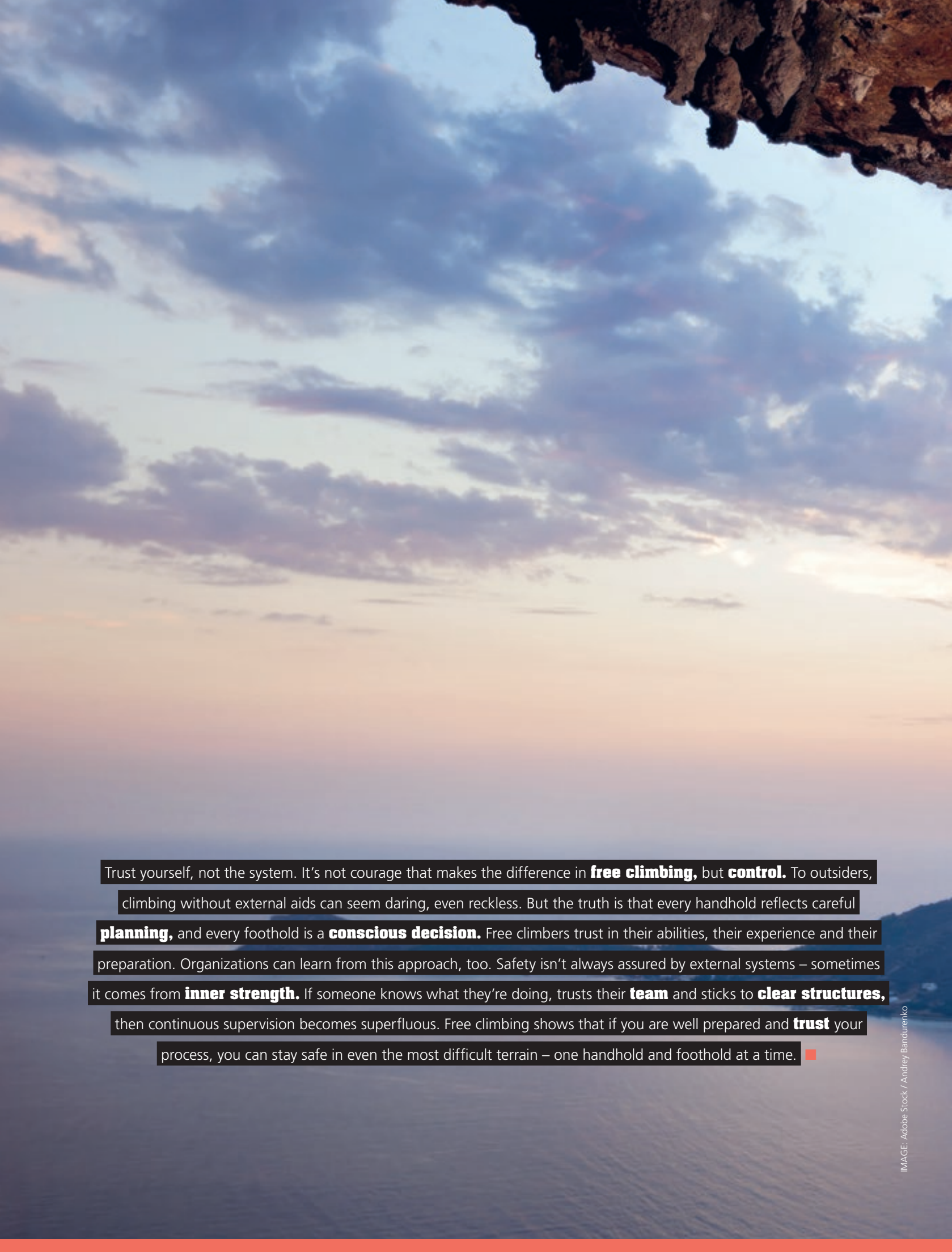
TRUe

THE MAGAZINE FOR SHEET METAL EXPERTS

22# 2025 SAFETY

TRUMPF



Trust yourself, not the system. It's not courage that makes the difference in **free climbing,** but **control.** To outsiders, climbing without external aids can seem daring, even reckless. But the truth is that every handhold reflects careful **planning,** and every foothold is a **conscious decision.** Free climbers trust in their abilities, their experience and their preparation. Organizations can learn from this approach, too. Safety isn't always assured by external systems – sometimes it comes from **inner strength.** If someone knows what they're doing, trusts their **team** and sticks to **clear structures,** then continuous supervision becomes superfluous. Free climbing shows that if you are well prepared and **trust** your process, you can stay safe in even the most difficult terrain – one handhold and foothold at a time. ■

IMAGE: Adobe Stock / Andrey Bandurenko

IMAGE: Getty Images / Debrocke/ClassicStock

It seems like an obvious step to us today, but in its time it caused an uproar. The introduction of **mandatory seat belts** drew widespread criticism. People said they were too uncomfortable, too paternalistic and simply too unfamiliar. But over time seat belts have proven to be a **simple, effective and reliable way of saving lives.** Organizations often go through a similar process. New **safety standards** or processes initially meet resistance, and it takes clear rules, patience and conviction for them to be accepted and become routine. The seatbelt mandate shows that **safety doesn't emerge overnight,** but through perseverance, insight and the courage to push through unpopular measures.

IMAGE: Adobe Stock / Stephan

What's the best response when things get dicey? The hedgehog demonstrates a simple yet effective **strategy to stay safe:** instead of fleeing or fighting, it curls into a ball with its prickles pointing outward. It's a defensive move – but one that sends a **clear message:** "Don't come any closer!" It draws a clear line without the need for a fight. Organizations also need these kinds of **protective mechanisms.** Sometimes the smartest move is to pause, size up the situation and then send a clear signal. Hedgehogs teach us that **protecting ourselves is not a weakness,** but rather a clever way to set boundaries. By keeping ourselves safe, we preserve our ability to act – even when things get tough.

IMAGES: Klaus Schwaiger, TRUMPF

Safety is the key to success

Dear readers,

Safety is more than a technical detail – it's a promise. At TRUMPF, we deliver on that promise with every product and every service. That's why this issue of TRUe is dedicated to safety and security in all their forms.

In the sheet-metal world, safety can never be taken for granted. We regularly encounter machines – chiefly from Asia – that pose serious risks to operators, including laser beams that can damage the retina without proper filtering, crushing hazards from inadequately safeguarded automation systems, and harmful chemicals. Such risks endanger not only people but the very future of the business, because if an employee is injured by an unsafe machine the employer will be first in line in terms of liability – to say nothing of the cost of downtime.

At TRUMPF, our position is clear: in most cases, we invest more than 15 percent of our manufacturing costs in obtaining the CE marking that demonstrates our compliance with European safety standards. That way, safety is built in from the start, not added as an afterthought when the machine is already on the shop floor. To see how we're driving machine safety at the European level and how our solutions deliver protection and reliability in the field, turn to page 30.

But our machines are not just safe – they're also ahead of the curve. Take our new 'indirectly' linked system, which unites the efficiency of line production with the tremendous flexibility of standalone machines. With TRUMPF's Oseon software and a combination of the brand-new, significantly faster TruBend Center 7030, the six-kilowatt TruMatic 5000 and the new STOPA storage system, you can manufacture both high-volume series and one-off parts – quickly, efficiently and at scalable capacity (page 15). With its modular architecture and open interfaces, this solution can easily be expanded – especially now that TRUMPF and STOPA are working even more closely together (page 35).

We're also setting new benchmarks in service. Supported by one of the industry's most advanced logistics centers and four global spare-parts hubs, we're achieving higher delivery reliability than ever before (page 38). Digital services such as Condition Monitoring, Remote Control and our Service app allow you to rectify many faults yourself. And if you ever do need a technician, they will arrive promptly, be highly qualified and speak your language (page 36).

Digitalization not only boosts efficiency; it also supports the move towards greater sustainability in manufacturing. With its Green Smart Factory, our customer Heizomat in Heidenheim, Germany, is showing how zero-emission production and commercial success can go hand in hand (page 16). At the same time, our Circular Economy experts are restoring used machine parts to as-new condition and returning them to the market, helping customers get more for their money while also benefiting the environment (page 46).

For us, safety isn't a buzzword – it's one of our guiding principles. Our systems create a safe working environment for your employees while ensuring a smooth and efficient production process. In short, safety is our way of ensuring your – and our – future success.

I hope you enjoy reading this issue

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

TRUe

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An unusual alliance between technology and nature is taking shape in Taiwan. Solar panels stretch across prawn ponds like giant sunshades, generating electricity, improving water quality and standing strong against typhoons. INTER-TECH develops the rugged support structures that make this possible. With help from TRUMPF, they show that precision and innovation can thrive even in the harshest conditions.

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... in Heidenheim

In a small town in Bavaria, Germany, Heizomat has opened a special kind of plant: the Green Smart Factory. It is designed to show how energy-self-sufficient production works on an industrial scale. This is where owner Robert Bloos produces woodchips for the global market – and where he shows how sustainability and profitability can go hand in hand.

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... in Jablonec nad Nisou

Czech ventilation specialist Atrea is bringing a breath of fresh air to manufacturing. Together with TRUMPF, the family-owned company is making the leap from labor-intensive manual work to fully automated workflows. Despite complex one-off builds, the new system delivers faster throughput and lower costs – and frees up time for creative work.

