building the best machine, but what elements you add to it. He keeps a close eye on developments in this area – and he's enthusiastic about the path TRUMPF has chosen. "They're doing a great job!"



Data, data, data: The more miniature cameras Korbinian Weiß's team installs in a TruLaser Center 7030, the more data they have to work with. The experts use the cameras to train the AI – and more data means better results.

Focus on simulation

The fact that Korbinian Weiß is so keen to have more cameras and sensors – in other words, more data – is music to Hochreiter's ears. The professor sees exciting opportunities on the horizon, including data sharing as a new cooperative model between companies, new business models based on customer connectivity, better AI based on more data, better machine capacity utilization, and much more besides. Specifically, he and his team are currently working on new simulation models for local industry partners in the Linz area.

The public release of the language model ChatGPT created a huge buzz in the AI industry, and the computer vision team have benefited from this new focus. Weiß expects to see a major surge in development in his field of AI this year – and he's excited to see where this will take TRUMPF machines next.



Fascinating facts and exciting innovations.



Big BANG for budding sheet-metal pros

As a member of Germany's **initiative to promote vocational training in industry**, known by the German abbreviation **BANG**, TRUMPF is committed to boosting the attractiveness of sheet-metal fabrication jobs and promoting high-quality training. To help in this task, TRUMPF has installed an array of modern machinery at the BANG training factory in Steinhagen near Bielefeld. This is where trainees and professionals can learn everything they need to know about the sheet-metal process chain – from design and manufacturing methods to digital connectivity. The aim of the initiative is to increase the supply of skilled workers and boost efficiency on the shop floor. TRUMPF customers can get a free place for their employees on the 12-week BANG course in laser-cutting and sheet-metal fabrication. This is a great way to pick up the specialist skills required to work in the sheet-metal industry.



Machines for Southeast Asia: TRUMPF opens new showroom in Bangkok

In February 2024, TRUMPF opened a new showroom in Bangkok for customers from Southeast Asia. The Thai subsidiary will use the 700-square-meter space to exhibit machines for **cutting, bending and welding solutions**. Many of the systems are entry-level machines designed for medium-sized businesses, but the new showroom also features a laser-cutting machine with a 24-kilowatt laser. "We expect the **24-kilowatt laser** and our entry-level products to generate significant sales in Thailand," says Decha Lertvilaisak, TRUMPF general manager in Thailand and the Philippines.



TRUMPF building new factory in India

TRUMPF is constructing a **new production facility** in Pune, India. "India is evolving fast and has real potential for growth. By staying close to this up-and-coming market, we can manufacture products more efficiently and respond more rapidly to customer needs. The new location will also enable us to exploit **global synergies**. In the long term, we'll be looking to supply other markets from India and to expand our supply chain," says Till Kueppers, chief operating officer at TRUMPF Machine Tools, Germany. TRUMPF is investing some five million euros in the new factory, which is due to start production this year. It intends to produce 300 machine tools a year at the facility. "This investment is the first step in our **long-term growth strategy for India**. The factory will start with bend-

ing machines from the TruBend 1000 series and will incorporate the TruLaser 1000 laser-cutting machine series by 2025. "India has a lot of experience in mechanical engineering. We'll be working with local talent to make products to TRUMPF's quality standards," says Mohammed Hidayath, director of sales at TRUMPF in India. TRUMPF is also expanding its **support infrastructure** with a new showroom in Bengaluru. Scheduled to open this year, the showroom will offer an improved service to customers. TRUMPF can also offer comprehensive IT solutions to customers in the region thanks to its software research and development facility in Chennai.

IMAGES: TRUMPF, DNWE



TRUMPF wins business ethics award

At the end of 2023, TRUMPF received an award from DNWE – the German chapter of the European Business Ethics Network – in recognition of its responsible corporate governance and compliance with ethical standards. At the awards ceremony, Professor Albert Löhr, chairman of the DNWE advisory board, praised TRUMPF as a **family-run company driven by cutting-edge technology**. He lauded TRUMPF's proactive and down-to-earth approach to corporate ethics. Andreas Möller, head of corporate communications, policy and brand at TRUMPF (center), accepted the award from Stephan Grüninger, chairman of the DNWE board (left) and Professor Dr. Michael Abländer, chairman of the DNWE award jury (right) in Berlin.



Space travel: TRUMPF and The Exploration Company join forces on 3D printing

TRUMPF and European space-travel start-up The Exploration Company have agreed to cooperate on the construction of core spacecraft components for space missions. In future, The Exploration Company will use the high-tech company's **3D printers** to print core engine components in Planegg near Munich. The aim is to make the engines reusable and refuelable in orbit. The start-up plans to send a space capsule to orbit the earth for several months in an initial mission in 2026. Subsequent missions, from 2028 onwards, will involve sending spacecraft to the moon. The spacecraft will initially carry freight, but the long-term plan is to have people on board, too. "Our 3D-printing technology is driving the **commercialization of the space industry**. Additive manufacturing is essential if you want to succeed in today's space industry," says Tobias Brune, who is responsible for TRUMPF's

additive-manufacturing business. Designers use 3D printing to combine entire assemblies into a single component. **This drives down weight and reduces complexity**. Every gram saved pushes down fuel costs, while less-complex components cut the cost of pre-launch safety tests and increase the probability of a successful space mission.



