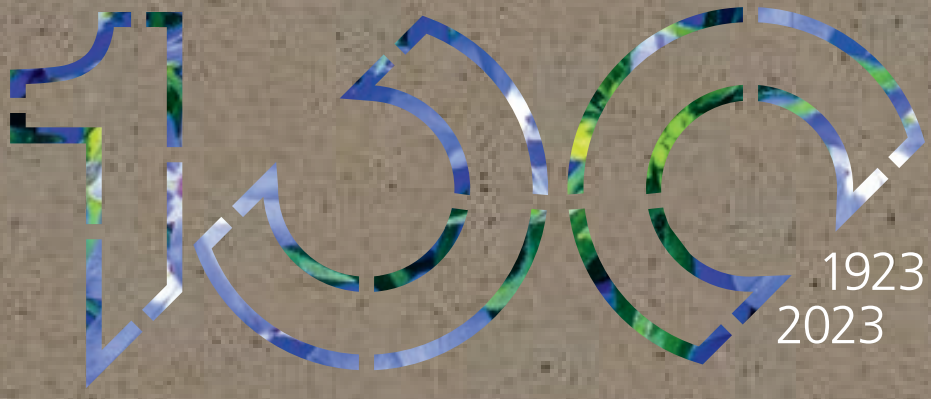
# TRUe

THE MAGAZINE FOR SHEET METAL EXPERTS

## 17# 2023 SUSTAINABILITY




TRUMPF

With **TRUMPF celebrating its 100th anniversary,** we decided to take our passion for sustainability to even greater heights this year – by saying it with flowers! You probably spotted the number "100" stamped into the new and unique paper finish of this issue's cover. Embedded in the numbers are the seeds of a beautiful blue plant: bird's-eye speedwell. All you have to do is pop the perforated numbers out of the cover and plant them in a pot this spring. You don't need to cover the seed paper with soil – just place it on top of the soil and press it down gently. Then simply keep the soil moist, and make sure it gets enough sunlight. These particular blooms thrive in nutrient-rich, damp soil in a sunny or semi-shaded location. And once the summer comes, you'll be feasting your eyes on a lovely crop of blue petals! TRUMPF keeps growing too, thanks to new lines of business and new technologies – but, more than anything, thanks to our partnership with you, our customers!

IMAGE: Getty Images


**Keen collectors.** Recycling has always played an important role in the metalworking industry. Whether steel, tin or aluminum, scrap metal is a valuable material that can be recycled multiple times. Since the onset of industrialization, it has become a prized resource in the waste-collection business. Recycled metals help companies minimize their use of increasingly scarce raw materials, reduce their energy use, and protect the environment. The **sustainable circular economy** is now high on the agenda for other types of material, too, such as paper, cardboard and waste glass. ■

IMAGE: Kurt Schwarz

Current projections suggest that **global waste production** will rise to around 3.4 billion metric tons by 2050 – including a whole lot of plastic. Scientists at the University of Texas in Austin are trying to get to the root of the problem. Using AI, they have generated novel mutations to a natural enzyme that enable it to degrade polyethylene terephthalate (PET). This process of enzymatic **depolymerization** breaks down plastic in a matter of days. The researchers are currently investigating whether these modified bacteria could help us clean up the environment. But until the plastic-eating enzyme is ready to do its work, we'll just have to keep reducing our use of plastic. ■

IMAGE: Alissa Eckert - Medical Illustrator

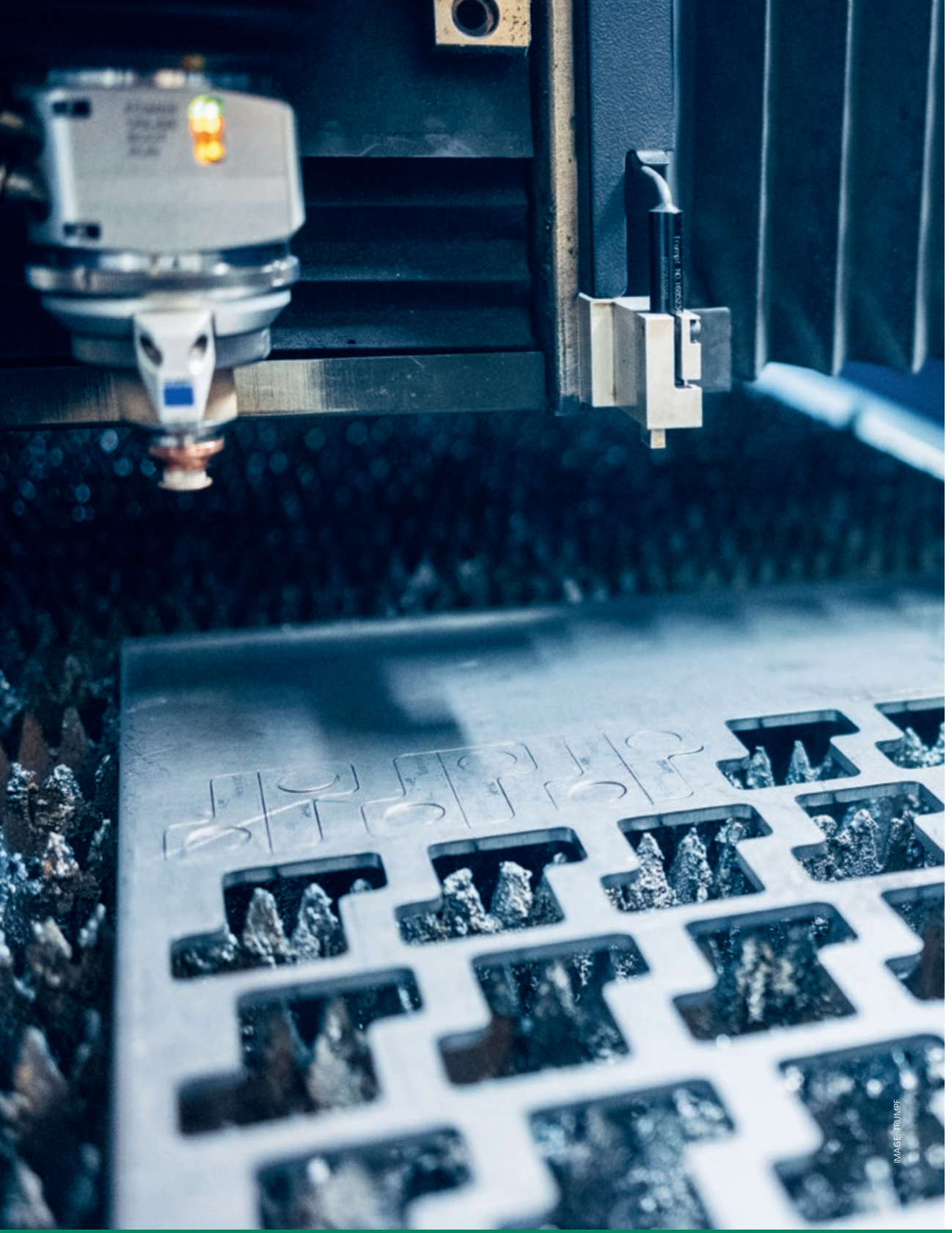


IMAGE: TRUMPF

# The future belongs to **sustainability**

Dear readers,

People from Germany's Swabia region have a reputation for thriftiness – perhaps that's what lies behind our efficient and economical solutions for sheet-metal processing! Given today's soaring energy and raw-material costs, the use of sustainable materials and technologies is becoming more important than ever. To tackle climate change, we need to drastically reduce the carbon footprint of our manufacturing sector. Regulatory requirements are increasingly pushing companies in this direction, and many large companies now expect their suppliers to have a climate strategy in place.

But how can sheet-metal fabricators like us be sure that our climate policy is fit for the future? We're making major investments in new, environmentally friendly technologies at TRUMPF locations to help meet the goals of the Paris climate agreement. Many of these new solutions are already up and running. For example, we're using waste heat from our laser machines to heat our headquarters in Ditzingen. We've also covered all our factory roofs with solar panels, making us one of the biggest electric-charging stations in southern Germany. TRUMPF's Head of Sustainability, Susanne Hartlieb, discusses this and similar projects on page 28.

Perhaps our greatest contribution to climate change mitigation lies in our efforts to develop sustainable technologies for our customers – particularly ones that allow our customers not only to reduce their carbon emissions, but also to boost their productivity. For example, our "Eco Cooler" feature cools laser-cutting machines with water instead of environmentally harmful refrigerants (page 21). By reducing the energy required for cooling by up to 80 percent, this new technology pays for itself faster than any photovoltaic system. Another good example is "Highspeed Eco", which reduces the use of cutting gas during laser processing while simultaneously improving quality. Our customers also benefit from our nanojoint technology and new laser-blanking system, which allows users to nest parts closer together to save material. Our infographic on page 38 shows some of the most important ways in which TRUMPF is pursuing its sustainability goals.

Another tool that is helping to make production operations more sustainable is digitalization. Smart, connected manufacturing keeps non-productive time to a minimum. Powering down a machine when it's not needed saves energy, and some companies even find some that some of their machines are no longer required. Our Slovenian customer Elpro Križnič is a good example of what connected manufacturing can achieve (page 12). Using TRUMPF's Oseon software, they connected their production machinery, improved their resource efficiency, and boosted productivity. New features such as a production-planning module make scheduling jobs even easier. And our Oseon software also makes it simpler to identify and eliminate non-productive time. Learn more about Oseon on page 17.

This year, in another great example of sustainability, TRUMPF is celebrating its 100th anniversary. You probably noticed the number "100" punched into the cover of this issue. Embedded in the numbers are some plant seeds, ready to pop out and plant! Without the trust you placed in us – and the close partnerships we have developed over so many years – we would never have achieved this century of success. The blossoming of these blue flowers symbolizes our solidarity with you and with all our customers – now, and for the next 100 years!

I hope you enjoy reading this issue.

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

TRUe

*Table of contents*

*#17/2023*

# SUSTAINABILITY ...

## 01 ...in Slovenska Bistrica

Page 12

By leading their father's long-established company into a new era of digitally connected manufacturing, Sintija and Tina Križnič laid the groundwork for a successful future. Based in north-east Slovenia, Elpro Križnič is now pursuing a corporate strategy that focuses firmly on sustainability.

## 02 ...in Utsunomiya

Page 18

Yuko Ueki drew on inspiration from Japan's thousand-year-old Kumiko woodcraft techniques to develop a new line of business for her long-established company UEKI Steel Material. She uses a TRUMPF laser to produce finely-wrought decorative ironwork and other designer objects.

## 03 ...in Neubrandenburg

Page 22

Introducing automated bending into a low-volume production environment was a huge challenge for packaging-machine specialist Weber Maschinenbau. They originally needed a separate gripper for each workpiece – but thanks to a development partnership with TRUMPF, they soon had a groundbreaking and highly versatile multigripper that could be set up for new parts in minutes.

## 04 ...in Ditzingen

Page 28

TRUMPF is working flat out to make production at its Ditzingen headquarters climate-neutral and to cut its carbon emissions to zero. Our quick tour showed that enthusiasm to tackle sustainability issues is at an all-time high.