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... in Ditzingen

Accidents are all too common in manufacturing: from crushing injuries caused by automated systems to eye damage from laser light, often the result of unsafe machines from low-cost suppliers. But not at TRUMPF. Here, machine safety is a top priority. Innovative technologies and a comprehensive safety strategy prevent accidents before they occur. And TRUMPF is also setting new standards in the industry at the European level.

01

TAIWAN

Safety in Taichung

PRAWNS AND PHOTOVOLTAICS

In densely populated Taiwan, land is scarce and energy demand is surging on the back of the country's chip industry. By 2050, the island aims to achieve net zero, in part by doubling up the use of space – for example, by installing **solar arrays over prawn ponds.** Sheet-metal specialist INTER-TECH develops the robust support structures required for these projects, while TRUMPF provides the technology and the assurance that projects will be delivered as planned.

IMAGES: Propaganda Studio

Partnership: Edward Liu has built up a reputation in Taiwan for his solar-panel mounting systems. To produce them, the company processes around 1,800 metric tons of steel sheet a month.

Like giant sunshades, the solar photovoltaic (PV) panels stretch across the prawn ponds. Their supporting structures rise several meters into the air, leaving plenty of clearance for the rearing ponds below, where thousands of saltwater prawns thrive. The idea is simple: "The panels shade the ponds and suppress photosynthesis, which curbs algal growth and improves water quality," says Edward Liu, managing director of INTER-TECH. By enabling a single plot of land to serve two purposes, the company is helping Taiwan use its limited land more efficiently. Yet putting this project into practice was anything but easy.

Edward Liu is the second generation of his family to lead INTER-TECH. The company manufactures components for the semiconductor and food industries, supplies the medical technology sector, and even creates bespoke steel features for buildings. For Liu, safeguarding the company's future means adopting production technologies that are faster, more precise and more advanced than those of the competition – and then applying them in challenging projects. One such challenge arrived nearly ten years ago, when the Metal Industries Research & Development Centre asked him to design support structures so solar panels could be mounted like sunshades over aquaculture ponds.

A blueprint for mounting solar panels above prawn farms already existed, but INTER-TECH's task was to turn it into a workable product – and the demands were exacting. "The structures must be corrosion-resistant and able to withstand strong typhoon-force winds and earthquakes up to magnitude eight on the Richter scale," Liu says. Working with Taiwanese steel dealer HKS Steel, he developed a custom alloy of magnesium, aluminum, zinc and nickel. "The frame and support assembly comprises around 100 individual parts, all manufactured to tight tolerances," he adds.

Two generations learning the craft from the ground up

Edward Liu continues to run the family business in the tradition of his father, Vincent, who founded INTER-TECH in 2003, at a time when solar panels generated just 0.003 percent of today's output. Before setting up on his own, Vincent worked for a company where he planned and oversaw production. During that period, he bought one CO_2 laser cutting machine from TRUMPF and another from a different brand and compared them meticulously, Edward recalls. "In the end, the TRUMPF machine outperformed the other one across all parameters," he says. "That's why my father chose to equip his own production facilities with TRUMPF machines."

Just like his father, Edward began his career on the shop floor – operating and maintaining machines, organizing shift schedules and learning production from the ground up. After the 2008 financial crisis – a period of great uncertainty for INTER-TECH – he moved into management and set about modernizing the company's machinery. He remained loyal to TRUMPF, investing in new machines and expanding the portfolio to include welding. The result was a leap in productivity and a noticeable

Dual use: Solar arrays shade prawn farms, improving water quality in the ponds and creating valuable space for power generation on the island.

improvement in product quality. "In 2012, we replaced six press brakes from other manufacturers with four TruBend Series 5000 machines to increase both quality and output," says Edward.

For the solar panels, he invested in a six-meter TruLaser 3060 fiber laser cutting machine with six kilowatts of laser power, a three-meter TruLaser 3030 fiber with 24 kilowatts, a six-meter 320-ton TruBend 8320 bending machine, and a four-meter 170-ton TruBend 5170 bending machine with an automatic tool changer. These machines set the company on course for long-term success and established it as a specialist in the solar industry. "They allow us to process sheets up to six meters long and between 32 and 40 millimeters thick," says Liu.

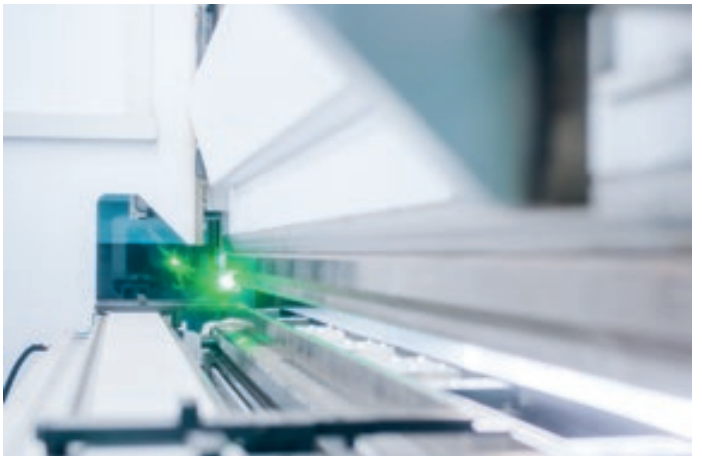
The material comes in large rolls of sheet metal known as coils. INTER-TECH cuts the metal, drills holes and bends it into shape. Workers then pack the finished workpieces and load them onto trucks. "Including infeed and outfeed, bending a six-meter workpiece takes exactly 37 seconds," Liu says with pride. Speed is critical, because INTER-TECH processes 1,800 metric tons of steel sheets a month for solar mounting structures alone. "Thanks to our TRUMPF machines, we can sustain this capacity while keeping quality consistent," says Liu. TRUMPF's Oseon software has been implemented since 2024 to monitor and coordinate production. Today, INTER-TECH's solar arrays shade around 350 hectares of prawn farms in Taiwan – and since 2016 support structures have accounted for 40 percent of the company's total revenue.

Precision: The team fabricates around 100 individual parts to create the rigid frame and support structure.

> " Right now, we're **the only manufacturer** in Taiwan able to deliver support structures with this level of quality. "
>
> Edward Liu, managing director INTER-TECH

Fortune favors the bold

On site, crews bolt the assemblies together with heavy fasteners. "We avoid weld seams because they accelerate corrosion," Liu says. "We use a specialized software package for bolted joints to calculate the position of each individual bolt. Nobody else uses that method, so it gives us a clear competitive edge," he adds. "Right now, we're the only manufacturer in Taiwan able to deliver support structures with this level of quality." His mounting systems have already been put to the test in Taiwan's extreme weather conditions: in mid-July, Typhoon Danas destroyed some 140,000 solar panels above aquaculture farms in the southwest; but INTER-TECH's installations stayed standing. In a fiercely competitive market, that resilience gives Liu confidence for the future.



Speed: The machine bends a six-meter workpiece in just 37 seconds – including loading and unloading.

Customer details

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Email: intertech@intertech-metalworks.com
www.intertech-metalworks.com

Machinery

- TruLaser Fiber 3030 (4 kW & 24 kW)
- TruLaser Fiber 3040
- TruLaser Fiber 3060
- TruBend 5230
- TruBend 5085
- TruBend 8320
- TruBend 5170 with ToolMaster
- TruBend 7050

IMAGES: Propaganda Studio

01

A closer look:

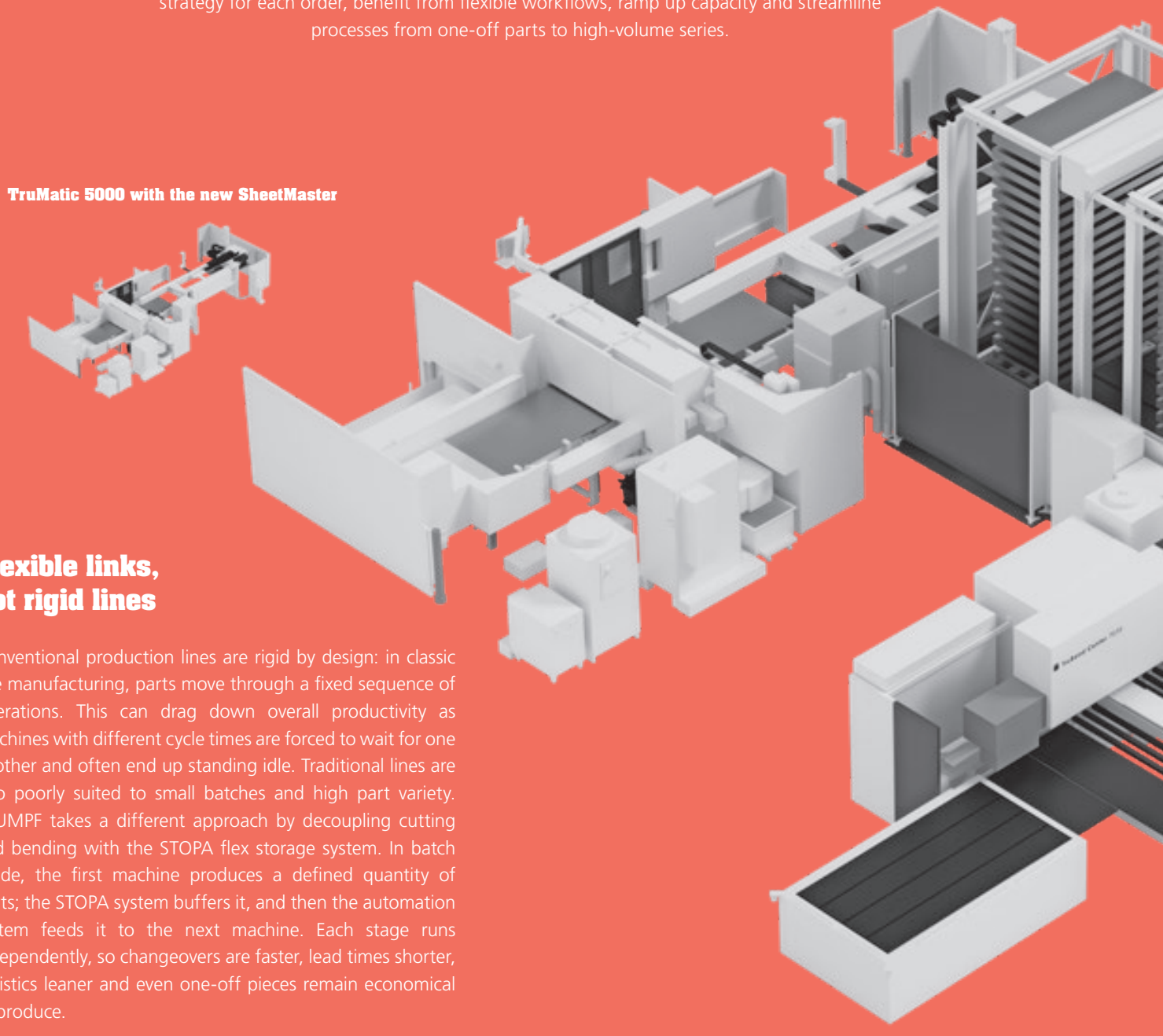
Flexibly linked

Fully automated, flexible and highly productive – those are the benefits that **TRUMPF's new fully connected manufacturing cell** brings to the shop floor. This setup combines the TruBend Center 7030 with the TruMatic 5000 punch-laser machine and a STOPA flex automated storage system. With the STOPA system buffering parts between operations, users can **choose the ideal production strategy for every job,** combining the **flexibility of standalone machines** with the **efficiency of a line.**

In brief

Smart path to greater productivity

With TRUMPF, manufacturing companies can evolve **step by step toward a Smart Factory.** The new "indirectly" linked trio of the TruBend Center 7030 panel bending machine, the TruMatic 5000 punch-laser and the STOPA flex opens up an entirely new world of possibilities: select the best production strategy for each order, benefit from flexible workflows, ramp up capacity and streamline processes from one-off parts to high-volume series.



TruMatic 5000 with the new SheetMaster

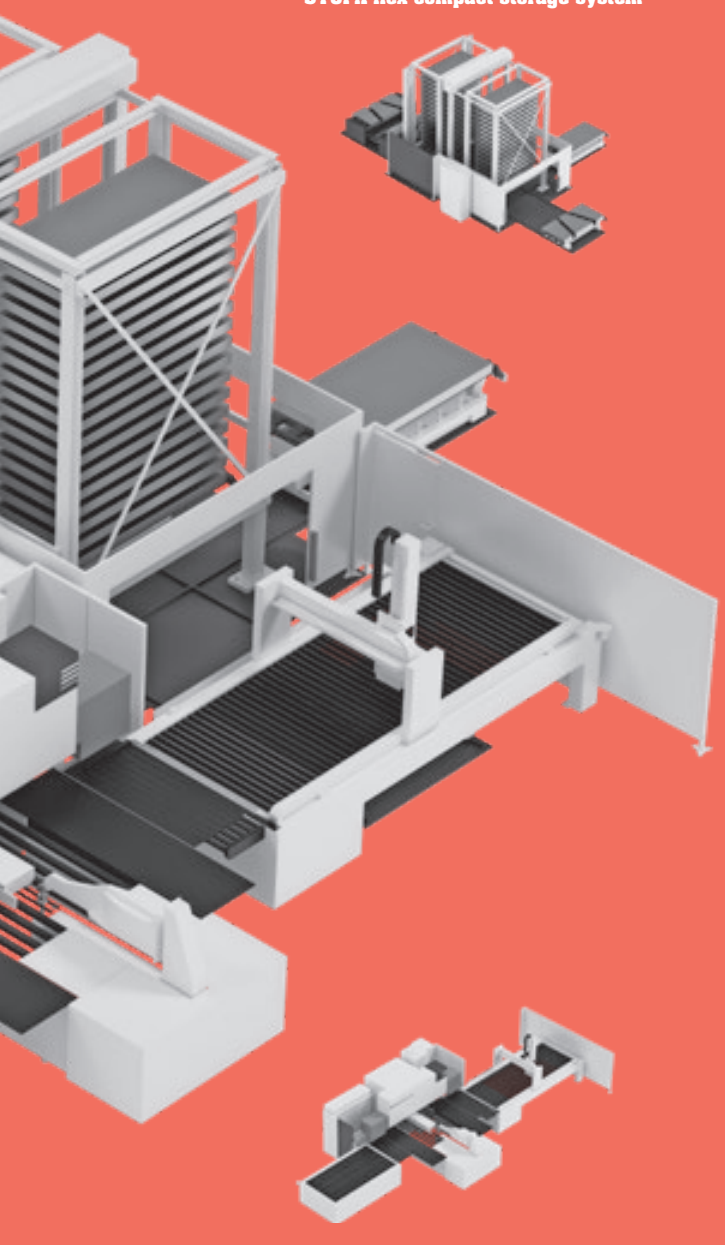
Flexible links, not rigid lines

Conventional production lines are rigid by design: in classic line manufacturing, parts move through a fixed sequence of operations. This can drag down overall productivity as machines with different cycle times are forced to wait for one another and often end up standing idle. Traditional lines are also poorly suited to small batches and high part variety. TRUMPF takes a different approach by decoupling cutting and bending with the STOPA flex storage system. In batch mode, the first machine produces a defined quantity of parts; the STOPA system buffers it, and then the automation system feeds it to the next machine. Each stage runs independently, so changeovers are faster, lead times shorter, logistics leaner and even one-off pieces remain economical to produce.

Automated from start to finish

The STOPA system manages the material flow between the TruBend Center 7030 and the TruMatic 5000 fully automatically. Oseon – TRUMPF's software for material flow and production control – monitors every process and slots in urgent orders as and when needed. The result is maximum transparency, optimum utilization and round-the-clock reliability.

STOPA flex compact storage system



The new TruBend Center 7030

TruMatic 5000 – the punch-laser powerhouse

With six kilowatts of TruFiber laser power, an integrated ToolMaster and an automated SheetMaster, the TruMatic 5000 is the versatile heart of the system. It punches, forms and cuts even challenging materials such as copper and brass safely and with pinpoint accuracy. Tool changes take place automatically and without interrupting production, while the SheetMaster keeps material flowing smoothly.

New TruBend Center 7030 – faster, smarter, safer

This latest-generation panel bending machine is 30 percent more productive than its predecessor. An optimized handling concept featuring a rotator and two-axis manipulator positions parts extremely close to the bending line – perfect for complex bends. The machine's open design with no safety barriers makes loading easier: laser scanners detect foreign objects and bring the machine to an immediate halt if danger arises, guaranteeing maximum safety.

Broad versatility for multiple industries

This solution is designed for small and medium-sized companies looking to expand their manufacturing capacity. It is especially suited to product shops in sectors such as elevator construction, HVAC, switchgear cabinets, commercial kitchen equipment and shopfitting.

Highlights:

- **Productive and flexible: standalone performance plus line efficiency**
- **Indirect link: STOPA flex storage system enables independent process steps and rapid adaptation**
- **Wide range of materials: fiber laser can also handle reflective non-ferrous metals**
- **Automated tool changes: ToolMaster ensures uninterrupted production**
- **Compact and space-saving: fits into almost any production facility**
- **Single-operator setup: reduces part costs and eases problem of finding skilled staff**

02

GERMANY

Safety in Heidenheim

WOODCHIPS MEET HIGH TECH

IMAGES: Klaus Schwaiger

Actions not words: Heizomat CEO Robert Bloos is driving construction of the Green Smart Factory with the same determination he applies to steering the company toward energy-self-sufficient production.

Robert Bloos believes in innovating by doing – and his goal is nothing short of a complete rethink of industrial production. The small Bavarian town of Heidenheim will soon be home to a plant that aims to show how **energy-self-sufficient, connected manufacturing** works in practice: **the Heizomat Green Smart Factory.**

For Robert Bloos, industrial innovation starts at work, not in the conference room. When he climbs into his excavator cab in the early morning sunlight, he takes his role seriously – because change starts with having the right attitude. Bloos is the CEO of Heizomat, a family-run SME in Gunzenhausen, Germany, which builds heating systems fueled by woodchips. For decades, it has been helping farmers, municipalities and organizations make the switch to heating with renewable energy sources, offering robust, carbon-neutral solutions that break the dependency on fossil fuels. Now Bloos hopes to go one step further by showing how industrial production can be both sustainable and economically viable at the same time. A few kilometers down the road from Heizomat's headquarters, the company is building its Green Smart Factory. This is no mere showpiece; it is a fully fledged production site that aims to set new standards in the industry for energy independence, digitalization and sustainable industrial production.

Plenty to do: Bloos inspects systems, oversees processes and confers with production manager Manuel Vorbrugg.