New TRUMPF Tech Center in Japan

In December 2023, TRUMPF Japan and the **Electronics division** opened a **new Tech Center** in Sendai, the capital city of Miyagi Prefecture in north-eastern Japan. "We are delighted to have this new location in Sendai, which has long been known for semiconductor development and fabrication," said Shinjiro Takanashi, managing director TRUMPF Japan, at the opening ceremony. "The new Tech Center will enable customers to make even more efficient use of TRUMPF's plasma generators."

Five ways to use OPC UA in your production environment

The OPC Unified Architecture (UA) standard plays a key role in modern sheet-metal fabrication. The universal interface technology allows your machines to communicate with connected IT systems in a secure, standardized way. Data received via OPC UA can be used to avoid downtime, improve capacity utilization and identify disruptive factors. Yet TRUMPF's OPC UA interface also offers an assortment of other useful functions that many users could benefit from.



Improve the flow of materials

TRUMPF's OPC UA interface can help improve the flow of materials in many of the company's high-tech machines. From 2D laser machines to punch-laser machines and laser tube-cutting machines, OPC UA makes it easy to check which parts are being produced on each machine, and from which materials. But that's only part of the story: OPC UA also tells the IT system whether machines have been loaded or unloaded, and it reports how full the containers are that are used to remove and store parts. In future, OPC UA will also make it possible to automatically process information on which tools are in the tool magazine. Equipped with this kind of machine data, you can avoid the waiting times and idle time that might otherwise occur in production due to retooling, a lack of raw material or other issues.



Make planning more reliable

Your TRUMPF machine's OPC UA interface makes it easier to plan production. Checking how many items in a job have already been completed is quick and easy, and you can also see when the machine has finished processing all the parts. This makes it much simpler to check whether the time planned for the job matches the reality on the ground. When delays strike, you can let your customer know in plenty of time and adapt your follow-up processes accordingly.



Flexible visualization

Data received from the machine via OPC UA can be visualized in a number of different ways. One possibility is the traditional dashboard on your monitor, but you can also display the data through a manufacturing execution system (MES). The information contained in the data can also be used to generate automated notifications and emails. OPC UA can communicate with any operating system, from Windows and Linux to iOS and Android.



Keep data safe

The OPC UA interface offers the highest level of data protection. The OPC UA standard, which was certified in 2015 by the German Federal Office for Information Security (BSI), includes numerous security mechanisms such as electronic certificates and access rights. No additional hardware is needed to exchange production data while adhering to data protection regulations. The standard's security mechanisms are activated by default when your TRUMPF machine is delivered.



Give older machines a new lease of life

Do you have an older-style TRUMPF machine that doesn't have an OPC UA interface? Check if the machine has the "Remote Control Interface" function; if it does, you can use our Extension Cube and OPC UA Retrofit software to access the machine's signals.



umati

Collecting machine data is one thing – processing it is another. Only by putting the data to work can you start adding value. This requires IT systems that are compatible with open interface standards such as OPC UA. To make this a reality, TRUMPF is working with partners from industry, government and research within the framework of the **umati initiative, which was launched in 2017**. Under the leadership of the VDW (German Machine Tool Builders' Association) and the VDMA (German Engineering Federation), umati members are developing specifications for a range of industries and products based on standards such as OPC UA. One of TRUMPF's key tasks in the umati community is to find ways of connecting solutions from the fields of machine tools, laser technology and 3D printing to IT ecosystems using standardized interfaces.

Check it out!

PARTNERSHIPS ARE THE KEY TO CREATING TURNKEY SOLUTIONS

Imagine trying to master every step in the fully automated process chain of tube manufacturing. On the face of it, this seems like an almost impossible task. But TRUMPF has risen to the challenge! The company offers **customized turnkey solutions from a single source** – from standalone machines to fully automated systems. All thanks to TRUMPF's dedicated and trusted partners.

1

Storing materials

An automated process chain normally starts with a large-scale storage system. Its job is to supply the machine with tube material around the clock. For this part of the process, TRUMPF relies on solutions from **STOPA**, one of the world's leading manufacturers of **automated storage systems**. STOPA systems are compatible with all TRUMPF's TruLaser Tube machines. The modular design allows users to choose the perfect length, width and height to meet their storage needs.

>30 years of partnership

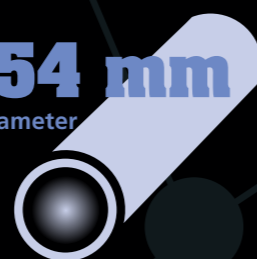
STOPA

2

Connection to tube storage = automated loading

The next step is to get the raw material into the tube-cutting machine. TRUMPF has its own solution for this part of the process. Positioned between the tube store and the laser-cutting machine, the **automated loading system** automatically takes tubes from the STOPA system and conveys them to the next stage. Next, the system removes the tubes from the cassette one by one and deposits them in LoadMaster Tube, which loads them into the machine.