BIZ+ SHORT CUTS 34

TEC+ SHORT CUTS 44

01
SLOVENIA

*Sustainability in Slovenska Bistrica*

# SHARED PASSION FOR DIGITALIZATION

IMAGES: Vid Rotar

By leading their father's long-established company into a new era of **digitally connected manufacturing,** Sintija and Tina Križnič have laid the groundwork for a successful future. Based in north-east Slovenia, Elpro Križnič started out as a one-man garage-based business. Today, the company is an **energy-saving smart factory** – and the two sisters are pursuing a corporate strategy that focuses firmly on digitalization and sustainability.

**Sought-after partner:** Elpro Križnič is a byword for high-quality turnkey solutions in sheet-metal fabrication and in the energy industry.

The vision of a fully connected smart factory has always fascinated Sintija Križnič. But it wasn't until 2019 – when the young CEO and English-literature graduate paid a visit to TRUMPF's Smart Factory in Chicago – that her plans finally began to take shape. "The new era of sheet-metal fabrication was literally within my reach – and I wanted Elpro to be a part of it," says Sintija Križnič. Determined to put her plans into practice, she called on the support of her younger sister, and co-CEO, Tina.

Elpro Križnič is headquartered in the town of Slovenska Bistrica, some 30 kilometers south-west of the regional capital Maribor. Founded in 1989 as a one-man electrical contractor, the company initially specialized in installing control cabinets and distribution boards. Over time, it steadily expanded its operations and now employs over 100 people. Company founder Ivo Križnič – Sintija's and Tina's father – retired in 2016. But the philosophy he used to turn Elpro into a successful business continues to resonate to this day.

## Garage-based business

Elpro has come a long way from its origins as a garage workshop. Today, Elpro is a sought-after partner in the energy industry and in sheet-metal fabrication, renowned for its high-quality turnkey solutions. On a plot of land at Tomažičeva 18 stands a 15,000-square-meter smart factory. Packed with cutting-edge

equipment and innovative technologies, this pioneering facility also includes the largest STOPA storage system in south-east Europe. "We built this new environment through hard work, perseverance, and a lot of expertise," says CEO Sintija Križnič. She feels a strong affinity to these traditional values, as does her younger sister Tina, who handles the company's finances.

## Fascination with the family business

Both women took a roundabout route to their current positions as CEOs of an industrial enterprise. While studying at Maribor University, Sintija lived in a world far removed from medium- and low-voltage distribution systems in smart grids, and light years away from CNC-controlled laser cutting, bending, and punching machines! Yet the longer she spent at her father's side, the more she became involved in the expansion of the family business, and the greater her fascination with the growth and diversification of its portfolio. Sintija stayed on at Maribor University, but she switched courses and ended up graduating with a Master of Business Administration in 2016.

## Trip to U.S. seals the deal

This proved to be the start of an exciting new phase in her life. In mid-2019, Elpro was planning the construction of a new factory. This coincided with Sintija's visit to the TRUMPF technology center in Chicago, a real-life production environment where people, machines, automation, and software work together in perfect harmony and sheet-metal fabricators can experience connected manufacturing solutions in action. On her return from the U.S., the young CEO laid the foundations for a digitally connected factory in Slovenska Bistrica. "People had been talking about digital connectivity for ages, but that trip to Chicago showed me it was already a reality. I saw with my own eyes just how far it had progressed. I realized that smart machines and systems were now capable of interacting with automated storage systems, with all the benefits that entailed," she says.

**Connected manufacturing:** Company founder Ivo Križnič und seine Töchter Tina und Sintija (right) keep the family business on track. "We've moved into the digital age."

> **" Family-run companies** are special. Their philosophy is infused with **emotions, loyalty, and responsibility. "**
>
> Sintija Križnič, CEO Elpro Križnič

## The start of connected manufacturing

In early 2022, Elpro's smart factory started making products for its two new business units, EK metal and EK electric. Since then, shipments of a wide array of electrical components and cabinets have left the high-tech factory on a daily basis, with any spare capacity filled by job-shop orders. From welding and punching to bending, Elpro's customers benefit from high-quality, precision parts and fast throughput times, all thanks to two TruLaser 5030 fiber machines, a TruPunch 3000, a TruPunch 5000, and the TruBend 5170 and 7050 machines. Materials are loaded and unloaded automatically by a LiftMaster Compact system.

IMAGES: Vid Rotar



**No time to lose:** Faced with an ever-increasing product mix and shorter lead times, new automation solutions play an essential role in ensuring future success.

## Biggest STOPA storage system in south-east Europe

A TruMatic 7000 combines the benefits of punching and laser processing in a highly cost-effective package, and a TruBend Cell 5000 bending cell sets new standards in programming and angle measuring. These and more machines have been connected to the STOPA system since 2022. This automated storage system not only serves as a material warehouse, but also performs the complex functions of a logistics center. Operating around the clock, it provides the new smart factory's shop floor with everything required for sheet-metal fabrication.

## Everything running smoothly

This story wouldn't be complete without mentioning the huge effort made by the whole Elpro team to put these technical

**Welding, punching, bending:** TRUMPF machines help Elpro achieve top-notch part quality, productivity, and flexibility.

**Smart factory:** Getting the new machines up and running in Slovenska Bistrica was one thing, but adopting a new shop-floor mindset was quite another! The key was getting everyone to implement the manufacturing philosophy of connected manufacturing in their day-to-day work.

**Sustainable development:** The charging stations for the company's vehicle fleet are powered by rooftop solar panels.

innovations into practice. It was clear that everyone needed to understand the manufacturing philosophy behind digital connectivity and be able to implement this step by step in their everyday work. Meeting this challenge required a new mindset among managers and shop-floor workers alike. "It took real fortitude and stamina to see it through," says Sintija Križnič. Now that the new processes are running smoothly, the stable operation of the facility has drawn praise from the many customers who have already toured the site. "Getting the system up and running was an incredible team effort," says Križnič. "We're really proud of what we've achieved and delighted that Elpro has completed yet another stage of its digitalization journey."

## Sustainable development

Construction of the new smart factory not only boosted the company's efficiency; it also made the business more sustainable. Elpro sources most of its power from a photovoltaic system with a 750-kilowatt peak output, using batteries to store energy until it is required. The company runs a fleet of electric vehicles and allows employees to use its on-site charging stations at no charge. It also makes extremely sparing use of water and other natural resources. Elpro Križnič is upbeat about its future despite the effects of ongoing global crises: "We're continuing to move our business forward with confidence," says Sintija Križnič. "Elpro is determined to celebrate its 100-year anniversary in 2089, just like TRUMPF did this year!"

> " We actively contribute toward **sustainable business growth** by acting in a transparent and ethical manner. "
>
> Tina Križnič, CFO Elpro Križnič

IMAGES: Vid Rotar

01

*A closer look:*

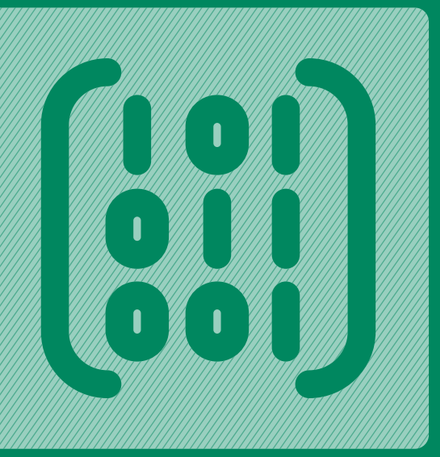
# Oseon software solution

**Elpro Križnič in Slovenia** relies on cutting-edge **digital connectivity** technologies and operates the largest **STOPA storage system** in south-east Europe. The company uses Oseon software from TRUMPF to fully automate the flow of materials in their production environment. We checked out what other benefits the solution offers – for material requirements planners and shop-floor machine operators.

*In brief*

# Free flowing

TRUMPF's integrated Oseon software enables sheet-metal fabricators to **digitalize** every stage of their **manufacturing and logistics processes** for the first time, with major gains in production efficiency. It even works for machinery that is already a few years old. The goal is to get things connected, ultimately creating a **smart factory.** The results can be truly remarkable, including **higher productivity, less idle time** – and a free-flowing production process.



## The database

Oseon is a comprehensive software package for production and material flow management. It acts as a centralized database for manufacturing by bringing orders, logistics, data collection, and evaluation under one roof. Reliable and autonomous, it controls all the relevant processes in the factory environment. Users start by loading their production plan into Oseon. The software then receives continuous updates on the production process from all the machinery on the shop floor. As well as collecting this data, Oseon processes information from the production plan, monitors material stocks, plots the locations of transport carts and trolleys, and keeps track of the location of each part throughout the manufacturing process.
Oseon tailors its information output to the needs of different users, and it supports both planners and operators by making everything rapidly accessible through mobile devices, so stakeholders have all the data they need at the touch of a button. With a single ecosystem, and no need to switch between different media and modules, many of the most common errors become a thing of the past.

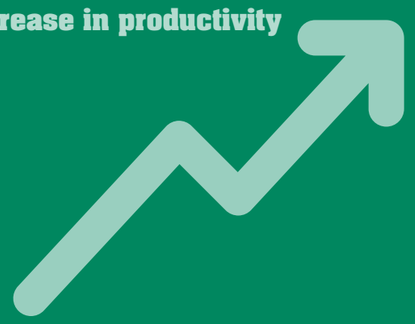
## Benefits

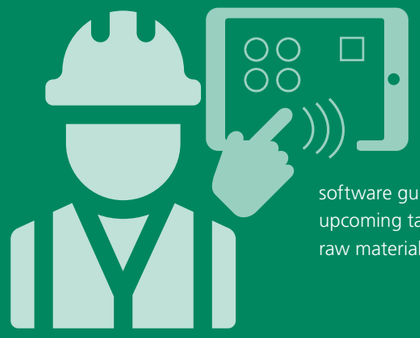
With Oseon, users can fully automate the flow of materials on their shop floor without requiring a connection to a large-scale storage system. The software brings the flow of materials into sync with the production plan, automatically choosing the best sequence in which to transport materials and sending transportation orders to free automated guided vehicles (AGVs) and workers with carts. What's more, Oseon can modify the material transportation schedule on the fly – for example, when a company takes on an unexpected, urgent job. The software also reduces non-productive time by minimizing the time spent waiting for machines to be unloaded or for more raw materials to become available. In short, Oseon makes production more affordable while enabling companies to respond more quickly to customer requirements. The software can achieve productivity gains of up to 30 percent.

**Up to**

**30 %**

**increase in productivity**



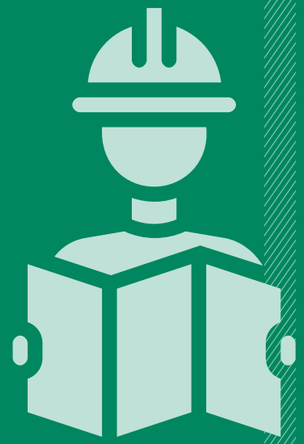


## … for machine operators

Thanks to its role-based design, Oseon gives each production or warehouse worker exactly the information they need on their mobile device to make their work as efficient as possible. This might include status updates on the production process, or relevant details of upstream or downstream process steps. The software guides them smoothly through all their upcoming tasks, from loading the machine with raw materials to removing the finished parts.

## … for production planners and managers

Production managers can use Oseon to keep track of machine capacity and to continuously optimize production in real time. Jobs can be modified quickly and flexibly to reflect changing conditions and requirements. Customer needs are met promptly and efficiently.



## … for logistics staff

Materials data, inventory data and transport jobs can all be managed from the shop floor. The software allows users to fully automate the flow of materials, drastically reducing production and delivery times.