Working closely with TRUMPF as a technology partner, Heizomat completely reworked and rebuilt its entire production process. The partnership is the perfect combination of high tech solutions and a can-do attitude. Bloos has long sought to expand beyond his traditional customer base, and the new factory is designed to appeal not only to farmers and municipalities, but also to industrial customers keen to deploy self-sufficient, tried-and-tested energy systems. Heizomat is determined to break out of its current niche. With years of experience at putting customers first, the company has built up an outstanding reputation for the quality, durability and practicality of its woodchip heating systems. Now Bloos is ready to take the next step by showing how his Green Smart Factory can combine sustainability and smart connectivity within a successful SME environment.

Going all in

Bloos understands that industrial manufacturers need to be confident in the plans they make. Few producers would feel comfortable switching to a new energy supply that hasn't been thoroughly tested. That's why he has taken the first step by showcasing how it can work in practice. The Green Smart Factory is the perfect example of how energy-self-sufficient production is technically and economically feasible on an industrial scale. Heizomat is transferring its entire sheet metal, round tube, and machining processes to the new building to show how sustainability and profitability can go hand in hand – with digitalization as the enabling technology.

"The Green Smart Factory has three defining characteristics," says Bloos. "Its energy supply, its state-of-the-art machinery and the software that holds everything together." It's all based on the straightforward principle that production should adapt to

> " Farmers cut enough wood to last a couple of years and stack it in their yard. **That's how we think, too.** "
>
> Robert Bloos, CEO Heizomat

IMAGES: Klaus Schwaiger

Pallet chipper: Turns waste pallets into valuable biomass fuel.

the energy that's available – not the other way around. Bloos calls this an "energy-led" system, and its key characteristics are as follows: all the factory's energy requirements are covered by sun, wind and wood, and integrated systems supply the production facilities with electricity, heat and even cooling. A woodchip heating system, together with a wood gasifier, forms the heart of Heizomat. The wood gasifier supplies both heat and valuable electricity – around the clock. Heizomat makes its own fuel on site: a pallet chipper turns delivery pallets – like the ones sheet metal arrives on – into woodchips. What looks like waste is instead transformed into a valuable energy source that keeps the plant fed with sustainable heat.

The heart of Heizomat: Bloos checks the quality of locally sourced woodchips.

Every last detail was considered in Heizomat's plans: the hall's heat distribution system operates with high efficiency – with integrated lighting included. This, too, is part of the driving concept of not merely shifting resource use, but actually reducing it. And there's plenty of other smart things going on beneath the surface. Production is automated, and control systems are intelligently networked. The machinery line-up, which was planned in collaboration with TRUMPF, includes various TruArc Weld 1000 welding cells, TruBend 5000 and 8000 bending machines, and laser cutting machines such as the TruLaser 3030 and 5040 and the STOPA storage system. All this can be planned and managed via TRUMPF's Oseon software, which integrates seamlessly with the in-house ERP that coordinates operations. Materials, data and energy come together in an intelligent, efficient and continuous flow.

Six additional partner companies are involved in the project, ranging from energy and building technology to automation solutions – and they are all delighted with the opportunities the Green Smart Factory offers. They can use the production hall as a showroom to demonstrate real-world production processes to their customers – a huge advantage in an era of digitally connected manufacturing, says Bloos: "Most companies still just show their customers individual machines, but what matters is how it all works together."

Planning ahead

Bloos sees his new plant not as a showpiece, but as a strategic necessity. Real independence requires preparation, which is why Heizomat is careful to build up enough woodchip reserves to last

More than just storage: The STOPA storage system in the Green Smart Factory – with a capacity of 1,500 storage locations – ensures independence and reliability in production.

Delivery: A new machine arrives – the next building block in the energy-self-sufficient factory.

IMAGES: Klaus Schwaiger

a whole year, as well as large quantities of metal sheets. On principle, it produces as much as it can in-house, because certainty doesn't come from words or declarations of intent, but from actions. "Farmers cut enough wood to last a couple of years and stack it in their yards. That's how we think, too," says Bloos.

He applied the same mindset when it came to financing the new factory, drawing on solid reserves instead of running any risks with outside capital. For Bloos and his team, it's all about planning ahead, which is why Heizomat can hold a stable course in a crisis when others falter. The company also strives for a genuinely circular economy. The woodchips come from the local region, often from trees that have to be felled anyway, such as along highways. What others perceive as waste, Heizomat sees as a valuable resource. And the benefits stay local thanks to short distances, clear accountability and a strong identity.

The choice of machinery was equally deliberate. Heizomat's close partnership with TRUMPF is designed to boost productivity while easing the strain on workers. Back-breaking tasks such as manually bending sheet-metal parts are very much a thing of the past. The machines slot seamlessly into the overall digital concept, and what used to be documented on paper is now controlled, recorded and analyzed in an automated system.

Innovating by doing

At Heizomat, improvements don't come as theories off a drawing board. Bloos trusts his instincts and listens carefully to his team to make sure new ideas, solutions to problems and other feedback are directly incorporated in the ongoing development of his machines. If a machine fails to perform reliably in day-to-day operations or is cumbersome to operate, then the situation is rectified immediately. Suggestions for improvement sometimes take just days to implement.

This isn't the kind of place where you'll find a traditional R&D department. Bloos favors pragmatism over process, and craftsmanship over glossy strategy presentations. He encourages his employees to get creative. "Don't talk, act!" has been something of an unofficial company motto for years, Heizomat's very own version of "carpe diem". Many of Bloos's team members work with the company's products themselves, whether on

Much anticipated: Robert Bloos and production manager Manuel Vorbrugg inspect the new TRUMPF machine.

service call-outs, on the assembly line or at home. Their feedback stems directly from day-to-day production, and this close proximity to the product is deeply rooted in the company's DNA. Robert Bloos Sr., Heizomat's founder, ran the business in line with his principles of better solid than speculative – and better grounded than grandiose. His son has maintained that philosophy with an open and practical culture of innovation.

> " Most companies still just show their customers individual machines, but what matters is **how it all works together.** "
>
> Robert Bloos, CEO Heizomat

Between steel and sustainability: Heizomat's Green Smart Factory impresses with modern machinery, software and sustainability credentials.

All comes down to planning: Bloos reviews the digital floor plan of the Green Smart Factory.

Looking ahead

Whether on the farm, in the cab of an excavator or at his desk, Robert Bloos believes that the future begins by embracing responsibility and finding the courage to take the first step. But even a pragmatist like him thinks strategically, and Japan and the USA are next on his list. Beyond its deep tech focus, these markets also offer ways to reduce reliance on Europe, and Heizomat is now exploring its international options even as it maintains its roots in the region. At some point, Bloos says, his son might take the helm at Heizomat. The eleven-year-old enjoys watching his father at work and helping out at the company, but the path he ultimately chooses is up to him. "He needs to chart his own course," says Bloos – just like his father did before him.

> " **'Don't talk, act!'** has long been an unofficial company motto. "
>
> Robert Bloos, CEO Heizomat

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Machinery

- 6x TruArc Weld 1000
- TruBend 5170
- TruBend 5230
- TruBend 5320
- TruBend 8500-40
- TruBend Cell 5230 with BendMaster 150 and ToolMaster
- TruMatic 7000
- TruLaser 5040 fiber
- 2x TruLaser Center 7030
- TruLaser Tube 7000 fiber
- STOPA Compact storage system

IMAGES: Klaus Schwaiger

02

A closer look:

Automation, done safely

Automation increases **efficiency, precision and availability** in on the shop floor. But without the right **safety measures,** this technology can pose a serious hazard to the company and its employees. That's why TRUMPF's automation solutions have the clear goal of doing everything possible to eliminate any sources of risk. The company's automation solutions include a **comprehensive safety concept** covering everything from risk assessment and engineered safeguards to on-site customer training.

In brief

Safety first – the systematic, responsible path to automation

Efficient, reliable and safe: TRUMPF drives automation with uncompromising attention to detail. With standards-compliant risk assessments, cutting-edge sensors and real-world tests, the company ensures automated processes are not only robust and capable but also safe. For customers, that translates into **customized solutions that protect everyone involved –** from the initial concept to commissioning at the customer's site.

01

A safety-minded approach starts at the development stage

Safety is built into every automation solution from the concept phase onward. This is based on the EN ISO 12100 standard, which requires a holistic risk assessment during all phases of the machine life cycle. TRUMPF relies on interdisciplinary teams to identify mechanical, electrical, thermal and ergonomic risks – first theoretically, and then on real prototypes. The result is an inherently safe system that meets all statutory requirements.

02

Technology delivers targeted protection

From light curtains at loading zones to laser scanners for area monitoring, modern safeguarding solutions ensure safety precisely where it matters most. For example, SheetMasters with the HZP option (loading and unloading parallel to production) include a laser scanner that monitors the area around the finished-parts stack. This allows production at the primary machine to continue without interruption while parts are being taken out of the machine and checked. The benefit is clear: safety functions are only activated when a real hazard is detected, keeping the automated process efficient and safe at the same time.

03

Sound insulation enhances safety

Things can get extremely noisy in sheet-metal fabrication, especially when large, fully automated machines are in operation. That's why TRUMPF combines its automation solutions with technology designed to protect workers' hearing. For example, the SortMaster Station is available with a dedicated sound-insulated cabin. This cuts down the noise generated when parts are separated from the scrap skeleton, helping operators to stay focused.