Automated loading and cutting of tubes up to **254 mm** in diameter



Laser tube cutting

Once the machine is loaded, cutting can begin. TRUMPF offers its customers three different machines for laser tube cutting. The TruLaser Tube 3000 fiber is a great option as an entry-level or supplementary machine. And for users who are looking to boost their productivity and produce a wider assortment of parts, the TruLaser Tube 5000 is the perfect choice. The TruLaser Tube 7000 fiber specializes in handling extra-large tubes.

3

4

STARMATIK

100% automation

Automated unloading

Once the tubes have been cut, they need to be unloaded. The automated unloading interface with longitudinal conveyor belt transports the finished parts to a connected robot system such as the unloading robot from TRUMPF's solution partner Starmatik. This eliminates the physically demanding chore of manually unloading the machine and allows operators to focus on other tasks.

5

12,500 transfluid® tube-bending machines are in use worldwide

Connection to tube-bending machines

Bending is the next step in the process chain once the tubes have been cut. Once again, TRUMPF has a solution for its customers in the form of transfluid® technology. The tube-bending machines made by this TRUMPF solution partner can easily be incorporated in the process chain, thereby ensuring seamless, automated processing of the cut tubes.

transfluid
The solution for tubes.



7

Welding

This step creates assemblies from individual parts. Depending on the customer's requirements, TRUMPF offers a range of simple solutions for this part of the process, including the TruArc Weld 1000 for automated arc welding and TruLaser Weld machines for laser welding.