## … for the environment

Sustainability on demand: Oseon maximizes the availability of machines and goods. By reducing nonproductive time and idle time, it helps companies reduce their resource consumption.

## Modular design

The Oseon software package comprises three modules designed to cater to different user requirements and levels of digitalization:

**1. Oseon Go** digitalizes all the core processes and provides full transparency of all the production processes.

**2. Oseon Grow** extends Go to the fields of storage and logistics with additional components and interfaces. Stock, warehouse and order data are kept in sync at all times.

**3. Oseon Flow** aims to achieve the complete connectivity required for fully automated production. The result is a smart factory where everything flows smoothly and machine idle time is reduced to a minimum.

## Customer details

**ek Elpro Križnič, d.o.o.**
**Standort:**
Tomažičeva ulica 18,
2310 Slovenska Bistrica – Slovenia
Phone: +386 2 292 80 00
Email: info@e-k.si
www.elpro-kriznic.si

## Machinery

- TruLaser 5030 fiber
- TruPunch 3000 and 5000
- TruBend 5170 and 7050
- TruMatic 7000
- LiftMaster Compact

For almost 50 years, the production of heavy steel components formed the core business of **traditional Japanese company UEKI Steel Material.** But in 2019, CEO Yuko Ueki drew on inspiration from Japan's thousand-year-old **Kumiko woodcraft techniques** to take her company in a new direction. Since then, the 33-strong workforce has been using a TRUMPF laser-cutting machine to produce **finely-wrought strips of iron** to decorate lampshades and wall bars. These designer creations are a beautiful addition to any home – and the perfect choice to boost the company's sustainability credentials.

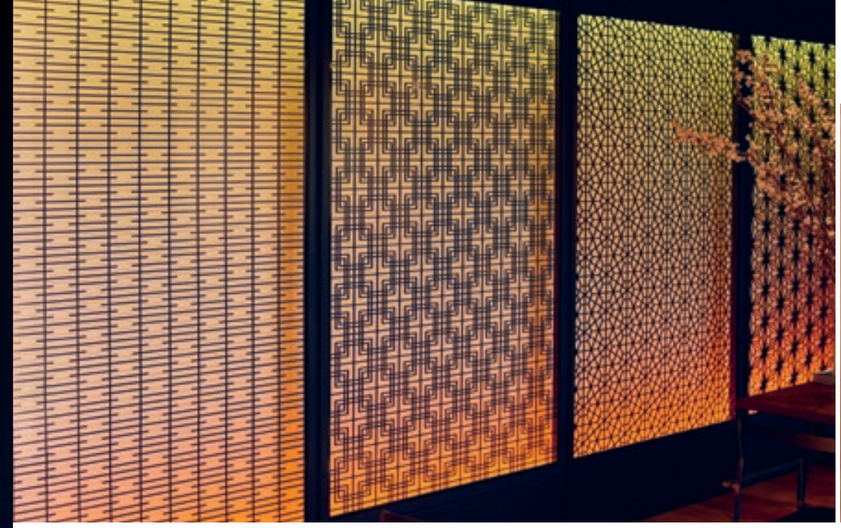
02
JAPAN

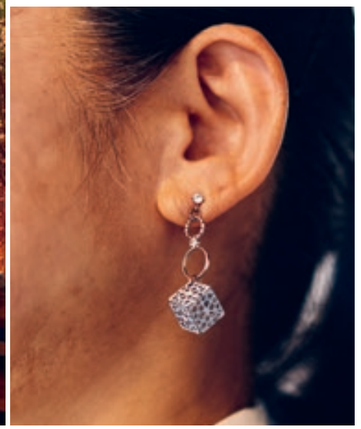
*Sustainability in Utsunomiya*

# AN IRONCLAD BUSINESS IDEA

IMAGES: Darlien Robertson







**High precision:** The traditional art form of Kumiko plays a central role in Japanese architecture. Typically used to decorate room partitions, the maasa brand has now extended it to costume jewelry.

Family-run metal fabricator UEKI Steel Material Company Ltd. will soon be celebrating its 60th anniversary. Located at Kawadamachi Street 804 in the Japanese city of Utsunomiya, the company embarked on a process of reinvention in 2020. "We've always worked with a wide variety of customers. Some work in the steel construction and sheet-metal fabrication industries, while others are in the auto and aviation sectors," says CEO Yuko Ueki. Their customers have all sorts of different requirements when it comes to geometries and materials – but one thing they all have in common is a steadily growing demand for top-notch precision. "This was the backdrop to our reinvention. The question was: how could we use our infrastructure and the expertise of our workforce to expand our product range?" says Ueki.

## An impressive tool

The first step toward creating new products came with the purchase of a new laser-cutting machine in 2018. Ueki was determined that it should be easy to use and maintain. "We wanted a machine that offered superior reliability and precision in steel processing, sheet-metal fabrication and tube cutting – and that's why we opted for the TruLaser 3030 fiber from TRUMPF. It sets the standard in the market," says Ueki.

Government subsidies reduced the initial costs by providing loan financing to cover not only the cost of the machine, but also new facilities on the company's premises – and the investment soon paid off. The machine arrived from TRUMPF Japan within six months, and TRUMPF technicians were on hand to help get it up and running. The 35 production workers were immediately impressed by the versatility, accuracy, and sheer power of the laser as a tool.

## Intricate ironwork

Determined to find an additional line of business, Ueki turned her attention to the traditional Japanese art form of Kanuma Kumiko. The skill of interconnecting delicate pieces of cedar and cypress wood into complex and ornate patterns is over a thousand years old. Its fame has spread far beyond Tochigi Prefecture to make it an integral part of modern Japanese architecture and home design. "One of our inspirations was the chain of Ritz-Carlton hotels in Japan," says Hideo Nakamura, director of business development at UEKI Steel Material. The interior design of many of the hotels is based on Kumiko elements reinforced with aluminum.

> " We want to turn **maasa into an international brand.** "
>
> Yuko Ueki, CEO, UEKI Steel Material

## The path toward sustainability

Producing aluminum is an energy-intensive process, however. This wasn't a good fit with Ueki's sustainability goals, so the decision was made to use regionally produced Japanese iron instead. The production process requires significantly less energy, and the resulting iron can easily be maintained in good condition and stored for an almost indefinite period. The journey from the initial business idea to the first respectable prototype of a Kumiko component took more than a year. But the superior quality of the results was well worth the wait. "The inspiration of traditional Kanuma Kumiko techniques is clearly visible. And our ability to successfully produce so many different geometries ultimately comes down to the outstanding precision of the TRUMPF laser system. The machine has brought us very close to meeting our goal of absolute symmetry," says Nakamura.

**Top-sellers:** Each lantern is unique, featuring its very own complex geometric pattern.

## Silhouettes and costume jewelry

UEKI Steel Material markets its innovative accessories under its very own "maasa" brand. Two of the family-run company's most successful products are candle stands made from steel plates and decorative light shades made from tubes. Each one is completely unique, and customers are happy to pay a premium price when they know their purchase is genuinely one of a kind. The "maasa" brand continues to move from strength to strength, and the team constantly finds new inspiration for its unusual interior creations thanks to its collaboration with renowned silhouette artists from the local area. "For example, we used 0.35-millimeter strips of iron to produce a completely innovative design of ornate candle holders," says Ueki proudly. Their range of products also includes elegant costume jewelry such as necklaces and earrings, all fabricated on the TRUMPF laser-cutting machine.

## On a growth path

Currently, UEKI's maasa products are exclusively available in Japan. But plans are already underway to tap into additional markets, and the company plans to start developing an online store in spring 2023. "We would like to market our products to private customers as well as gain a foothold in the B2B sector and build maasa's reputation among architects and designers," says Ueki. Ultimately, she hopes to turn maasa into an international brand and to start selling their one-of-a-kind creations in other countries. The team already has plans to expand their portfolio with elements and motifs of Japanese calligraphy.

"We're looking at different options to boost our manufacturing capacity. Either we'll collaborate with a long-standing customer who also uses TRUMPF machinery, or we'll simply invest in another laser-cutting machine ourselves," says Ueki. Whatever option they choose, TRUMPF technology looks set to play an important role in the company's ongoing expansion.

> " Our ability to produce **so many different geometries** ultimately comes down to the **precision of the TRUMPF laser machine.** "
>
> Hideo Nakamura, director of business development, UEKI Steel Material


IMAGES: Darien Robertson

**Expansion:** Yuko Ueki (right) and Hideo Nakamura are keen to acquire a second laser machine from TRUMPF.

02

*A closer look:*

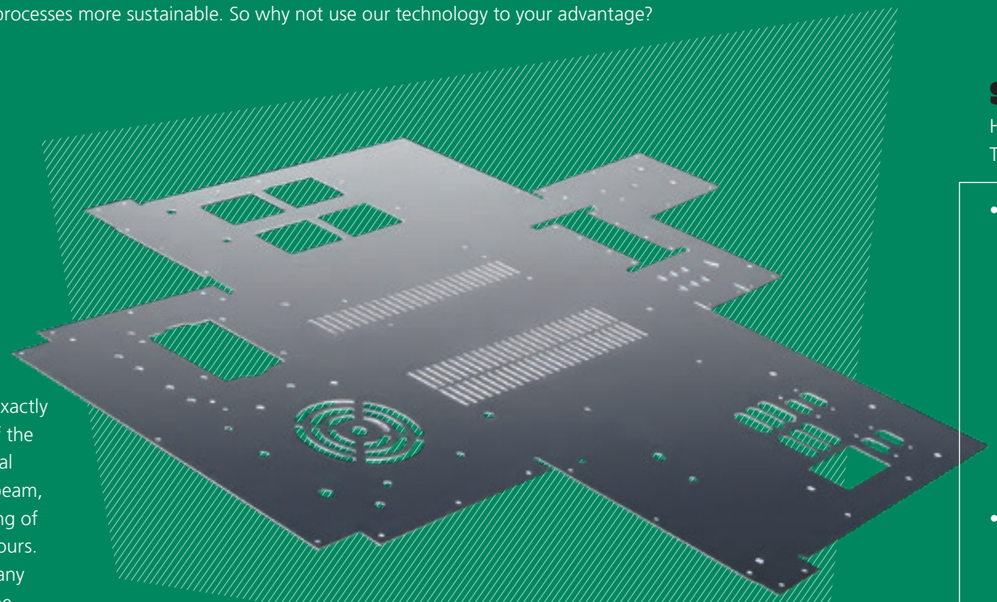
# Precision laser cutting

The **UEKI Steel Material Company** in Japan started a new line of business with a laser-cutting machine from TRUMPF. Since then, its 'maasa' brand has gone from strength to strength in the market for iron-based furniture, jewelry and artworks. More and more manufacturing-technology experts are discovering the **versatility and flexibility** of the laser as a tool. They are learning to appreciate how it can help them cut costs and reduce energy use on the shop floor.