04

Safety tailored to each application

TRUMPF tailors its safety concepts to each customer's individual production environment. The goal is targeted efficiency gains with consistently high safety – and the TRUMPF experts achieve that without sacrificing productivity. Whether you're working with a LiftMaster, a SheetMaster or a connected robot system, the risk-assessed safety solution keeps operations running smoothly while providing the day-to-day protection that employees rely on.

05

Hands-on testing trumps theory

In TRUMPF's test facility, experts validate all safety-critical functions of automated solutions under real-world conditions. Noise measurements, endurance tests, and on-site walk-throughs with service teams ensure the concepts don't just work on paper, but also in practice.

06

Separated zones boost efficiency

Modular safety concepts enable parallel work: employees can enter designated areas while the machine continues processing parts in other zones. Clear separation of loading and unloading areas increases flexibility without compromising safety. This is especially beneficial for linked, fully automated lines, where zoned access helps keep the system continuously productive.

07

Smarter software equals safe operation

Many automation units are operated directly from the machine's control panel. This centralized solution eliminates the need for extra displays and ensures all safety-relevant information and functions are clearly presented in one place, so the operator always knows where they stand. For safety-critical actions, the system requires a clear acknowledgment at the start post – pressing a button and engaging the foot switch – and simultaneously verifies that safeguards such as a closed safety barrier are in place. In this way, TRUMPF prevents unsafe situations and measurably improves operators' day-to-day safety.

08

Safety doesn't end with delivery

TRUMPF supports customers through the entire machine-commissioning process. In automated processes where people and machines work in close proximity, a comprehensive safety concept is essential to reliably reduce risk and keep operations running without interruption. As part of the safety acceptance at the customer's site, trained TRUMPF technicians verify all the relevant safety functions, provide training and instruct the operating personnel. Services in this area also include training at TRUMPF's Ditzingen headquarters, safety-focused training videos and detailed operating and service manuals – including full documentation of identified hazards.

09

Gaining experience from the field

TRUMPF doesn't just build for the real world – it also draws on it for inspiration. Lessons learned in customer projects and feedback from service teams flow straight back into the development of our automation solutions. This is especially true at safety-critical interfaces between machines and automation, where users benefit from proven concepts that are continuously refined to ensure greater safety in day-to-day operation.

03

CZECH REPUBLIC

Safety in Jablonec nad Nisou

A BREATH OF FRESH AIR FOR MANUFACTURING

IMAGES: Tobias Ebert

With TRUMPF at its side, **Czech ventilation and heat recovery specialist Atrea** is breaking new ground. Because its production is so specialized, many steps were previously carried out by hand – for years, manual work simply seemed the safest bet. Now, TRUMPF has brought **automation to the shop floor,** presenting an exciting challenge for both partners. The rewards are clear: **Atrea is slashing costs** in areas that once seemed out of reach and now produces every single component of its systems under its own roof.

Integrated solutions: Daniel Morávek designs ventilation and heat-recovery systems – manufactured with the aid of numerous TRUMPF punching tools.

"The best ventilation systems are the ones nobody even notices," says Daniel Morávek, CEO of Atrea, a Czech specialist in ventilation and heat recovery systems. He speaks from experience: Atrea built the ventilation system for the V Tower in Prague – the Czech Republic's tallest residential building – and delivered heating and ventilation for Amber Gardens, Romania's first luxury passive housing development. The soon-to-be-completed Danube Flats, Vienna's tallest residential building, also makes use of Atrea technology, and Atrea ventilation systems can be found in hospitals, schools and cinemas. Its showcase projects include Škoda's factory kitchen, the largest kitchen in the Czech Republic and among the largest in Europe. Here, staff prepare more than 30,000 meals a day in a 1,000-square-meter facility that even includes a dedicated "dumpling room".

> " Developing new products and **boosting productivity** are crucial. "
>
> Daniel Morávek, CEO Atrea

From manual work to high-tech production

"Large-scale kitchens produce heat, odors and steam. We keep the air fresh – without drafts, so staff don't get cold," says Daniel. His turnkey systems deliver on that brief. All Škoda's chefs see on the ceiling are LED panels and rows of ventilation grilles, but

Unique: Atrea's systems are highly complex. Many parts look alike, yet each one plays a unique role in the production process.

hidden behind them are thick ducts, aerosol separators, filters and two large heat recovery units. Atrea's software controls and monitors the ventilation system via a high-tech cloud-based interface accessible from anywhere in the world. The systems can be adapted to almost any type of building – and it's this versatility that makes production so demanding. "Many of our system components look alike, but each one is slightly different," says technical director Marcel Jenček. For years, Atrea chose to play it safe by having machine operators manually oversee the line: swapping out parts, recalibrating, and preparing machines for each new component. But several years ago, Daniel decided to boost efficiency on the shop floor by investing in TRUMPF automation – and the results were a breath of fresh air.

For more than 20 years, Atrea has relied on TRUMPF for new machinery. The company purchased its first bending machine in 2000, shortly after it began exporting ventilation systems to Germany. "That really boosted the quality of our systems," says Daniel. The task then was to build a production process that delivered the efficiency of mass production – despite the bespoke demands of each product. "We wanted fully automated production with minimal staffing of the machines. That also meant linking to a warehouse system to keep materials flowing smoothly," he says.

Daniel is the second generation of his family to head up the company. His father Petr Morávek founded Atrea in 1990 in the laundry room of their family home – shortly after the Velvet Revolution, the collapse of the Soviet Union and the dissolution of Czechoslovakia. Before that, Petr had worked for a large state-owned enterprise. It was the era of cheap nuclear power, when ventilating a hall meant simply throwing open the doors – even in winter, when temperatures dropped to minus 20 degrees. Radiant heaters warmed the incoming air, while fans kept it moving. Petr quickly recognized how much energy this approach was wasting, and his first step was to insulate the hall. That insight led to the idea for his first heat recovery system. The principle was simple: each unit had two fans, one for air intake and one for exhaust. The warm indoor air simultaneously heated the cold air coming in from outside. "The modern systems we use today still work on a similar principle, only now they're far more efficient," says Daniel. Today's units are also much more complex, he adds, but back then his father's ideas were viewed with a great deal of skepticism: "Nobody thought it was a good idea at the time."

Living lab in the family home

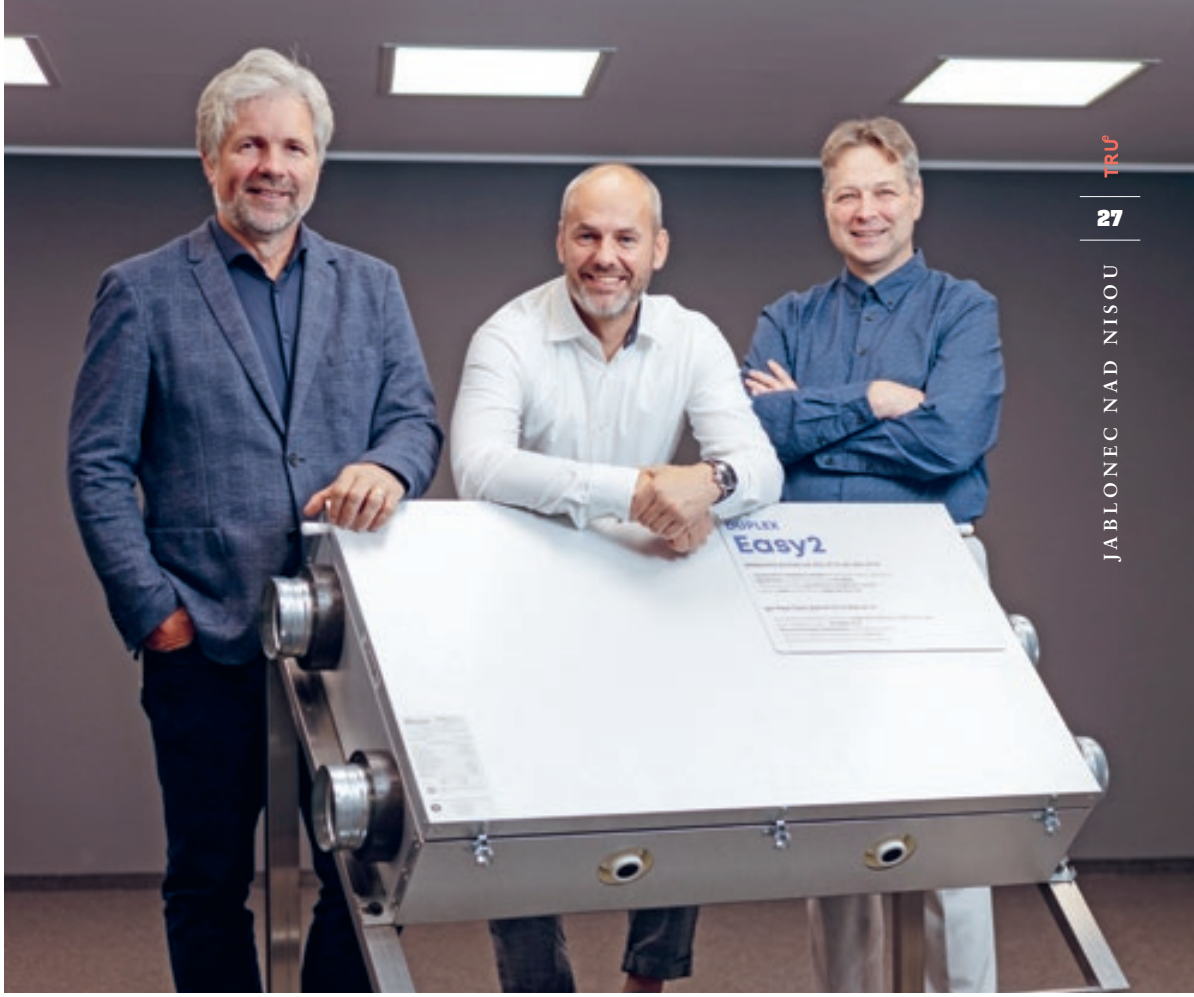
After all the political upheaval, Petr continued pursuing his goal, spending two years in the family home developing his original concept. This led to his technological developments for passive houses and low-energy homes. Yet the family faced great uncertainty in those early days. While Petr built the new company, his wife, Tat'ána Morávková, initially kept her job at another firm – but two years later she was finally able to join the family business.