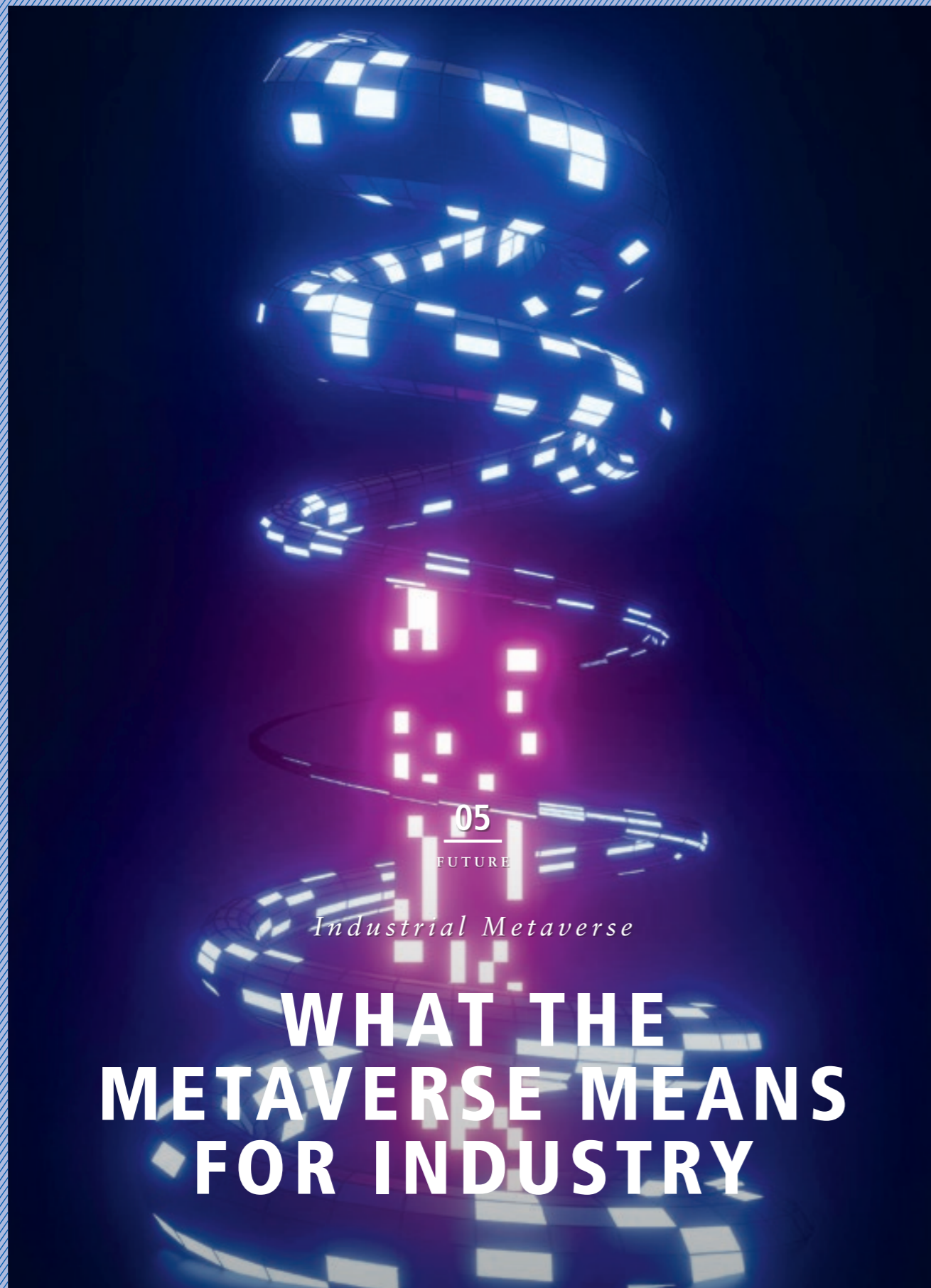
6

3D laser cutting

Additional cutting may be required after bending due to the deformation this involves. 3D laser cutting with a TRUMPF TruLaser Cell is the perfect choice for this purpose. The TruLaser Cell series comes in a variety of options that cater to different tube processing requirements – from the flexible entry-level TruLaser Cell 5030 to the highly productive TruLaser Cell 8030 machine for series production.

Our other partners:

- ARKU Maschinenbau GmbH
- Astes4 SA
- BECHTLE AG
- InspecVision Ltd.
- Jungheinrich AG
- NITRO PRO GmbH
- scrap² VALUE (sus.raw GmbH)
- TECOI CORTE S.L.



05

FUTURE

Industrial Metaverse

WHAT THE METaverse MEANS FOR INDUSTRY

IMAGES: TRUMPF, Fraunhofer IUK, Unsplash

We are on the brink of a **virtual industrial age** that is fully integrated with the real world. For companies, this opens up previously untapped potential, such as running production tests in a virtual environment to minimize downtime. When exactly the **metaverse** will fully materialize is still open to debate. But recent breakthroughs in artificial intelligence suggest that change can happen overnight – with radical results. There are already signs that this will bring **added value** for industry.

“ If we get it right, we will be able to improve **energy efficiency** and serve **far more customers** with the same number of employees. ”

Ingo Sawilla, TRUMPF
Head of monitoring & analytics



Ingo Sawilla joined TRUMPF almost 25 years ago. He started out in 2000 as a development engineer working on control-system development. He led this unit from 2005 onwards and subsequently went on to hold various management positions. Sawilla currently works as a data governance and data security coordinator, information security coordinator and data protection manager.

It's a sunny spring morning in the year 2052. A man strolls into the production hall of a sheet-metal factory in Baden-Württemberg, Germany, where the early shift is just getting underway. Just like every morning, he puts on his BCI headset, which is seamlessly integrated in his lightweight hard hat. BCI stands for brain-computer interface, and his headset provides him with a neural connection to the factory's systems. Using thought commands, he instructs a sheet-metal cutting machine to cut a specific pattern.

Straightforward and hassle-free, this method of control has long since become the industry standard. The AI systems integrated in the machines interpret his instructions and carry them out. Earlier this morning, one of his colleagues dealt with a customer inquiry. An AI-based system analyzed the customer's order and generated a design for the parts based on the key criteria of material thickness,

weight, durability and production costs. A member of the team then checked the design and made a couple of minor adjustments before sharing the information with her colleague who controls the machine.

This may sound like science fiction, but it may be a reality sooner than many people think. The technology available to us has grown exponentially in recent decades, and this century looks set to bring many more technological advances. Recent developments in



artificial intelligence only serve to underline this point. Virtually overnight, the ChatGPT language model catapulted AI applications from a niche concept to the mainstream. It now seems clear that AI will be performing key manufacturing tasks at least semi-autonomously well before the year 2052.

Technologies such as AI and VR headsets are ubiquitous in a metaverse. Experts use this term to refer to a virtual world that merges with physical reality to create immersive spaces. Users can move around these spaces as avatars and manipulate virtual objects. This opens up all sorts of possibilities, such as attending a concert with a friend who lives on the other side of the world, or working on a joint project with experts from different countries.



“ We need to understand that the **digital twin** will one day be more valuable than the physical machine. ”

Dr. Dietmar Laß, research manager
at the Fraunhofer ICT Group

The metaverse is already here, though it's still in its infancy

The metaverse – or at least an early version of it – is already a reality at many companies. As soon as people start working on the same 3D model in real time, then you're already heading down that path, says research manager Dietmar Laß from the Fraunhofer ICT Group in Berlin. “The concept emerged back in the 1980s, but now we've reached a cost point and a level of maturity that opens up all sorts of possibilities,” says Laß. At the same time, the shortage of skilled workers is forcing companies to find new ways of increasing efficiency. Today, many companies are using 3D environments to quickly train up their employees, says Laß, or to teach engineers software skills. The key to the metaverse, he adds, is the feedback between a machine and its 3D model.

Of course, controlling machines remotely is nothing new. “Experts used to call it telepresence,” says Ingo Sawilla, data governance and data security coordinator and data protection manager at TRUMPF. Two decades ago, TRUMPF was one of the first companies to start connecting to machines located at its customers' sites. “Back then,

IMAGES: TRUMPF, Fraunhofer IUK, Unsplash

we were limited to a dial-up connection, and it took a good two hours to transfer the data. But it was still technically feasible,” says Sawilla. Using this method, they were able to perform remote diagnostics and adjust machine parameters.