*In brief*

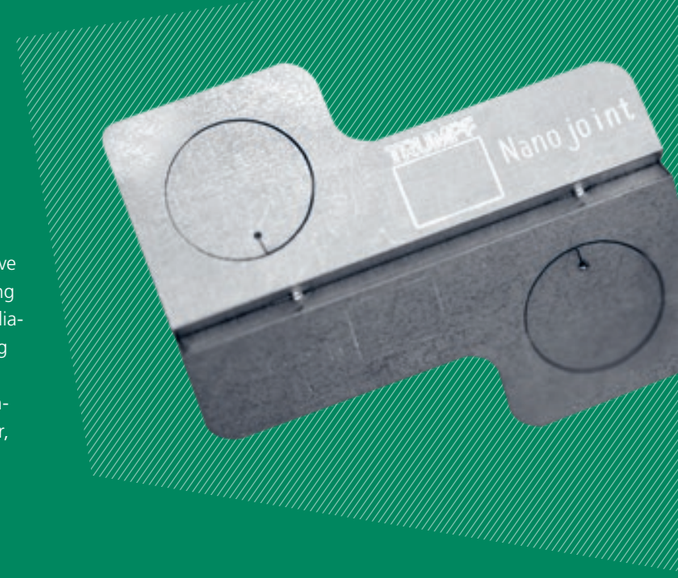
# Cut and save

TRUMPF lasers are there for you through thick and thin. Whatever type of material you're cutting, TruLaser machines such as the 3000 series can handle a variety of thicknesses while producing consistently high quality. New solutions make processes more sustainable. So why not use our technology to your advantage?



## Cut any contours

The bundled laser beam focuses its heat exactly where you need it. That means the rest of the workpiece is exposed to little or no thermal stress. With a kerf barely wider than the beam, the laser executes smooth, burr-free cutting of even the most complex and intricate contours. In most jobs, this eliminates the need for any time-consuming post-processing work. The flexibility of this approach makes it suitable for high-mix, low-volume manufacturing as well as for prototyping.




## Reliable process

Nanojoints are a reliable, resource-efficient solution for parts fabrication: unlike microjoints, nanojoints only leave the part connected to the scrap skeleton by tiny retaining tabs at the bottom of the kerf. Nanojoints guarantee reliable processing by preventing parts from tilting or tipping while cutting is in progress, and they make it easier to remove parts from the scrap skeleton once cutting is finished. What's more, parts can be nested closer together, so workers can fit more on each sheet.

## Sustainability

High-precision machine tools and efficient fabrication processes not only increase the quality of sheet-metal processing. They also improve sustainability. To be precise:

- An efficient machine must be configured to work without the need for manual calibration. One way to achieve this is by using TRUMPF's Highspeed Eco cutting function, which is designed for nitrogen cutting with solid-state lasers. Depending on sheet thickness, this function can increase throughput by up to 100 percent without increasing laser power. At the same time, Highspeed Eco reduces cutting-gas consumption by 70 percent and lowers cutting-gas pressure by up to 60 percent, which means it uses less power.
- High-precision cutting optimizes material usage: TRUMPF laser-cutting machines equipped with the Drop & Cut feature can reduce the consumption of raw material by up to 14 percent. This feature offers a quick and easy way to create additional parts from remainder sheets.
- TwinLine is another useful technology that TRUMPF offers for its laser and punch-laser machines: parts with simple outer contours can be processed with a single cut common to both parts. This method eliminates the scrap skeleton, thereby saving material. It also speeds up processing, which reduces overall use of energy and cutting gas.
- CoolLine nozzles maximize sheet usage by directing a fine spray of water at the metal to keep it cool. As well as saving water, this feature enables very narrow web widths and intricate contours in thick sheets. It achieves high-quality results while reducing scrap from cutting by up to 25 percent.
- TRUMPF Eco Cooler uses pure water as a coolant. It uses up to 80 percent less energy to keep things cool during laser cutting and completely eliminates the need for harmful chemical refrigerants such as fluorinated gases. The resulting energy savings can reduce carbon emissions by an average of 15 metric tons a year. And by removing F-gases from the process, this innovative approach shaves a further 12 metric tons off its carbon footprint. The Eco Cooler feature is available for all TRUMPF laser-cutting machines in the 1000 to 5000 series.

## Diverse materials

The laser achieves high-quality cutting results for almost all standard sheet metals used in industry – from mild steel, aluminum and stainless steel to brass, copper and titanium. This flexible tool can handle material thicknesses from 0.5 to more than 30 millimeters.

**Up to**

**80 %**

**savings in energy**

## Customer details

**UEKI Steel Material Co., Ltd.**
**Standort:**
804, Kawadamachi, Utsunomiya, Tochigi,
321-0111 – Japan
Phone: +81 028 633-5225
www.uekikohzai.co.jp

## Machinery

- TruLaser 3030 fiber

03
GERMANY

*Sustainability in Neubrandenburg*

# HEY ROBOT, HERE'S YOUR NEXT JOB!

IMAGES: TRUMPF

Weber Maschinenbau's automation project almost came to nothing. The manufacturer of slicing and packaging machines for the food-processing industry was struggling to find a solution for its **low-volume bending** needs. But then the company joined forces with TRUMPF to develop a **robot gripper.** The project was back on track – and it proved to be the perfect way to combat the shortage of skilled workers.


Weber Maschinenbau produces innovative, high-precision line and automation solutions for slicing and packaging deli products. Weber machines portion and pack cheese, sausage and cold meats to the nearest gram, ensuring they reach the supermarket shelves without any loss of freshness. Employing some 1,500 people, Weber is one of the most important equipment suppliers in the food-processing industry. Over the past four decades, it has transformed itself from a small meat-processing business based in the German town of Breitenbach to the world market-leader with a total of 22 locations in 18 countries.

## A tricky start

One of these locations is Neubrandenburg, the third largest city in the state of Mecklenburg-Vorpommern, which has been the company's main production site since 1999. Here, around a hundred sheet metalworkers make machine parts out of stainless steel. The company buys in very little; in fact, 85 percent of all the parts are produced in-house. "We could actually sell far more than we can produce," says Peter Schulz, who heads up the metal-fabrication shop. He is pleased with the steady rise in demand, though a strong order book is only part of the picture

in a company that puts equal emphasis on the health and satisfaction of its workforce. “We’ve always taken this approach, but the shortage of skilled workers makes it more important than ever. That’s why we want to harness automation to ease the burden on our employees. We want to improve their conditions by making their work less tiring and monotonous.”

Around three years ago, they decided the best place to start would be a fully automated bending cell. Production manager Mike Herrmann and his colleague Peter Schulz soon set their sights on a TruBend Cell 5000 from TRUMPF. Combined with the ToolMaster tool changer and the BendMaster bending robot, they figured it would increase throughput while giving skilled workers more flexibility in their daily work. But Herrmann and Schulz were uncertain whether to place the order. “We normally produce very small batches, typically just two or three parts,” says Schulz. So how could they be sure the solution would work for such low volumes?

## Pushing the boundaries of automation

It was clear that processing such a mix of parts in an automated bending system would require a wide variety of grippers. Each of


**Efficient:** The new suction-cup gripper is attached to the BendMaster’s robot arm. Machine operators can make any necessary adjustments within the system itself, which saves time when setting up the bending cell.

**Development partnership:** The design of the new TRUMPF multigripper offers Weber Maschinenbau real added value. “We had a good feeling right from the start,” says Peter Schulz, who heads up sheet-metal processing at the Neubrandenburg plant

these would need to be individually designed and built by one of Weber’s shop workers, a painstaking task that would require serious amounts of time and expertise. What’s more, TRUMPF’s TruBend Cell offers only twelve spots to store the various grippers – too few to give Weber any kind of meaningful boost in productivity.

## Flexible joints

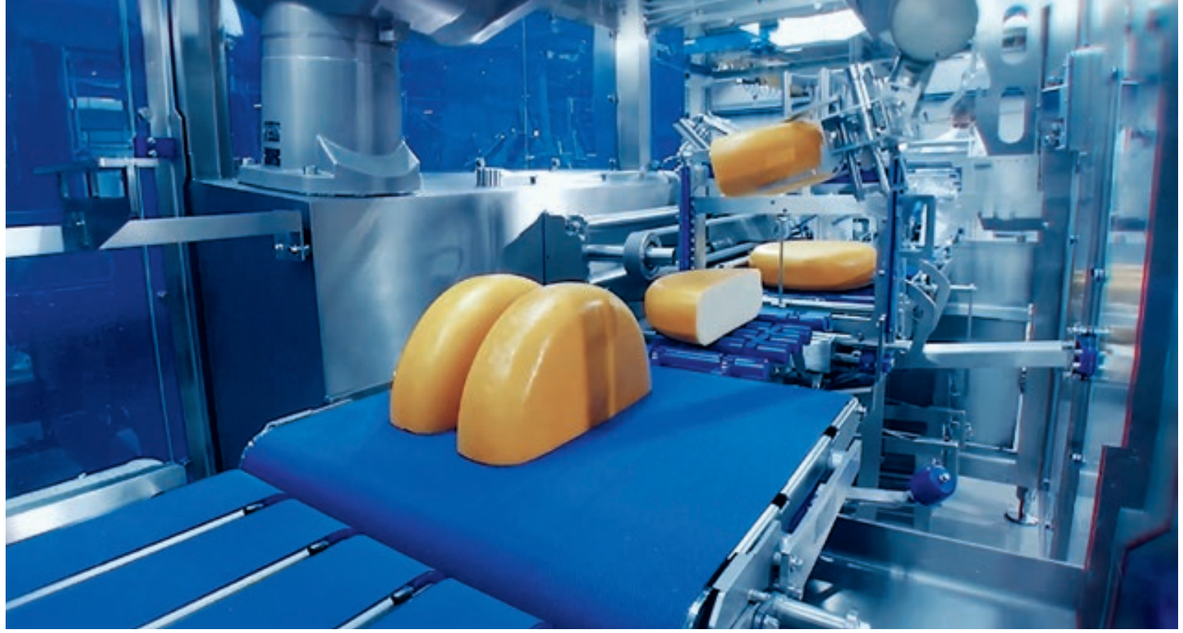
“The situation was deadlocked, with no clear path to a solution,” recalls TRUMPF sales representative Bernd Jähner. He visited the company’s plant in Neubrandenburg to assess how things stood, and he soon saw that none of TRUMPF’s standard solutions would work. But then he remembered a semi-secret project run by some of his Austrian colleagues, who were developing a new multigripper that could be mounted on the BendMaster robot. They hoped to give it arms and joints that could be adjusted quickly and flexibly, thereby making it easier to adapt the robot to new parts. The result would be a TruBend Cell 5000 that could be automatically configured for a wide range of parts.

## Joint efforts speed up development

It wasn’t long before Mike Herrmann and Peter Schulz were on the road to Upper Austria. Their destination was the TRUMPF site in the municipality of Pasching, where the high-tech company has established a center of expertise in multigrippers. Herrmann and Schulz were keen to get an exclusive insight into how the new multigripper had been developed. And when they saw it a few hours later, they immediately realized what it could mean for Weber. To accelerate the development process, they offered to invest in the TruBend Cell 5000 as part of a development partnership.