> " The machines are **more compact,** use **less energy** and are **cleaner to maintain**. "
>
> Daniel Morávek,
> CEO Atrea

Today, Atrea's production facilities are based in Jablonec nad Nisou in northern Czechia – 40 kilometers from the Škoda plant, 80 kilometers from Prague and 20 kilometers from the German border. In 2014, the family built a 20,000m² production hall to their own specifications. The aim is to deliver solutions that are sustainable not only for their customers, but also for Atrea itself. To cut energy

IMAGES: Tobias Ebert

Manual work: Automation has eliminated the physically demanding aspects of machine operators' work, freeing up time to spend on other tasks.



Partnership: Daniel Morávek, TRUMPF's Ludek Finda, and technical director Marcel Jenček (left to right) have worked side by side for nearly 25 years.

and maintenance costs, the company uses TRUMPF machines with servo drives. The key benefit is that the drive runs only during machining; otherwise, the hydraulics remain idle. "The machines are more compact, use less energy and are cleaner to maintain," says Daniel. In 2019, Atrea invested in new machines, Oseon production software and a connected STOPA storage system, a move they had been planning since 2016. Today, their TruPunch 5000 punching machine and TruLaser 3030 fiber laser cutting machine run fully automatically, with workers simply launching the required program, while the STOPA system keeps materials flowing on its own. "These machines make our production processes more flexible. Oseon tracks which parts are being made, no matter how similar they look, while the STOPA system changes over materials automatically and puts finished parts back into storage," says Daniel.

In the past, Atrea turned out around 100 parts an hour; today it's five to six times that – 85,000 to 100,000 parts a month. Toxsustain this pace, the company's five CNC programmers generate programs for some 600 to 800 distinct components every day. Before installing TRUMPF's automation solutions, Atrea outsourced around 70 percent of the parts for its products: "Today,

Automation: A fully automated STOPA storage system now organizes the entire material flow, dramatically boosting Atrea's productivity.

Customer details

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Email: export@atrea.eu
www.atrea.eu

Machinery

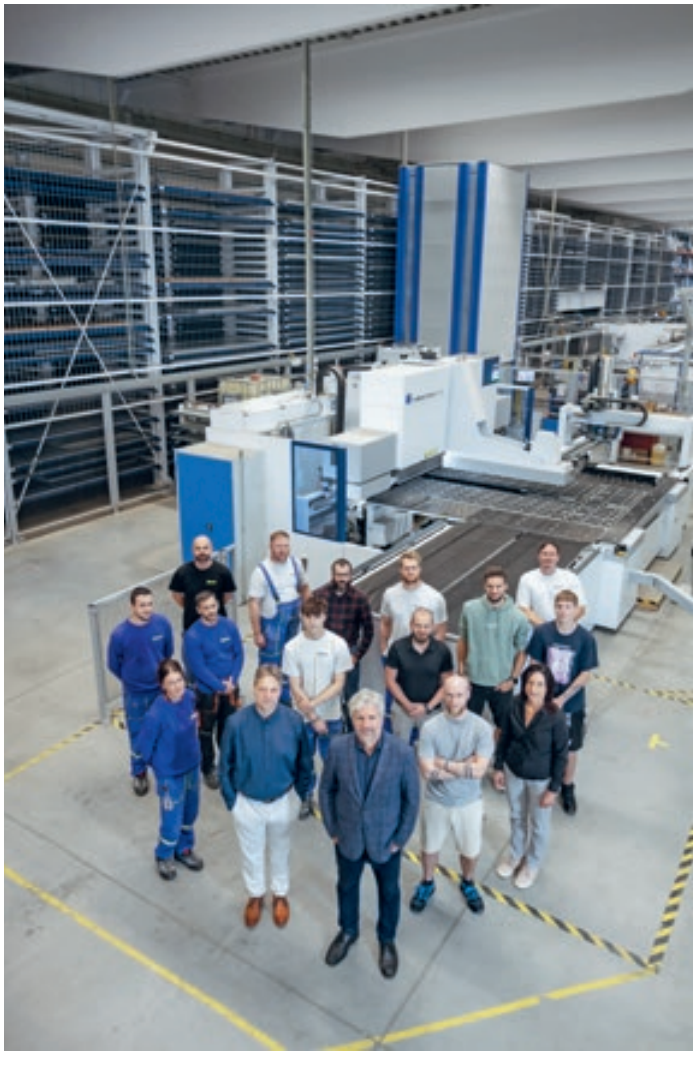
- 2x TruPunch 5000
- TruBend Center 7030
- TruBend Center 5030
- TruLaser 3030 fiber
- TruBend 5130
- TruBend 5085
- TruBend 3100
- 2x TruBend 7036

we manufacture 100 percent of our systems in-house," says technical director Marcel Jenček. Staff now take on very different roles from the physically demanding machine work of the past, and Atrea has a stronger platform for growth. In 2024, it integrated Czech heat-pump manufacturer Master Therm into the family-owned group – and it now has the capacity to handle a large share of Master Therm's production as well.

Looking ahead: R&D and expansion

Daniel has no intention of slowing down. Competition in the sector is fierce, and his company's in-house test lab, the Airlab, is constantly exploring new trends. "Developing new products and boosting productivity are the key to staying competitive," he says. Atrea plans to keep growing, and it already has plans for expansion and building permits at the ready. Daniel intends to double the company's manufacturing space.

The Covid-19 pandemic heightened people's awareness of the need for fresh, clean indoor air – a trend that makes him feel confident about the company's future: "Wherever people live and work, they always need fresh air."



Growth: Atrea is gearing up for growth. It currently produces its systems on a 20,000-square-meter site that employs some 400 people. Daniel Morávek plans to double that floor space.

IMAGES: Tobias Ebert

03

A closer look:

Bending to perfection

Whatever the size or complexity of a sheet-metal part, **modern bending processes** set a high bar: customers expect better quality and greater throughput even as skilled labor becomes harder to find. **Automated bending systems** from TRUMPF help manufacturers meet this challenge head-on. They produce consistent results, ease the strain on operators where it counts, and deliver the first good part after just a short ramp-up. In this feature, we present three TRUMPF automated bending solutions tailored to different needs – **from short runs** with high part variety through to **fully automated series production.**

In brief

Better bending: how automation makes the difference

From compact entry-level setups to fully connected high-end cells, profitable sheet-metal bending today demands flexibility – whether coping with changing part geometries, tighter requirements or scarce resources. **TRUMPF offers automated, precise and flexible solutions to meet just about any challenge**. From complex large parts to short runs with frequent changeovers and end-to-end Smart Factory workflows, **TRUMPF bending systems** turn **automation** into a genuine **competitive advantage.**

TecZone Bend

When variety meets volume: TruBend Cell 5000

The **TruBend Cell 5000** is designed for anyone looking to produce a broad range of parts economically and at scale, whether in machine building, contract manufacturing or as a supplier. This automated bending cell doesn't just boost productivity; it also offers greater predictability regardless of which operator is at the controls. The combination of the TruBend 5000 press brake, BendMaster robot (for up to 40 or even 100-kilogram part weights), automatic tool and gripper change, and smart angle measuring systems (ACB Laser or ACB Wireless) ensures precision from the very first part. What's more, integrated interfaces make it easy to connect automated guided vehicles, enabling the end-to-end automation that is the hallmark of a true Smart Factory environment.

Quick start thanks to rapid offline programming

When time is tight and part geometries keep changing, offline programming solutions like TRUMPF's TecZone Bend and TecZone Fold make all the difference. Instead of creating programs manually, the software automatically calculates suitable bending sequences – fast, reliably and with real-time collision checking. This reduces pre-production effort and guarantees consistently high quality, even for frequent design changes. For operations with high part volumes or multiple one-off pieces, it's a genuine efficiency boost – especially when resources are stretched thin.

TecZone Bend

TecZone Fold

Compact, flexible, perfect for small parts: Flex Cell with TruBend 7050

Manually bending small parts can be time-consuming and labor-intensive, especially at medium to high volumes. **Flex Cell** offers a smart, straightforward solution: it transforms the manual **TruBend 7050** into TRUMPF's fastest mobile bending cell in next to no time. Docked to the bending machine in just a few simple steps, it takes over defined workflows autonomously, providing a compact, fast and reliable solution. The key benefit is that users can switch between manual and automated modes as needed, because the unit can be detached just as quickly as it was docked. With a footprint of less than 10 m², high loading capacity and up to 42 hours of autonomous operation, the Flex Cell offers truly impressive speed and versatility. And thanks to TecZone Bend software, programming the bending cell is now faster and more flexible than ever. While the machine is running, the complete bending and robot program can be created offline at the desk at the push of a button, including real-time collision checks. That slashes programming time from as much as two hours to just a few minutes and makes complex geometries feasible for the first time. The TruBend Cell 7000 boasts even greater speed: optimized for the smallest components, it offers ultra-fast cycle times and maximum autonomy.