How small businesses are opening the door to the metaverse

Industry still has a long way to go to reach a metaverse in the sense of a virtual world that is fully integrated with reality. One of the problems of immersion is that the tremendous complexity of real-world production cannot yet be fully rendered in a virtual environment due to technical limitations, says Sawilla. Today's computers only have a limited capacity to process complex simulations in real time, and the bandwidth and speed are often too low to transfer large quantities of data. Tackling this issue requires compromise solutions such as digital twins, which draw on both real and virtual approaches. Such solutions can be used to make forecasts and to



Dietmar Laß was appointed as senior research manager at the Fraunhofer ICT Group in Berlin in 2021. He and his team act as an interface between the activities of various Fraunhofer institutes. All these activities are associated with the metaverse in one way or another. “However and whenever it materializes, the metaverse is coming,” says Laß.

perform simulations without affecting the corresponding real-world objects. Major investments are already being made in this field, even though nobody knows when its potential will actually be realized – and when it will start delivering measurable added value. Dietmar Laß believes that the metaverse will only reach the next stage in its development if companies cooperate on creating an end-to-end virtual value chain. This would map every single step in an integrated digital environment and seamlessly combine real and virtual elements.

“We need industry-wide initiatives rather than everyone simply doing their own thing,” says Laß, pointing to initiatives such as Manufacturing-X, which seeks to create a sovereign data space across industry. If successful, this could unlock undreamed-of potential. “We need to understand that the digital twin will one day be more valuable than the physical machine,” says Laß.

Even small businesses can start taking steps to access the metaverse. A sheet-metal fabricator could build virtual showrooms where customers can browse and customize products in an immersive 3D environment before placing an order. Such offerings could help businesses tap into new customer groups while raising their own profile. SMEs looking for skilled workers could also expand their reach and attract more attention by running virtual recruiting events, which applicants would attend as an avatar of their choice.

What Ingo Sawilla and Dietmar Laß both agree on is that the metaverse will be a game-changer. “If we get it right, we will be able to improve energy efficiency and serve far more customers with the same number of employees,” says Sawilla. Energy savings could be achieved in various ways – for example, by using virtual prototypes to replace physical tests, or by promoting remote working in virtual environments.





Innovations, technologies and future trends.



TRUMPF uses AI to make design engineers' work easier

TRUMPF will be presenting its new "iAssist" concept at its in-house trade show INTECH. The software supports design engineers by using **artificial intelligence (AI)** to analyze whether an assembly could potentially be optimized and to suggest improvements. The engineer simply uploads the assembly's STEP file, and the results of the AI's analysis are generated automatically in a matter of seconds. "iAssist gives engineers a much faster way to achieve excellent results. Instead of having to rely on trial and error, they can get the AI to figure out key areas that are ripe for optimization. This approach leads to better outcomes while also helping to boost efficiency," says Jörg Heusel, TRUMPF's R&D manager for sheet-metal design. TRUMPF provides iAssist free of charge to all interested users.



AI-based setup assistant for the TruMatic 5000

TRUMPF's INTECH show will also feature the "**Runability Guide**", an **AI-based solution** designed for TRUMPF's highly productive punch-laser machine, the **TruMatic 5000**. This solution makes it **quicker and easier to set up** the machine. Previously, workers had to test the program separately on the machine each time they received a new order with unknown geometries or materials. This resulted in unproductive downtime, especially on fully automated machines that produce large numbers of different parts. Thanks to TRUMPF's AI-based software, users can now **save up to 20 minutes of idle time** that would normally be required to set up

their machine. The solution uses various analytical models to help production staff decide whether the TruMatic 5000 can start producing the parts right away or whether some kind of manual intervention is necessary. Jonathan Eberle, a project manager in TRUMPF's development department, says the benefits are clear: "Our solution boosts companies' productivity and competitiveness. As well as saving time, it also helps them train up new staff and frees up existing personnel to use their skills in other value-adding areas."



Supercomputer: TRUMPF joins forces with High Performance Computing Center Stuttgart

TRUMPF has reached a cooperation agreement with the University of Stuttgart's High Performance Computing Center Stuttgart (HLRS) which will give TRUMPF employees **unlimited access to HLRS's computing resources**. "These mainframe computers will enable our developers to run virtual simulations of machine functions before the first prototype is built and to train AI solutions more quickly. It's a more sustainable and efficient way to innovate," says Berthold Schmidt, CTO of TRUMPF. The Hawk supercomputer at the HLRS is one of Europe's most powerful computers for industry, with a peak performance of 26 petaflops. One petaflop corresponds to one quadrillion computing operations per second.