IMAGES: TRUMPF





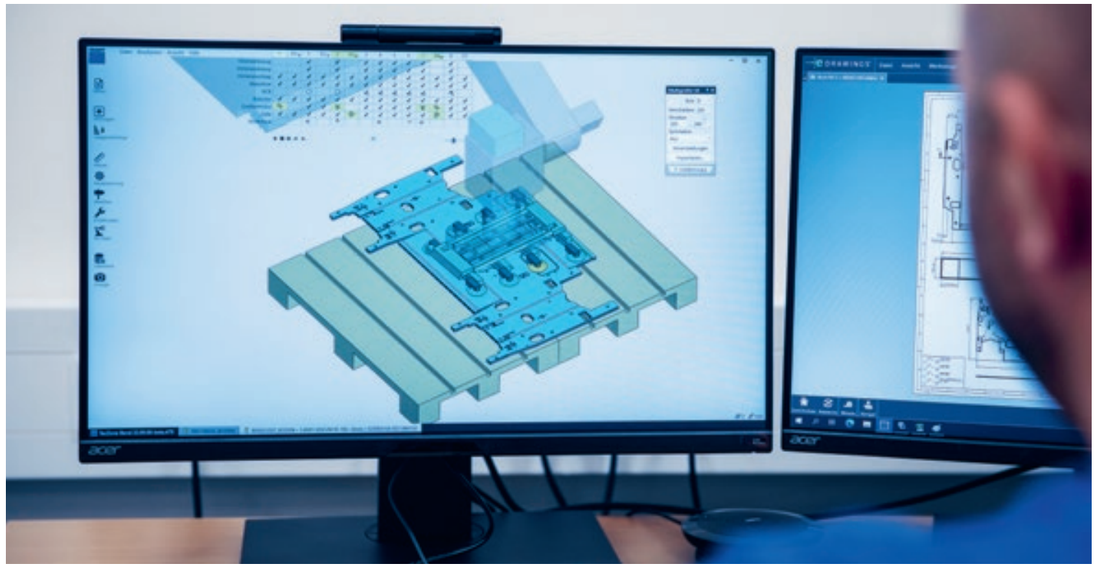
**Broad range:** The food-processing industry uses Weber’s slicing and packaging machines to slice, portion and pack sausage, cold meats, cheese and other deli products in quantities accurate to the nearest gram. Using stainless steel as a raw material made it even harder to find a variable gripper that would do the job

> “ Weber offers its customers **customized automation solutions.** And that’s exactly what TRUMPF did for us with the development of the multigripper. That’s what I call **teamwork!** ”
>
> Mike Herrmann, production manager at Weber Maschinenbau

## Great partners

From here, things went from strength to strength. Weber supplied the TRUMPF engineers with a broad assortment of sample parts and carried out numerous analyses of component sizes. They carefully examined the results of every type of bending part, studying everything from heavy components to complex geometries. Machine operators in Neubrandenburg tested the medium-format multigripper on real components and gave valuable insights on how to improve it, working with functional prototypes to come up with feedback that wouldn’t normally be available until pre-series. Month by month, the experts on both sides began to trust each other even more, communicating as equals and openly sharing their experiences, both good and bad – almost as if they belonged to the same company.

**A gripping story:** Equipped with the multigripper, the BendMaster bending robot has automated the bending process at Weber’s main plant in Neubrandenburg.

**Welcome assistance:** Before the gripper gets to work, the machine operator uses the TRUMPF offline programming system to create a setup plan. It only takes a few clicks on the simulated part model to specify where the suction cups should be placed. Any suction cups that are not needed can simply be deactivated.

## Ready for action in minutes

Weber and TRUMPF presented the results of their development partnership to the public for the first time at EuroBLECH 2022. Visitors to the world's leading trade show for sheet-metal processing saw two versions of the multigripper in action: small and medium. The larger variant is attached directly to the TruBend bending robot and has eight suction cups, each of which can be controlled individually. Using the TRUMPF offline programming system, it takes the machine operator no more than a few minutes to create a setup plan and just a few clicks to specify on a simulated model where exactly the suction cups should be positioned. Any suction cups that are not needed can simply be deactivated.

## Sustainable solution

The multigripper offers particular benefits for low-volume production, where Weber Maschinenbau can keep the number of grippers to a minimum. "It also eliminates the need for our workers to load heavy parts, so they're available to work on other machines," says production manager Mike Herrmann. Overall, the bending process has become faster and more efficient, thereby boosting Weber's sustainability credentials. The company can now get by with far fewer grippers, which means it is using fewer material resources, and the new system has also markedly improved working conditions on the shop floor. "We put a lot of time into this project and took a certain amount of risk," says Schulz. "But we had a good feeling right from the start, because we felt that the TRUMPF experts were on the same wavelength. The surest way to achieve success is to bring together people who are eager to try something new and ready to work for it."

**A helping hand:** Weber machine operator Enrico Spitzer enjoys working with the multigripper. Now that he no longer has to load parts into the machine, he has more time for other tasks.

IMAGES: TRUMPF

03

*A closer look:*

# Nothing escapes the multigripper

**Weber Maschinenbau GmbH** develops and manufactures slicing and packaging machines for the food-processing industry. In this **low-volume, high-mix production environment,** conventional automation approaches often fail to hit the target. Fortunately, TRUMPF's **multigripper** proved to be the perfect solution for meeting Weber's automated bending challenges.

*In brief*

# One for (almost) all

The innovative suction-cup multigripper from TRUMPF
drastically reduces setup times and increases productivity in automated bending.
What's more, it's quicker and easier to set up than conventional systems.

## Innovation

Up to 12 suction-cup grippers can be mounted on the arm of the TRUMPF BendMaster robot. With their help, the robot picks up sheets from the stack, moves them into the correct position in the bending cell, and places the finished parts on the unloading stack. This solution counters the notion that producing sheet-metal parts in low volumes is simply too expensive. Previously, workers would have to adjust the gripper for each new workpiece, leading to lower productivity and bottlenecks due to the shortage of skilled workers. But the new multigripper from TRUMPF is different. It can be adjusted to handle a new workpiece in a matter of minutes without requiring any special expertise on the part of the operator.

## Benefits

The multigripper is the perfect solution for sheet-metal fabricators who might be struggling to hire enough skilled workers and who are looking for a profitable, automated method of low-volume production.

**Advantages:**

- Eliminates need to have multiple different grippers in stock
- Reduces setup time, increases efficiency
- Easy-to-use: quick and easy manual setup of gripper arms
- Produces a wide range of parts
- Eliminates the time-consuming task of designing and building individual grippers and leaves more time for other jobs

## Variants

Two versions of the gripper are available: the small (S) variant can transport workpieces up to six kilograms in weight; the medium (M) variant can handle workpieces up to 52 kilograms. Between them, these two variants cover many of the parts that are typically produced. The gripper can be incorporated in the TruBend Cell 5000

## Small

The S-variant features a swivel joint that allows the gripper to rotate a workpiece through 180 degrees, offering a sufficient degree of freedom to fabricate parts without regripping. This leads to shorter cycle times than those of conventional gripper systems.

## Medium

With the M-variant, each of the eight vacuum cups can be individually adjusted and correctly aligned using an Allen key. Minimal expertise is required to perform this task. Moreover, the M-variant multigripper allows each of the vacuum cups to be individually activated. This makes it easy to handle even the most complex geometries.

## Details

The multigripper is suitable for all companies that operate a fully automated bending cell.

**Key features:**

- Gripper dimensions of small (S) multigripper: 140 by 120 millimeters to 240 by 240 millimeters
- Gripper dimensions of medium (M) multigripper: 495 by 310 millimeters to 1,105 by 580 millimeters
- Compatible with different types of vacuum cup
- S multigripper: fully dynamic handling with 6-kilogram part weight, provided that all cups are fitted as Schmalz SAXM 60 bell suction cups
- M multigripper: fully dynamic handling with 52-kilogram part weight, provided that all cups are fitted as Schmalz SAXM 115 bell suction cups
- Production of simple nesting formats without regripping thanks to 180-degree rotary unit for optimized cycle times (S)
- Individual suction cup activation (M)

## Customer details

**Weber Maschinenbau GmbH**
**Address:**
Weber Maschinenbau GmbH
Feldmark 11
17034 Neubrandenburg, Germany
Phone: +49 395 45060
Email: info@weberweb.com
www.weberweb.com

## Machinery

- TruBend Cell 5000 bending cell with automatic ToolMaster tool changer
- BendMaster bending robot
- LiftMaster Compact

04

GERMANY

*Sustainability in Ditzingen*

# WORKING FOR A GREENER FACTORY

IMAGES: Johannes Wosilat

**Susanne Hartlieb** has headed up **sustainability** since August 2018. So does she really believe its possible for a company that consumes the same amount of energy as a small town to slash its carbon emissions by more than half? We visited the company's headquarters in Ditzingen, where this ambitious plan is already taking shape.

Susanne Hartlieb strides purposefully across the top level of the TRUMPF parking garage. "Our employees have access to 86 electric-vehicle charging points on this level, with a total output of some 1,000 kilowatts. That's equivalent to the energy it takes to power 10,000 televisions. Our goal is to make it easy for employees to charge their cars while they're at work," she says. When TRUMPF's parking garage – with its unique undulating, slatted facade – opened in 2019, the media heralded level 8/9 as the biggest electric charging station in southern Germany.

But that was only the start: "Our field service, sales, and service teams are currently exploring which trunk sizes, ranges, and EV charging methods are the best fit for their day-to-day work. The goal is to achieve a 50-percent reduction in our vehicle fleet's carbon emissions by 2030 as compared to fiscal 2018/2019," says Hartlieb. She emphasizes that this will be another important step toward climate neutrality, which TRUMPF first achieved on its balance sheet in 2020.

**Ms. Sustainability:** People's willingness to tackle sustainability issues is at an all-time high. "We have a limited window of time," says Susanne Hartlieb. "So we need to act now!"

> " Sustainability and **responsible stewardship** have always been **important values** at TRUMPF – we owe it to future generations. "
>
> Nicola Leibinger-Kammüller, president and chairwoman of the TRUMPF Group Managing Board

**Smart factory:** TRUMPF offers numerous technologies that help improve manufacturing companies' environmental footprints.

## Strategy to eliminate carbon emissions

TRUMPF will invest 80 million euros over the next seven years in reducing its climate footprint. Instead of continuing to rely on the carbon offset certificates that are so common in the industry, the high-tech company is determined to drive its emissions as low as possible. But how realistic is it for a company with some 17,000 employees to reduce carbon emissions from energy use by more than half? These emission-reduction targets have already been certified by the internationally recognized Science Based Target initiative (SBTi), a collaboration between the UN, WWF and businesses. "They're certainly ambitious, so that's all the more reason for TRUMPF to step up to the plate! We've set demanding targets to reduce our products' energy use. And shrinking the carbon footprint of the materials we use will be equally challenging," says Hartlieb. But she notes that project teams throughout the company have already come up with ideas and drawn up binding roadmaps. "Sustainability is a major project that requires everyone's contributions and involvement," she says. Fortunately, she adds, people's willingness to tackle sustainability issues is at an all-time high.

IMAGES: Johannes Wosilat



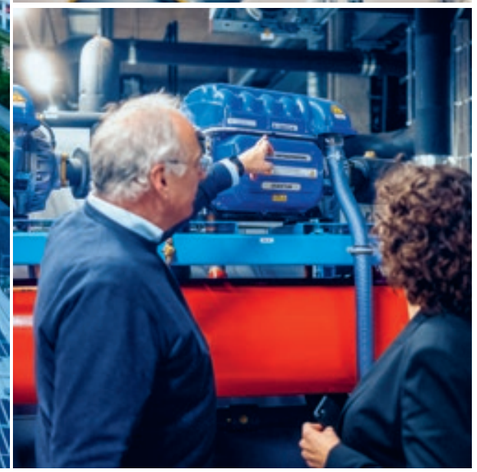
> " Humanity has a **limited window of opportunity** between now and 2030. We need to **act now.** "
>
> Susanne Hartlieb, head of sustainability, TRUMPF Group

## Energy master plan

Our next stop after the parking garage is production area 4, where Susanne Hartlieb shows us the three brand-new production halls with their offices, technical areas and warehouse facilities. This new site covers 45,000 square meters, or more than six soccer pitches, and it will soon be home to a more environmentally friendly incarnation of the company's laser division. "These kinds of projects require an energy master plan right from the start. For example, the engineers configure the flows of heat and cold to create an optimized network. Everything is aimed at saving energy, from process cooling on the shop floor to intelligent building services and energy monitoring," says Hartlieb, as we head down a flight of stairs.