Automatic swiveling, precise bending: TruBend Center 7030

Panel bending of large or complex workpieces takes experience – and muscle. The new **TruBend Center 7030** takes care of both, fully automatically. It is designed for companies that produce large sheet-metal components with high repeatability, for example in the enclosure manufacturing, HVAC or furniture industries. An angle drive with two synchronized linear axes enables an exceptionally precise bending motion. Even on mild steel up to three millimeters, the machine achieves robust, low-mark results, including radius bends and angles up to 135 degrees. The ACB Laser system ensures accurate angles while ToolMaster Bend handles automatic tool changes. Equipped with the SheetMaster loading and unloading system and integrated with a storage solution, the machine produces parts up to three meters long – continuously, reliably and efficiently. The new model is up to 30 percent faster than its predecessor and requires a lower upfront investment.

04

GERMANY

Safety in Ditzingen

MAKING MACHINES SAFER

TRUMPF invests substantial **time and money** to ensure its machines are **safe** for customers. Many lower-priced competitors – particularly from Asia – take a very different approach. Unsafe machines pose a risk not only to operators, but also to the companies that are liable if something goes wrong.

IMAGES: Klaus Schwaiger

BendGuard: Safety instructions are always in the operator's line of sight. The BendGuard technology itself remains invisible, yet is capable of shutting the machine down in fractions of a second when necessary.

TRUMPF's Customer Center in Ditzingen – A TruBend 5230 is bending a stainless-steel sheet several millimeters thick, and its 230-metric-ton press force makes the material look almost pliable. Andreas Kuch, a machine operator at TRUMPF, started the machine after carefully positioning the sheet between the bending tools – but seconds later it suddenly comes to a halt. Kuch moved his hand too close to the bending tool, and the BendGuard – an integrated laser safety system – recognized the danger and switched the machine off in mere fractions of a second. This is one example of the kind of safety system that allows people to work safely with TRUMPF machines all over the world.

Product safety from the outset

Last year, German professional associations registered over 780,000 notifiable workplace accidents, a quarter of which involved machines and tools. Most of the big machine makers invest significant quantities of time, money and innovation in preventing such accidents. At TRUMPF, the task of making its machines as safe as possible falls to the Product Compliance central department, working alongside safety specialists for each of the different machine types. It starts with repeated risk assessments at the development stage and continues well beyond the safety acceptance sign-off following installation at a customer's site. Before the machine is put into service, TRUMPF experts provide the customer's employees with comprehensive training – not just on how the machine works, but also on the many ways in which it keeps them safe.

Imported risks

It has long been clear, however, that some of the systems in European manufacturing facilities do not comply with current EU safety standards, especially when it comes to laser-cutting machines. This was even evident at Blechexpo 2021, one of the two leading fairs for sheet-metal fabrication in Europe. A visitor to the fair was actually able to open the door to the interior of a laser-cutting machine from Asia while it was in operation. The laser beam was still active – a hazardous situation since laser radiation poses a significant risk to people's eyes.

Incidents like this have raised the alarm among market surveillance authorities, which are now running regular inspections of machines exhibited at trade fairs to determine whether they comply with safety standards. Machines that fail to pass the test are shut down or rated as non-compliant. Nonetheless, some manufacturers, especially low-cost providers from Asia, continue to ignore these requirements, which is why fair visitors still come across machines with open doors or missing beam guard devices. It's impossible for the authorities to check every machine, but they are certainly ramping up their work, probably spurred on in part by TRUMPF's efforts in this area.

Safety expert: Alexander Kunz drives TRUMPF's efforts to improve laser-cutting machine safety across Europe.

Safe door, safe glass

We're back at the TRUMPF facility in Ditzingen. Sparks are flying in a TruLaser 5030 as the laser beam cuts through a sheet with millimeter precision. Demo technician Uli Schrade rattles the door leading into the machine – and it stays firmly closed. If he were to attempt to force his way in, the machine would immediately turn itself off. Door interlocks prevent it from operating if the door is open. If someone were to enter the danger zone where the automation system is at work, this has its own separate safety features to shut the machine down, such as door interlocks or a safety light curtain. And anyone watching the laser-cutting process through the viewing window can do so with confidence: special protective glass shields the eyes and achieves laser class 1 safety.

Product safety expert Sonja Pfenninger points out further, invisible safeguards: an extraction unit removes harmful dust in seconds; a complex network of light curtains divides the system into separate hazard zones so the operator can work safely and comfortably; and some interventions even require conscious acknowledgment of the safeguards – for example by pressing a foot pedal or a button.

Checklist: Together with fellow specialists, Kunz has drawn up a comprehensive safety checklist for laser-cutting machines. Market-surveillance authorities now use the checklist as well.

"There are strict rules for many of these machines," says Alexander Kunz, head of Product Management and International Sales at TRUMPF in Austria. "But some competitors simply don't stick to them." Kunz has seen machines with signs saying "Please wear safety glasses" – a clear indication that the viewing panel

Control panel: Demonstration engineer Uli Schrade shows how every safety parameter is clearly visible on the display before the laser can start.

in the door is not made from protective glass. He has also come across equipment bearing counterfeit CE markings that create a false impression of safety while falling far short of European requirements.

Protecting operators, owners and manufacturers

"We want to protect operators from injury and companies from financial risk," says Kunz. Unsafe machines can threaten an SME's very existence, because the machine owner is also liable in the event of an accident.

TRUMPF works on multiple levels to improve occupational safety. Following the Blechexpo incident, a team led by Kunz and Pfenninger drew up a checklist for laser-cutting machine safety that was recognized by Germany's Federal Institute for Occupational Safety and Health. Using this checklist, TRUMPF trained market surveillance officials to make them better at spotting safety deficiencies.

IMAGES: Klaus Schwaiger

Light curtains: An invisible web of light curtains ensures that TRUMPF machines run only when nobody is present in the safety zones.

> “ We want to protect operators from **injury** and companies from **financial risk**. ”
>
> Alexander Kunz, head of Product Management and International Sales at TRUMPF in Austria

Plugging safety gaps

TRUMPF service technicians are also careful to keep an eye out for unsafe machines at customer sites; if they identify a hazard, they notify the customer in writing. And if the risky machine is located in the technician’s immediate work area, they can insist that it be switched off.

Retrofitting an unsafe machine can be expensive, sometimes running into five figures. That’s why TRUMPF and other European machine makers are demanding that importers comply with local safety regulations when they bring machines into Europe and asking authorities to enforce these regulations more rigorously.

Complex market surveillance

Six leading European machine builders have petitioned policymakers and the European machine-tool association CECIMO to establish a single EU-wide market surveillance authority. At present, there are around 500 such authorities operating in Germany alone, and about 2,900 across Europe. They use more than 50 different IT systems, and there is a clear lack of consistency when it comes to interpreting the existing rules. The association has called for closer cooperation between industry, customs and market surveillance authorities to ensure compliance with EU product safety directives and regulations – and to level the competitive playing field.

“The fact is that machine safety eats up an enormous amount of time and money,” says Kunz. “That simply isn’t reflected in the price of many low-cost machines. That’s why I strongly urge anyone in the sheet-metal community buying imported equipment to take a close look at it themselves. It’s always better to double-check!”

Cyber security at TRUMPF

At TRUMPF, staying safe means not only protecting machine operators, but also protecting sensitive data. Cyber security is therefore a top priority, especially where customer information is concerned.

How TRUMPF enhances the security of its data, products and processes at every level.

These efforts focus on three key areas:

Information security: TRUMPF’s Ditzingen site maintains ISO certifications across all business units to protect internal and customer-specific data. At the same time, the company is preparing to implement the EU directive on network and information security, which mandates strict reporting requirements for security incidents.

Product security: All TRUMPF products are developed to the standards laid down in the EU Cyber Resilience Act, which sets binding security requirements for digital components. Secure software-development processes, detailed risk analyses and regular security updates further enhance product reliability.

IT security: An annually updated Cyber Security Roadmap sets clear milestones and drives the continuous improvement of TRUMPF’s overall level of IT security.

BIZ+

SHORT CUTS

Innovations, technologies and future trends.

India in focus: TRUMPF opens new plant in Pune

In August, TRUMPF opened a **new production facility** in Pune, India. Stephan Mayer, CEO Machine Tools, and Pradeep Patil, managing director India, heralded the site as a milestone for local manufacturing and international collaboration. TRUMPF began operations in India in 2006 with just two employees – today the team numbers over 230. ThePune plant will start by building **TruBend Series 1000** bending machines and later add laser cutting machines, serving the Indian market first and, in time, customers across Asia, Africa and the Global South. With its growing industrial base, rising demand for sheet-metal fabrication and a young, skilled workforce, India is both a key sales market and an important **innovation hub** for TRUMPF.