IMAGES: TRUMPF



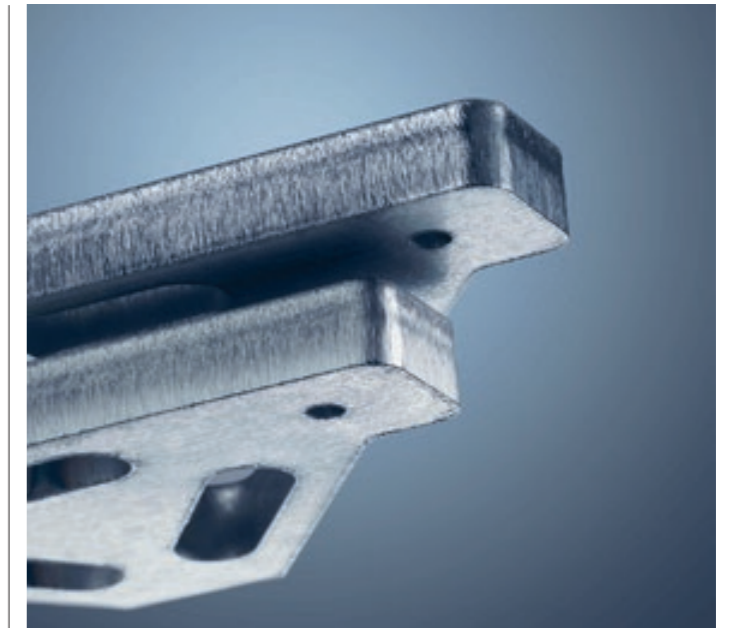
X-Blast for TruLaser Tube machines

TRUMPF's **X-Blast cutting function** is now also available for TruLaser Tube machines. Based on a **patented nozzle geometry**, X-Blast modifies the flow of gas and allows cutting to be carried out with the nozzle at a greater distance from the workpiece. This significantly reduces the risk of collision. In addition, TruLaser Tube machines equipped with X-Blast require considerably less cutting gas to achieve the same cutting results. Users can reduce their use of cutting gas by an average of 33 percent and a maximum of 39 percent when performing high-pressure cutting of tube walls between 1 and 3 millimeters thick. This is equivalent to annual potential **CO₂ savings** of up to **3.5 metric tons** per shift. The X-Blast cutting package is available for the 5000 and 7000 machine series.



ACB ups productivity of TRUMPF's fastest mobile bending cell

TRUMPF's in-house trade show INTECH will also showcase the Flex Cell, a mobile robot bending cell designed to automate TRUMPF's fastest bending machine, the TruBend 7050. For the first time, this combination of the TruBend 7050 and Flex Cell will feature TRUMPF's **ACB (Automatically Controlled Bending)** angle-measuring technology. ACB sensors in the work area record the angle of each individual bend and measure the spring-back in the first part. The ACB system saves this data and uses it for every other part in the series. With perfect bending guaranteed from the very first part, fabricators can speed up production, increase part quality and make life easier for production staff.



Better part quality thanks to built-in gas mixer

Visitors to the INTECH show can also learn more about TRUMPF's **solution for laser-cutting with mixed gas**. The integrated gas mixer combines the cutting gases nitrogen and oxygen automatically, without requiring any operator intervention. This novel solution is available for TruLaser 1000, 3000 and 5000 machines with 12 kW and 24 kW of laser power. The combination of mixed gas and high laser power improves part quality when cutting medium-to-high thicknesses of structural steel or aluminum sheets. Depending on material type, alloy and quality, it can also minimize the formation of

burrs on the cut edge, thereby reducing the need for manual rework. The easy-to-use **integrated gas mixer** is operated directly through the machine's user interface. Users simply select the required parameters, and the gas mixer automatically creates the desired mixture. The solution is integrated within the machine housing, which saves space and gets thing up and running quickly without the need for additional installation.

Smart factory consulting from TRUMPF: your partner for connected manufacturing

Finding a reliable way to transform sheet-metal fabrication may sound challenging. But hitting goals such as a 30-percent drop in throughput time and a 20-percent reduction in costs might be easier than you think. Sven Ongert, a managing consultant at TRUMPF Smart Factory Consulting, explains how the process works.



Sven Ongert completed his Bachelor's and Master's degrees in industrial engineering at Karlsruhe Institute of Technology (KIT). He joined TRUMPF Smart Factory Consulting in July 2018 and now works as a managing consultant. Together with his team, he is responsible for factory and technology planning and future strategy.

“As consultants, we have the **industry expertise** – but customers understand their **processes** better than anyone. The secret is to combine our **skills**.”

Sven Ongert, managing consultant at TRUMPF Smart Factory Consulting

First steps

For the first exploratory meeting with a potential client, we don't necessarily have to be on site. The idea is to get to know each other and set expectations. What does the customer hope to gain from the smart factory consulting service? Where can we offer the most help? Once those questions have been answered, we consider which consulting services make sense and which analyses could help them reach their goals. Once we've pulled everything together, we present our ideas to the customer on site. This is also a chance to make final adjustments to the project. The customer may have rethought some of their goals since

our first conversation, perhaps after talking to their employees or supervisors. At that point, my job is to add anything new they need to the consulting service. Ideally, we then prepare an official offer, which the customer is generally happy to accept.