**Blueprint:** The right combination of heating and cooling applications can reduce energy use.

Two floors below street level, she opens a door to show us a basement full of ducts, pipes, and generators. This is the beating heart of the new facilities, brimming with heating, ventilation, and air-conditioning technology. "This could be the blueprint for all our other locations. For example, we use a centralised refrigeration system and harness its waste heat to heat up the cleaning system for laser components." Measures like this reduce the amount of energy that TRUMPF uses for heating and cooling applications by around 70 percent. That, in turn, saves around 4,500 metric tons of carbon emissions a year – not to mention the cost savings.



**Power from the rooftops:** TRUMPF is steadily expanding its in-house generation of renewable energy through sources such as large photovoltaic systems.

## More growth, fewer emissions

TRUMPF's headquarters in Ditzingen account for a good half of its energy consumption. Using fiscal 2018/19 as a benchmark, the company aims to steadily reduce its energy consumption year by year between now and 2030. The planned measures will lead to a 1.5-percent drop in electricity use and a three-percent drop in natural gas and heating oil consumption. "We're improving the energy efficiency of the buildings, systems, and processes at all our locations," says Hartlieb. And those efforts look set to pay off: five years ago, TRUMPF's locations were emitting a good 50,000 metric tons of carbon a year, but the company is now hoping to half this figure by 2030.

## Energy from the rooftops

This is one reason why TRUMPF has spent years expanding its in-house generation of renewable energy. Hartlieb points to the roof: "As you would expect, our new production halls in Ditzingen have solar panels on the rooftops. We're talking about 9,500 square meters of solar panels in production area 4 alone, which is almost as big as 1.5 soccer pitches. The PV plant supplies 1.15 gigawatt-hours of electricity a year. That's equivalent to the energy requirements of more than 280 four-person households over the course of an entire year," says Hartlieb. By 2027, the company intends to install solar panels on every suitable rooftop of the buildings it owns. This will produce an output of between 15 and 18 megawatt-peak (MWp) – some ten percent of the company's total energy use. The rest will come from renewable sources. TRUMPF already purchases green power from the newest unsubsidized plants available. In future, it also hopes to buy energy directly from wind-farm operators.

## A smart factory is a green factory

Hartlieb's tour has now brought us to TRUMPF's smart factory, where the company uses its own machines to fabricate sheet-metal parts for in-house use, for example in the housings for its bending machines. Standing next to a laser-cutting machine, Hartlieb tells us about nanojoints, Drop and Cut, Active Speed Control, TwinLine, and a whole host of other technical features that will save energy and materials. "TRUMPF already has a lot of technologies that are designed to save materials and energy and to help minimize a factory's environmental footprint. The key to improving sustainability is to make data transparent. For example, digital connectivity opens the door to predictive maintenance and helps to avoid downtime. We help customers boost productivity and protect the environment," she says.

IMAGES: Johannes Wosilat, TRUMPF



## Leaving a legacy

"We have to rise to this challenge," she says emphatically. "Humanity has a limited window of opportunity between now and 2030, so we need to act now. Ultimately, we have to ask ourselves what legacy we want to leave for future generations." And, with that parting thought, she unlocks her bike, bids us farewell, and heads home.

**Energy master plan:** TRUMPF's major construction projects rely on intelligent building services. "Everything is aimed at saving energy," says Susanne Hartlieb.

**Electric charging station:** Employees in Ditzingen have access to 86 charge points in the company's own parking garage. TRUMPF is also electrifying its vehicle fleet.

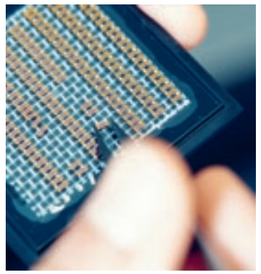
BIZ+

# SHORT CUTS

*Fascinating facts and exciting innovations*

## Strong fiscal year

The TRUMPF Group finished fiscal 2021/22 with the highest sales revenues in the company's history: **sales grew by 20.5 percent to 4.2 billion euros,** while order intake rose by **42.1 percent to 5.6 billion euros.** Earnings before interest and taxes **(EBIT) increased by 26.8 percent** to 468 million euros. TRUMPF was able to stabilize earnings thanks to its strong sales growth, particularly in the EUV business unit, as well as by cutting non-personnel costs. As a result, TRUMPF achieved an **EBIT margin of 11.1 percent.** Thanks to the creation of new jobs, mainly in the growth areas of EUV and Electronics, the company's global headcount reached 16,554, an increase of nearly 2,000 employees.



## Investment in quantum-technology start-up

TRUMPF Venture has announced a single-digit million-euro investment in Spanish start-up Quside. The company's flagship product is a **high-performance random number generator** embedded in a photonic chip. The device enables the encryption of messages that even the most powerful quantum computers cannot decrypt. It could also be used, for example, to simulate weather forecasts or risk analyses in the financial sector faster and more energy-efficiently than before. Quside is already seeing significant demand from industries with high security requirements, and it also hopes to expand into the consumer market. The global market in random number generators is expected to be worth between seven and ten billion euros by 2026.

## Smart logistics partnership for the factory of the future

TRUMPF and STOPA, one of the leading manufacturers of **automated storage systems,** intend to work even closer together in the future. STOPA's automated storage solutions are used in a variety of settings, including TRUMPF's smart-factory solutions. STOPA systems enable customers to load and unload their machines automatically and to significantly reduce non-productive time by connecting machines to form logistics networks. Till Küppers, CEO of TRUMPF Machine Tools, sees important benefits ahead: "Our goal is to forge a solid basis for embarking on the next stage of our successful journey with STOPA, especially the ongoing **expansion of our smart-factory solutions.** Partnering with STOPA will enable us to offer our customers an even more comprehensive range of **efficient, sustainable, and productivity-enhancing** solutions in the future." STOPA storage systems are versatile enough to meet the growing challenges of modern smart-factory environments and can also be seamlessly integrated into existing factories. Their benefits come to the fore when combined with TRUMPF's new Oseon software, which is designed to make production planning and control even simpler, up to and including fully automated operation of the sheet-metal fabrication process.

IMAGES: TRUMPF, iStock / martin-dm

## Wrist-worn glucose sensor

TRUMPF Photonic Components and Danish medical device company RSP Systems are aiming to make life easier for the approximately 540 million adults worldwide who live with diabetes. Instead of having to prick their finger with a needle or wear an implant, people with diabetes will have the option of wearing a **device on their wrist that will read their blood glucose using a mini-laser.** The two companies have partnered to create an innovative sensor that will allow RSP's groundbreaking, non-invasive technology to be miniaturized to a wearable format. TRUMPF Photonic Components will contribute its market-leading expertise in the miniature vertical cavity surface-emitting lasers (VCSELs) required for this application.

## TRUMPF joins Quantum Technology & Application Consortium

"TRUMPF's decision to join QUTAC is great news, and we're delighted to welcome yet another highly innovative, high-tech German company to our ranks. We stand to be enriched by their experience in applying **quantum computing to key areas such as machine tools, connected manufacturing, and laser technology",** says Jörn Messner, Chairman of the QUTAC Executive Committee and CEO of Lufthansa Industry Solutions. TRUMPF will join forces with the consortium's twelve existing members to develop quantum computing for industrial use. TRUMPF will initially participate in QUTAC's Production & Logistics and Quantum Systems working groups. Their goal will be to develop a series of quantum-computing applications, specifically focusing on optimizing capacity utilization on the shop floor, processing images using machine learning, and harnessing quantum computing to accelerate machine learning. TRUMPF is also researching how to use quantum computing to simulate heat input during laser cutting and how it can improve the automation of manufacturing systems.

## Field stoves for Ukraine

As the bitter cold of winter set in, life became even harder for everyone in Ukraine. Meppen-based **KUIPERS technologies GmbH** teamed up with an aid organization for a special project designed to bring a little warmth to the ice-cold front. Over the course of just three weeks, the German company designed and produced 760 field stoves. By a stroke of good fortune, Kuipers had commissioned its new TruBend Center 7020 panel bender from TRUMPF – including robot automation – just a few weeks earlier. This system enables automated bending of parts with a box height of up to 350 millimeters. Kuipers' engineers designed the stove with a 333-millimeter combustion chamber. Filled with wood, this gives off heat that can also be used for cooking. The field stoves were shipped to the war zone in late January.

# Quality on autopilot: digitalizing a family-run business



**Next step in digitalization:** CEO Philipp Höse plans to restructure the company's booking and storage systems.

**Family-run company Metallbau Höse has posted record-breaking sales every year for three straight years. Based in the Wallau district of the German town of Biedenkopf, it pulled off the same feat last year, once again increasing its headcount and sales. Despite challenging market conditions, the company is firmly on a growth path – and cutting-edge machinery lies at the heart of its success. TRUe interviewed managing directors Philipp Höse and his brother-in-law Martin Marburger to discover how they combine growth with sustainability.**

**More solar power:** Managing director Martin Marburger aims to expand Metallbau Höse's photovoltaic system to 240 kilowatt-peak this year.

***Mr. Höse, almost all the products you make come in contact with a TRUMPF system at least once during the manufacturing process. Which machines and technologies have you invested in recently?***

**Philipp Höse:** It's true that TRUMPF technology supports almost every stage of our manufacturing process. We took delivery of a TruBend Cell 7000 in early 2022, which was a dream come true! Its one of the fastest bending cells in the world, so we're tremendously proud to have it. The benefits include short throughput times on the shop floor, especially for small parts, and a robot arm that automatically sets up the right tools around the clock. We hardly have to even think about it anymore – it's like having quality on autopilot!

***What are you planning next?***

**Philipp Höse:** We ordered a TruLaser Weld 1000 from TRUMPF in December 2022. It's due to be delivered in summer 2023, and we're hoping this new laser-welding cell will automate the most time-intensive parts of the process. We're also thinking about replacing our $CO_2$ laser and punch-laser machines with even more economical systems based on fiber technology.

***You spent years using TRUMPF's TruTops Fab software, which was incorporated into Oseon last year. What other plans do you have for digitalizing your sheet-metal fab operations***

**Martin Marburger:** We use Oseon to synchronize our material flow with the production plan, so we can respond quickly and flexibly to spontaneous jobs. The automated process ensures that material always gets where it's needed. The next step on our digitalization journey is to restructure our booking and storage strategy. For the past nine months or so, we've been a test customer for the planning board. Now we're looking to further improve our transparency and capacity utilization by combining the planning board with Oseon's new Fabrication module and a traceability strategy for every part on the shop floor. This approach should also reduce unnecessary search and idle times.

**Philipp Höse:** We also expect to make the entire order sequence even more transparent. By 2024, our goal is to go completely paperless and to make sure that all orders are 100-percent traceable. TRUMPF is a great partner because they're ready to respond to all our needs.