Preparation

Consulting projects tend to work best when you have a dedicated team consisting of consultants and the customer's employees. Our customers don't just invest money in these projects, but also time. We need layouts and drawings of sample components as well as information on quantities, machine

“As consultants, we continue to be an important **point of contact** for the customer.”

Sven Ongert, managing consultant at TRUMPF Smart Factory Consulting

utilization, number of employees and shift arrangements. This requires input from lots of people on the customer side. Ideally, we would get this data within two weeks of the kick-off meeting, because our goal is to return four weeks later with some first impressions of how the analyses might look.

The concept

Preparing these analyses is very time-consuming. The process starts at TRUMPF in Ditzingen and then continues at the customer's site. For example, we use time studies to simulate which of the customer's machines and technologies is best suited to fabricating the parts. Then we plan the optimum layout for efficient manufacturing. One option is to carry out this analysis entirely on our own based on the customer's data; this gets the process completed quickly, and we're happy to do that if that's what the customer wants. But it's better to get the customer's project team involved in developing the content. As consultants, we have the industry expertise – but customers understand their processes and products better than anyone. Joining forces is therefore a great way to combine our skills. The analysis also gives time for ideas to mature. It's important to present interim results to the customer and to finalize and interpret these together. We also need to give time to let the results sink in, which is why we like to include breaks of up to two weeks between individual work packages.

Implementation

How fast things are implemented depends on the results of the consulting project. It generally takes longer to build a completely new production facility than to renovate an existing one. The actual realization of the project is usually carried out by TRUMPF sales partners and sales representatives with support from architects and a construction company. As consultants who have been coming and going for weeks, however, we continue to be an important point of contact for the customer. This keeps trust high, as well as ensuring that everything that happens contributes to the overall goal. In other words, Smart Factory Consulting provides the framework for customer transformation.

TRUMPF Smart Factory Consulting GmbH

- Consultants to the sheet-metal fabrication industry
- Founded in 2015 & spun off in 2023
- Managing director: Thomas Rupp
- Approx. 12 consultants
- Four specialist areas: continuous improvement, digital production, factory and technology planning, and future strategy
- > 450 successful projects completed worldwide.



SMART SAVINGS: TRUMPF PART DESIGN

Better quality at a lower cost: TRUMPF part-design workshops teach users how to get the best out of their parts and machines in order to make production more cost-effective and efficient. Each issue, TRUe takes a look at a different part to illustrate how this process works.

This issue: Weight-saving design

Weight is a key consideration for assemblies that move dynamically. Components that are too heavy are associated with excessive energy use, lower efficiency and higher carbon emissions, all of which lead to higher costs. Engineers are therefore keen to find ways of reducing the weight of such components during the design process. The support structure of the SheetMaster for the TruMatic 7000 is a good example. Originally, this was a conventional sheet-metal construction with various bends and MAG welds. Although this production method is widely used, it has some shortcomings. MAG welding creates a significant build-up of heat in the component, which causes the material to warp. To counter this effect, design engineers often resort to thicker sheets, which ultimately increases the weight of the part. Subsequent work is normally required to correct the distortion. The TRUMPF Part Design team came up with a clever alternative for the support structure: deep-penetration welding



Marcel Bürkle, training instructor for laser welding and fixture construction at TRUMPF Part Design

with a laser. “Using this process, we can weld faster and with less distortion, and we can also join thinner sheets to thicker ones. By restricting material to the places it’s really needed, designers can increase rigidity while also decreasing weight,” says Marcel from TRUMPF Part Design. The redesigned structure for the SheetMaster is 25 percent lighter. And the optimized design eliminated all the post-processing work, cutting costs by a full 60 percent. “The laser’s precision also reduced the complexity of the subsequent processing steps,” says Bürkle. This successful redesign shows how reducing weight can have multiple benefits, including boosting production efficiency and reducing energy use and CO₂ emissions.