***Sustainability is clearly at the top of Metallbau Höse's agenda. What specific steps have you taken?***

**Martin Marburger:** Our energy-efficiency drive has made various improvements, including replacing the old shop-floor lighting with LEDs. This year, we'll be expanding our existing photovoltaic system to reach an installed capacity of some 240 kilowatt-peak, most of which we use ourselves. We cover 100 percent of our remaining needs with green energy. We're also planning to equip our new building with solar panels to move even closer to our vision of self-sufficient production. And fiber technology will be another key component of our efforts to significantly improve our carbon footprint.

***Your brand promise is "passion for sheet-metal". What are the most tangible examples of that within the company?***

**Martin Marburger:** That passion is clear from the commitment shown by our employees every single day. They put so much fun and dedication into their work – it's all about participation, coming up with new ideas, and actively driving projects forward.

**Philipp Höse:** Our business has maintained a real family feel over the past 44 years – and that makes our work together really special. We've experienced tremendous growth in recent years, but we're determined to keep this positive working environment going. It's something we have to focus on every day, but it's definitely worth it!


**100% green electricity**

**240 kWp photovoltaic system**

**Martin Marburger and Philipp Höse use Oseon software to plan and control their manufacturing operations. The next step is to restructure their booking and storage strategy.**

*Check it out!*

# NEW LEASE OF LIFE FOR PRE-OWNED MACHINES

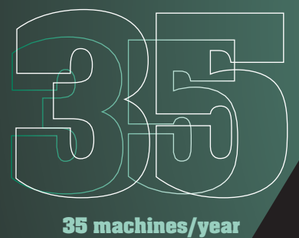
Whether books, clothes, or cars, eco-conscious consumers are increasingly scouting out **second-hand** options. The same applies to pre-owned production machinery, which gets a second lease of life at the TRUMPF Resale Center. Refurbished with original parts, the machines are put back on the market in an **"almost new" condition.** Customers can benefit from the latest technologies while helping to save resources.

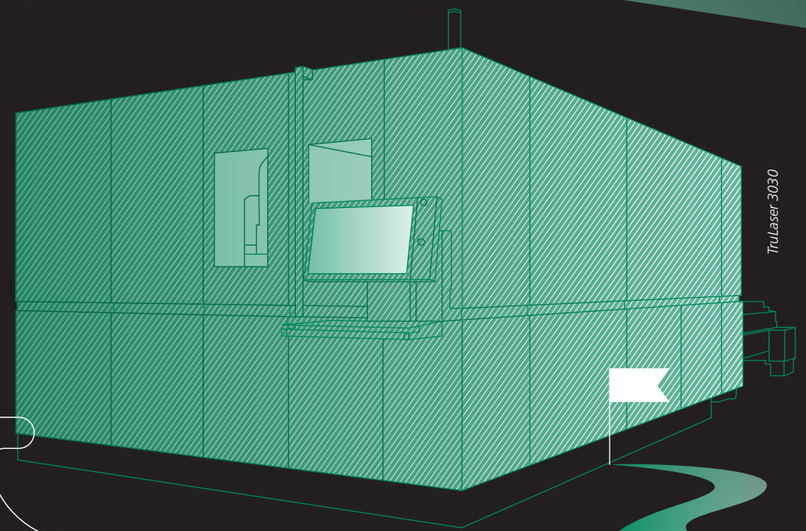
The TRUMPF Resale Center stands behind the quality of its refurbished pre-owned machines by offering a **warranty of at least six months** on every machine.

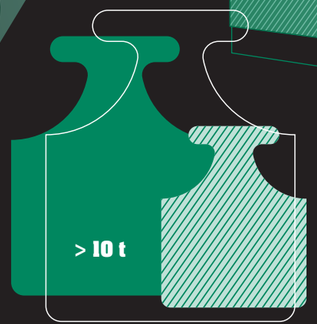
TRUMPF has installed over **2,000 pre-owned machines** at customer sites worldwide.



The **8 employees** at the TRUMPF remanufacturing plant in the Netherlands refurbish some **35 machines** a year.





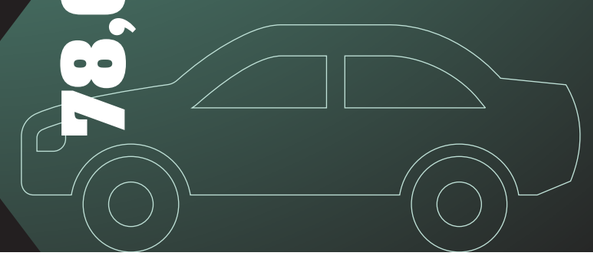
Sheet-metal fabricators that opt for pre-owned machines instead of new ones can save money and reduce carbon emissions. By sidestepping the energy-intensive production of raw steel for the machine body and eliminating the other downstream manufacturing processes, buyers of pre-owned machines can save **some 20 metric tons of $CO_2$.**

According to a TRUMPF survey, **85 percent** of refurbished machines continue to operate reliably for **at least ten years** after purchase by the new owner.

**85%**

The production of one metric ton of steel emits approx. 1.4 metric tons of $CO_2$, depending on the method used. Sheet-metal processing machines often weigh **more than ten metric tons.** Eco-conscious companies should therefore endeavor to use machines for their entire lifetime.

Let's take an example:
Machines like the TruLaser 3030 weigh about twelve metric tons. Just by recycling the machine body, companies can save some 16 metric tons of $CO_2$. That's equivalent to driving **over 78,000 kilometers** in a mid-range car.



05
FUTURE

*Biological material research*

# CAN MUSHROOMS REPLACE PLASTIC?

IMAGES: Unsplash / Evocative Design



Mushrooms are a common topping on pizzas – but could they really offer a viable **alternative for packaging materials** and electronics? Researchers are coming up with all sorts of fungus-based innovations as they search for **sustainable solutions** for everything from furniture to printed circuit boards. Zero waste is the goal.

> “ **Mycelium technology** has come a long way since 2007. Consumers are finally starting to show **real interest** in mushrooms as a packaging material. ”
>
> Gavin McIntyre, co-founder of Evocative Designn

**Pioneering work:** Gavin McIntyre (left) and Eben Bayer, the founders of Evocative Design, transform mushrooms into sustainable packaging.

However unlikely it may sound, mushrooms are increasingly being used as a substitute for expanded polystyrene, plastic packaging, electronic components, and the composites used in medical devices. Scientists around the world agree that fungi offer huge potential to replace all sorts of environmentally harmful materials. Mushroom-based technology could even offer a substitute for polymers, the large-molecule chemical compounds that are notoriously difficult to recycle. These exciting developments could play an important role in the much-needed sustainability transition.

## Polystyrene is a climate killer

Expanded polystyrene, or EPS, may be useful, but it’s bad for the environment. It consists of 98 percent air and two percent polystyrene, a plastic made from crude oil that requires a lot of energy to produce. Some five liters of crude oil are needed to produce one kilogram of EPS. And, to make things worse, polystyrene takes over 10,000 years to decompose in the environment.

## A sustainable and versatile alternative

Scientists and start-ups all over the world have already come up with better alternatives based on mushrooms, which are completely biodegradable. U.S. company Evocative Design is using mushrooms to replace Styrofoam food packaging, while Indonesian start-up Mycotech is turning mushrooms into a material that looks and feels like leather. In Berlin, biotech start-up Fungtion is looking into compostable mushroom alternatives, while students

and scientists at TU Berlin are researching ways to produce fungus-based clothing, furniture, and building materials. Even large companies such as IKEA and Dell abandoned their use of EPS some years back and are now using mushroom-based packaging and filling materials. This approach could easily be adopted by the metalworking industry, for example to ship sheet-metal parts, and it offers a whole host of benefits. The mushrooms grow in a matter of days and the packaging they produce is fully recyclable. What's more, mushroom-based packaging is approximately as light and water-repellent as the plastic equivalents that do so much harm to the environment.

**Fast-growing alternative:** Mycelium, the root-like structure of fungi, can replace plastics in many sectors of industry.

## Organic waste + mushrooms = future

But how can mushrooms be engineered to replace plastic? Evocative Design uses mycelium, the thin root-like fibers of fungus. This is the part of a mushroom that normally grows underground in almost every direction, and it can take on many forms. Evocative Design uses a mold to force the subterranean root structure into a specific shape, using hemp or organic waste such as sawdust as a growing medium. Within a week, the mycelium fuses into a stable structure, which is then dried. The resulting foam, which is similar to EPS, is suitable for many applications, including protecting wine during shipping and filling door panels and seat shells in the auto industry. Mycelium can also serve as a sustainable raw material in the electronics sector. To demonstrate this, scientists at Johannes Kepler University Linz used the skin of the lacquered bracket fungus (Ganoderma lucidum) as a substrate material for electronic components, heralding an approach that could make the industry more environmentally friendly.

IMAGES: Unsplash / Evocative Design, Adobe Stock / ukjent



## Mycelium-based fitness trackers

The researchers discovered that lacquered bracket fungus forms a closed mycelium skin on the surface of its growing medium to protect itself from pathogens and other fungi. All it needs to grow are beechwood shavings, wholegrain spelt flour, water, and a dark room. The resulting material is robust and can withstand temperatures up to 250 degrees Celsius. Remarkably, the mycelium skin is easy to remove and can be processed into the kind of flexible, biodegradable printed circuit boards and integrated circuits that are used, for example, in smartwatches, fitness trackers, and medical devices.

**Remarkable new discovery:** Lacquered bracket fungus forms a closed mycelium skin on the surface of its growing medium to protect itself from pathogens and other fungi. This skin is easy to remove and can then be dried and used as a substrate for electronics. The mycelium skin only needs waste wood to grow on, so the results are environmentally sustainable.

> " The discovery of the tree fungus as a **substrate material for electronic components** was more or less accidental, as is so often the case in science! "

Martin Kaltenbrunner, Soft Matter Physics Department, Johannes Kepler University Linz

TEC+

# SHORT CUTS

*Innovations, technologies and future trends*

## New TRUMPF laser-blanking system saves material and $CO_2$

The trend toward high-mix, low-volume production is gaining momentum, and TRUMPF has responded by launching its TruLaser 8000 Coil Edition. Using laser-blanking methods, this system provides fully automated processing of up to 25 metric tons of sheet-metal coil stock. The machine handles every step in the process – from unwinding and aligning the coiled metal to removing and sorting the finished parts using a robot. "The TruLaser 8000 Coil Edition is another example of how TRUMPF is helping customers embrace the trend toward **greater sustainability** in the manufacturing industry while simultaneously boosting efficiency. Compared to conventional laser-cutting machines, this solution can help companies save almost 1,700 metric tons of steel a year, which equates to around 4,000 metric tons of carbon emissions and 1.6 million euros of material costs," says Richard Bannmüller, CEO of TRUMPF Laser Technology Germany. Sheet-metal fabricators typically rely on press lines to manufacture high volumes, but producing and retrofitting bending tools for new product variants is an expensive and time-consuming business. In contrast, laser processing straight from the coil **saves time, costs and material.** The production system is fully automated, and it includes an innovative transport system to keep material moving quickly through the cutting process, with impressive gains in productivity. TRUMPF developed the system in cooperation with SIEMENS and ARKU. It is already available for purchase.

## Power on demand

Fluctuating order volumes and varying sheet thicknesses pose a tough challenge for sheet-metal fabricators, many of whom end up investing in a high-power laser-cutting machine even though they rarely use the high power setting. This pushes up their energy bills and running costs. The **Power by the Hour** function from TRUMPF solves this problem by offering fabricators the option of purchasing a powerful TruLaser 1000 or 3000 machine for the price of a lower-power machine. Users can make flexible use of the higher power setting, for example when dealing with large order volumes or thicker sheets. TRUMPF charges for this higher laser power on a pay-per-use basis, so users only pay for what they actually use. This feature can help companies reduce their consumption of energy and cutting gas. It also requires a lower initial investment. TRUMPF will be launching the solution at its INTECH in-house trade show.

## Oseon: next-level transparency and productivity

TRUMPF will be showcasing the new functions of its Oseon production planning and control software at its **INTECH** in-house trade show. Features include the ability to plan jobs by **working backwards:** the user simply enters the desired delivery date, the available workers and machines, and a few other parameters, and Oseon automatically slots the job into the production plan. As well as making it easier to meet deadlines, this solution boosts **transparency on the shop floor.** Oseon's new features also include even simpler ways to reduce non-productive time, such as viewing and comparing the target and actual times of each work step in the process chain. If they spot any discrepancies, they can quickly eliminate the cause. Users will also gain the ability to operate automated warehouses with Oseon, enabling a **seamless flow of materials** on the shop floor.

IMAGES: TRUMPF

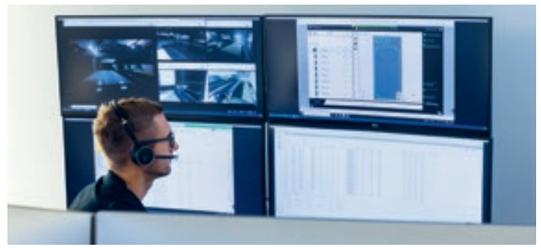


## 3D printing: TruPrint 1000 ready for series production

In late 2022, TRUMPF primed its TruPrint 1000 for additive manufacturing in series production. "Thanks to smart automation, the new system is twice as fast as its predecessor. That makes it a great choice for series production in sectors such as the dental and medical-device industries," says TRUMPF product manager Mirko De Boni. The Multiplate function is another point in the TruPrint 1000's favor when it comes to producing higher volumes. Up to four build plates can be stacked on top of each other in the build cylinder, enabling 3D objects to be printed on one platform after the next. This allows the TruPrint 1000 to work **throughout the night** without requiring a worker to be present, which saves time and cuts costs. Just 80 centimeters wide, the machine takes up minimal space and fits through a standard doorway. Even in smaller facilities, users can have several machines next to each other manufacturing objects in parallel, thereby making production even faster.

## The easy way to bend oversize formats

TRUMPF will be launching the latest generation of its TruBend Series 8000 at INTECH. With an 880-millimeter open height and a stroke of 700 millimeters, the TruBend 8000 bending machine offers a superbly efficient way to bend XXL parts, allowing workers to easily bend and remove workpieces that require a large box height. The machine can also be equipped with a bending aid that makes operators' lives easier by automatically positioning the workpiece for bending. With a **press force of 400 metric tons,** the first in this new generation of machines is an efficient powerhouse that has no trouble processing short, thick pieces of sheet metal. And thanks to its generous 4.40-meter bending length, it is equally at home with longer, thinner parts. Users can choose to position multiple upper and lower tools next to each other to process a wide range of parts without having to change the machine setup each time. The machine can also be equipped with an on-demand drive with a frequency converter that automatically adapts the speed of the motor to the current application. This can **reduce energy use by up to 26 percent.**



## Sharing is caring: TRUMPF Pay per Part model boosts productivity by over 50 percent

Last fall, TRUMPF launched a new digital Pay per Part business model for its full-service TruLaser Center 7030 laser machine. Under an **equipment-as-a-service (EaaS) contract,** TRUMPF supplies the high-performance machine to customers together with a material storage system. This allows companies to use the TruLaser Center 7030 in their own manufacturing environment. The full-service laser machine is equipped with cameras and sensors and connected to TRUMPF via remote technologies, so TRUMPF can operate the machine from its Remote Control Center in Neukirch without requiring the customer to be present. "Our Pay per Part business model focuses on customer needs like never before," says Stephan Mayer, chief executive officer for machine tools at TRUMPF. "It helps them combat the **shortage of skilled workers in industrial manufacturing** and provides them with even more add-on services to boost their productivity and competitiveness." The Pay per Part model also supports the trend toward greater sustainability in manufacturing. For example, TRUMPF experts can make better use of raw materials through optimum nesting techniques while operating the machine as efficiently as possible. This approach can reduce carbon emissions by up to 37 percent per sheet. Under the Pay per Part model, TRUMPF can **remotely plan and control production** with the processing cell while also carrying out programming and maintenance. In the event of machine failure, TRUMPF will be notified without delay and – in its own interest – move to remedy the problem as quickly as possible. Under this new business model, customers are only charged for parts that are actually manufactured, and the first customers to sign up have already seen their productivity boosted by as much as 50 percent.

# Energy-saving tips for laser cutting

**Ongoing geopolitical tensions and high inflation are having a major economic impact. One of the most visible consequences is the increase in energy prices in many countries around the world. As a result, sheet-metal fabricators are doing everything they can to reduce their running costs. Fortunately, there are plenty of simple tricks and smart technologies available to make laser cutting more energy-efficient. Just ask TRUMPF.**

**Eco Cooler:** Components such as laser diodes and drives must be kept cool throughout the cutting process. TRUMPF's new Eco Cooler system is the first to use water instead of chemical refrigerants. It reduces the energy required for cooling by up to 80 percent, potentially saving some 10,000 euros a year. Plus, it's better for the environment.

**Nanojoints:** One way to speed up the laser-cutting process and save material is to use tiny break-off tabs, or "nanojoints," as retaining points in the sheet. This allows parts to be nested directly next to each other on the sheet and makes it quicker and easier to remove them after cutting.

**Less scrap:** The CoolLine nozzle sprays water onto the workpiece to ensure optimum cooling during cutting. The result? Enhanced part quality and up to 25 percent less scrap.



**Predictive maintenance:** Performing maintenance proactively rather than reactively is another effective way to make sheet-metal fabrication more environmentally friendly. This is particularly true in laser-cutting lines, where the unplanned failure of a machine can massively increase a company's carbon footprint. If the malfunction goes unnoticed, the parts produced by the machine are often unusable, and the material is wasted. Machines in predictive-maintenance environments digitally transmit real-time information on their status to a database.

**Avoiding downtime:** Various smart functions can be employed to avoid downtime caused by collisions and cutting flaws. These include standard cutting with a high nozzle distance, "Smart Rerun" automatic re-entry after cutting flaws, and the "Smart Nozzle Automation" nozzle inspection system. Combining these functions enables users not only to minimize rejects, but also to save energy.

**Game-changing digitalization:** An increasing number of services can be carried out remotely by TRUMPF engineers, including proactive machine maintenance. But analyzing machine data doesn't only help to avoid errors; it can also provide the basis for boosting performance. By digitalizing their production facilities, companies can save time and energy and significantly increase their productivity.

**Producing cutting gas in-house:** Another clever way to save energy is through the in-house production of N2 cutting gas. Companies can connect their photovoltaic system to a nitrogen generator, enabling them to produce the gas themselves and store it in an N2 buffer tank as a backup for less-sunny days. TRUMPF offers nitrogen gas generators in collaboration with NitroPro.

**Harnessing a cooling loop:** Laser-cutting machines require a cooling system – but this needn't be built in. Users can take advantage of a universal cooling interface to connect their machines to their company's existing cooling circuit, thereby further reducing energy consumption.

**Using idle mode:** Keeping production machinery up and running for long periods of time is a waste of energy. Just like household devices, these machines shouldn't be left switched on and primed for action. Instead, companies should activate the automatic standby mode and scheduled power-up.

# SMART SAVINGS: TRUMPF PART OPTIMIZATION

Higher quality at lower cost: TRUMPF's part optimization workshops teach users how to make production more economical and efficient by getting the very best out of their machines and parts. Each issue, TRUe takes a look at a different part to illustrate how this process works.

**This issue:**
## Reducing $CO_2$ emissions

TRUMPF part optimization has traditionally focused on functionality and efficiency. But sustainability is now more important than ever in the sheet-metal fabrication industry. "As the cost of energy and raw materials continues to go up, companies are becoming even more aware of the need to save resources. The way parts are designed and built offers many opportunities to achieve that," says Jörg Heusel, head of TRUMPF part optimization. He and his team decided to take a closer look at how users can reduce their costs and carbon emissions. "Cutting both those factors at once is a win-win situation for customers and the climate."

It's important to understand that the use of raw materials represents the largest component in a part's value chain. "Milling involves removing material, but bending eliminates that step, which saves raw materials and reduces emissions. That's why users should always check whether they can make a part using a more eco-friendly method that would achieve the same goals," he says.

**Jörg Heusel**
Head of part consulting at TRUMPF

But a company's carbon footprint is shaped not just by how much material they use, but also by the required production steps: "You have to include setup, programming and energy use in calculating a finished part's carbon footprint," says Heusel. In other words, maximizing carbon savings is not just about choosing the right material, but also about optimizing sheet-metal part design and taking energy-saving measures on the shop floor.

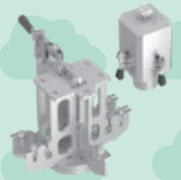
**PART DESIGN FOR SHEET METAL**

**PART DESIGN FOR TUBES**


**PART DESIGN FOR LASER WELDING**

**OPTIMIZED METHODS AND INTELLIGENT PART DESIGN LEAD TO LOWER CARBON EMISSIONS.**

**FIXTURE DESIGN FOR SHEET METAL**



IMAGES: TRUMPF

*#17*

# pARTgallery

This picture shows a **beveled punch** as you've never seen it before. A beveled cutting edge reduces the required punching force and generates less noise during the punching process. By taking this punching tool out of its normal environment, photographer **Marie-Therese Cramer** helps us see it in an entirely new light.

## Tweet show in Las Vegas

Tweet, tweet! "Time to connect with nature!" One of the surprise hits of CES 2023 in Las Vegas combined smart AI, tech, and nature in a beautiful and truly heartwarming way. The Bird Buddy wowed tech bloggers everywhere when it was launched – and also scooped one of the coveted CES 2022 Innovation Awards. Equipped with cutting-edge AI and a solar panel, this smart bird feeder provides live bird-arrival notifications in its user-friendly app and captures high-resolution images with its built-in 720p camera. It also recognizes up to 1,000 species and organizes them into a Bird Buddy photo album. The smart bird feeder features a soft, pastel-colored design and is made from sustainable materials. The post-pandemic timing of its launch was perfect, with birding in the U.S. now ranked as the country's second most popular outdoor hobby.

But who would have thought it would be such a hit amid the glitter of Las Vegas? CES was awash with computer giants presenting dual-screen laptops and automakers drumming up enthusiasm for high-power charging, infotainment platforms and autonomous driving, all egged on by ex-cyborg and Terminator star Arnold Schwarzenegger. But hadn't they heard what the sparrows were whistling from the rooftops?

Those in the know were mulling over mindfulness, not bits and bytes, and all the talk was about conscious experience, not connected cars. Bird Buddy is helping to fuel this broader trend, and it gave CES visitors a rare opportunity to catch their breath amid the hustle and bustle of this huge trade show. So maybe the future belongs to tweets of the feathery kind!

What comes next is anyone's guess. Who knows what other tricks mindful techies might employ to get us out into nature? There are certainly plenty of animals – and even plants – that people would like to learn more about. Perhaps they'll even get Arni interested in the love life of ants!

*Daniela Müller*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