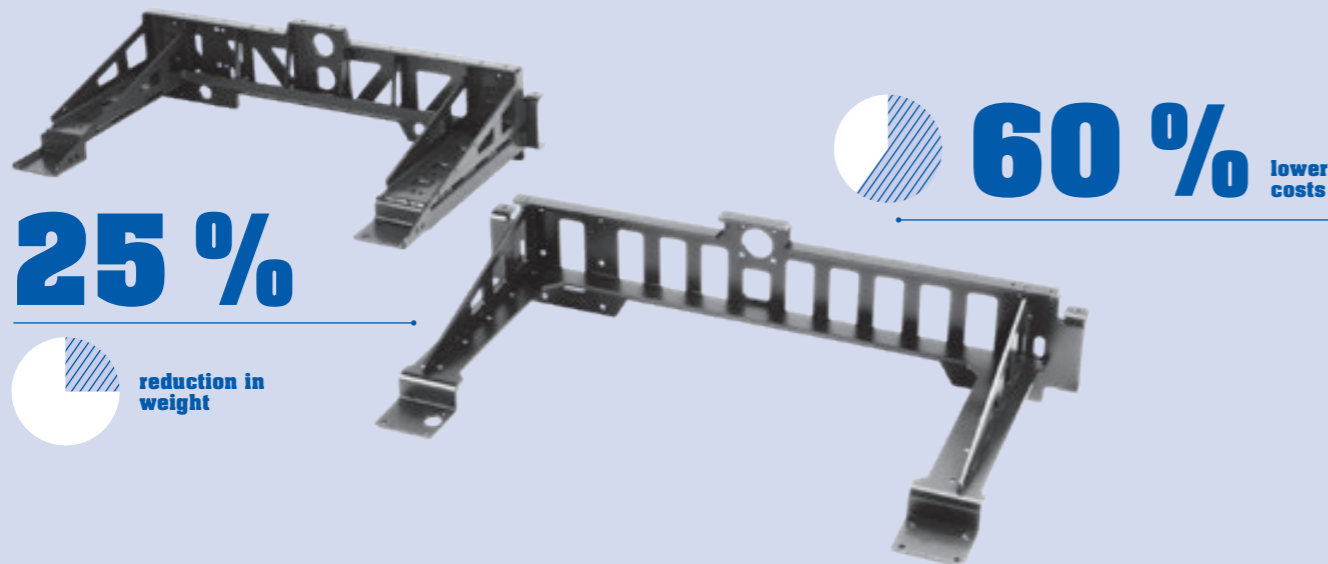


IMAGE: TRUMPF



This picture shows a **lens replacement tool** like you’ve never seen it before. Users regularly have to clean or replace the lenses in CO₂ lasers. Engineers can use this tool to unscrew the lens from the holder and to securely tighten the new one in place. By taking this part out of its familiar environment, photographer **Jörg Schieferecke** helps us see it from an entirely new perspective.



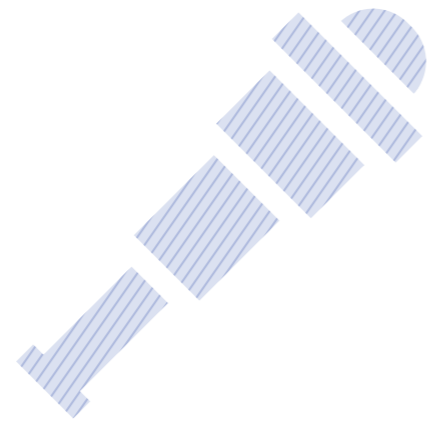
An exploration of loyalty

Loyalty can sometimes be a tough call. Perhaps your boss asks for something that you just know won't work. Or your colleague insists on throwing everything you do into question, so the mood sours and everything grinds to a halt.

For Sir Ernest Shackleton and his crew on the ship Endurance, any such crisis of trust would have meant certain death. Aiming to cross the Antarctic continent, they set sail from England in August 1914. But some six months later, their ship became trapped in the pack ice in the Weddell Sea, where it was crushed by the immense power of the ice.

The 28 castaways dragged the salvaged lifeboats across the ice and then drifted on ice floes that were constantly in danger of breaking up, all while braving snowstorms, bitter cold, hunger and thirst. By some miracle, they finally managed to reach Elephant Island in April 1916. Shackleton then chose five of his men to accompany him on a voyage of more than 1,000 kilometers across the stormy Southern Atlantic to South Georgia. Launching their tiny lifeboat, their chances of survival seemed ridiculously low.

Having survived the most terrible conditions, Shackleton and his crew eventually succeeded in reaching the Stromness whaling station on South Georgia. From there, they organized the rescue of their companions on Elephant Island, where the Antarctic winter conditions had been almost as harsh as those faced by the crew during the South Georgia crossing. Their initial rescue attempts were thwarted by thick pack ice, but the rescuers finally succeeded in reaching Elephant Island at the end of August 1916. All 28 men survived.



This extraordinary expedition made Sir Ernest Shackleton into a household name. The voyage of the Endurance and the rescue of its crew have a special place in the history of human exploration, and the books and films inspired by these events remain popular to this day. The crew of the Endurance only survived thanks to the intense loyalty shown by the crew toward Shackleton and his seconds-in-command, and the loyalty Shackleton showed to them in return. The idea of giving up and abandoning his men to their fate never even crossed his mind.

Many of us could learn a thing or two from Shackleton and his crew. For example, how to plan our next steps with everyone's needs in mind, not just our own; how to support our team unreservedly, even when there are areas we still need to work on; and how to trust our colleagues even when we doubt their ideas will work.

In these challenging times we're living through, companies need loyalty to be alive and well at every level of the business. And when the going gets tough, it's worth recalling the tale of the Endurance. A replica of the lifeboat that Shackleton used to sail to South Georgia is on display in the island's museum in Grytviken – though this may be a little far away for team-building projects. Nonetheless, this lifeboat is perhaps one of the best examples of how people can achieve remarkable things with the most modest of resources.

Jürgen Brand



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