TRUMPF opens state-of-the-art Smart Factory in the US

Farmington, Connecticut – TRUMPF has opened a **new Smart Factory** in Farmington, investing some 40 million US dollars. The 5,200-square-meter expansion strengthens regional machine-tool manufacturing as part of a **"local-for-local" strategy.** The fully networked, automated line manufactures sheet-metal components for TRUMPF machines built in the US, which go on to serve automotive, aerospace and agricultural customers. Visitors can tour the facility to see digital connectivity, automation and data-driven manufacturing in action. Designed by architecture firm Barkow Leibinger, the sustainable building features smart-glass windows for optimal climate control and is pre-wired for solar. TRUMPF has been manufacturing in Farmington since 1969 and produces all laser cutting machines for the North American market there. The new factory underscores the company's commitment to **innovation, technology and growth** in North America.

TRUMPF Portugal marks tenth anniversary

Over 500 machines installed at more than 300 customer sites – that's the impressive track record of TRUMPF Portugal as it marks its tenth anniversary. Since 2015 the company has become a leading provider of **end-to-end solutions for sheet-metal fabrication.** "The TRUMPF Group's investment in the Portuguese market has clearly paid off. The market values TRUMPF's technologically advanced solutions as well as the quality of our technical service," says Juan Manuel Sanchez, general manager of TRUMPF in Portugal and Spain. With the launch of the TruShop platform, which enables customers to purchase parts, tools and accessories online, TRUMPF has once again shown that customer focus remains its top priority.

IMAGES: TRUMPF

Semiconductor technology center in Malaysia is new high-tech hub

At the **Semicon Southeast Asia** trade fair, TRUMPF Electronics announced the opening of a regional technology center in Kota Damansara, near Kuala Lumpur. The new hub strengthens the company's presence in the booming southeast Asian semiconductor industry and gives local customers direct access to innovative solutions. Strategically located near the airport and port, the facility offers state-of-the-art infrastructure to streamline customer processes. Products showcased at the fair included **TruPlasma RF generators and matchboxes –** key components for deposition and etching in semiconductor fabrication.

TRUMPF and STOPA growing closer

TRUMPF is expanding its successful partnership with STOPA, one of the leading manufacturers of automated storage systems. By increasing its **stake in STOPA from 25.1 to 74.9 percent,** TRUMPF is solidifying its position as a provider of innovative smart-factory solutions in the machine-tool sector. For customers, tighter integration means even more powerful, sustainable and connected offerings from a single source. STOPA's automated storage systems enable intelligent loading and unloading of machines and efficient material logistics, thereby cutting non-productive time and driving long-term gains in productivity and competitiveness. "By taking this step, we're putting our long-standing collaboration with STOPA on a new footing. Our aim is to work together on the further development of smart-factory solutions and to offer our customers an even broader range of efficient, sustainable and productivity-enhancing options," says Till Küppers, COO TRUMPF Machine Tools. STOPA also sees the benefits of closer cooperation: "After almost 40 years of successful partnership with TRUMPF, we're excited to take the next step together," says STOPA COO managing partner Michael Stolzer.

Game Changer Award 2025 goes to TRUMPF

TRUMPF has received the prestigious 2025 Game Changer Award. The prize, presented by international consultancy Bain & Company and Manager Magazin, honors companies that **make disruptive change central to their business.** At the gala in Berlin, attended by more than 200 guests, Joe Kaeser, chairman of the supervisory board of Siemens Energy and Daimler Trucks, praised TRUMPF as "a beacon of German family entrepreneurship". Accepting the award, CEO Stephan Mayer said: "We can only gain new market share by staying relentlessly innovative for our customers." Other award-winners included Trade Republic, Nemetschek Group and Planet A Foods.

Remote. Smart. Proactive. Welcome to the service of the future

How TRUMPF customers quickly solve machine malfunctions themselves – without the need for an on-site visit.

A malfunctioning machine used to be synonymous with stress, downtime and a long wait. But today, many of TRUMPF's customers solve technical problems themselves – fast, reliably and digitally. All thanks to a combination of smart monitoring and intelligent services. Welcome to Service 4.0.

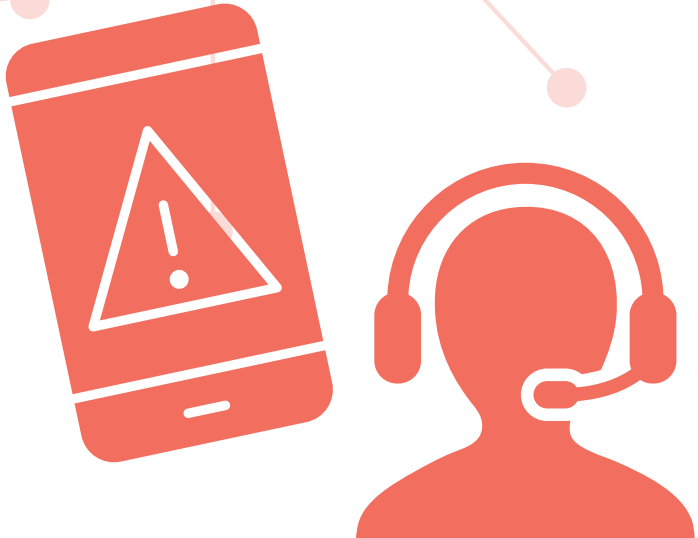
Condition Monitoring: catch faults before they happen

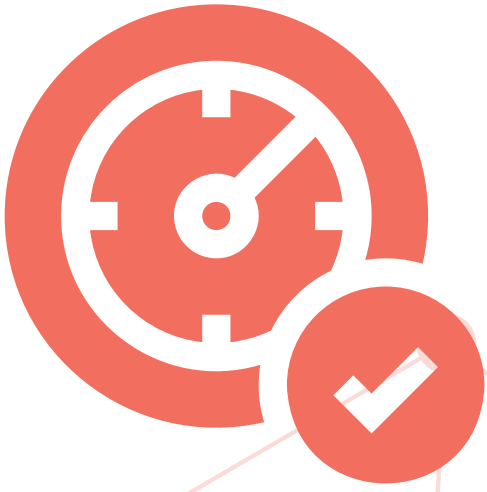
A mid-sized, family-run shop turns out hundreds of control cabinets every day, with virtually no buffer in the schedule. The laser cutting machine seems to be running like clockwork, but repeated acceleration is quietly loosening the cutting-head mounting. The problem is invisible to the operator, but it could result in quality issues or damage to the machine. Fortunately, the Predictive Service Center spots the anomaly early on via Condition Monitoring; after running detailed diagnostics, it gives the user specific instructions to tighten the mounting. Thus, one simple step prevents unplanned downtime. In this scenario, the customer benefits from a maintenance contract with TRUMPF thatxincludes Condition Monitoring. This option is also available as part of other service agreements – making scheduled maintenance easier, reducing stress and keeping availability consistently high.

Service app: confidence in the next step

In the past, a fault code on a machine display inevitably led to unplanned downtime. Today, a maintenance technician at an automotive supplier opens a digital service ticket in the TRUMPF Service app, selects the machine and fault – and receives instant support. Is the problem excessive mechanical resistance, or an electrical-signal issue in the bending machine? Depending on the fault, the operator receives step-by-step illustrated instructions for on-site troubleshooting through the Technical Guide; for example: 1. Check ACB Laser for stiffness and lubricate. 2. Remove the housing cover and test the proximity switch. 3. Tighten the drive coupling and check belt tension. Moments later, the machine is back in operation.

If the technician still has any doubts, they can connect directly to TRUMPF Remote Support via the app. A specialist will then provide live assistance with Visual Assistance, with no wait time and no need for a site visit. Some 70 percent of issues can already be solved remotely without requiring a site visit. With ever more connectivity and diagnostic tools available, remote support is faster, more direct and more convenient than ever. The **Remote Service Contract** makes this rapid support possible, with hotline access, remote login and real-time assistance. For those who want more long-term security – including spare parts, on-site visits and scheduled maintenance – the **Performance Contract** is the right choice.





Performance Check: reveal hidden potential on the shop floor

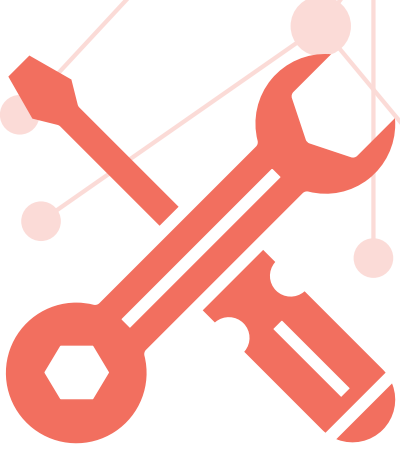
In Production at a metalworking company is stable, but output has fallen below expectations and quality is inconsistent. Keen to find answers, the production manager takes advantage of TRUMPF's free Performance Check, first unveiled at INTECH and Blechexpo. A team of TRUMPF experts analyses the machine data in advance, including machine-status records, service and error logs, and software versions – all enabled by the machines' connection to the TRUMPF network via existing connectivity functions. In a brief consultation – sometimes as short as 30 minutes – the experts identify untapped potential, from digital features that the customer has forgotten or overlooked to practical tips on preventing unplanned downtime. Whether it's a neglected filter, incorrect machine handling or a useful tool, small changes can have a big impact. For the customer, it's a targeted way to make sustainable improvements to efficiency. **All made possible thanks to smart connectivity from TRUMPF.**

Smart View for Machine Tools: everything visible at a glance

It's the morning walk-through at an agricultural machinery plant, and the production manager wants to know if there are any anomalies and if the laser cutting machine is running as planned. A glance at the Smart View for Machine Tools dashboard provides all the answers. Machine status, operating hours, downtime, program analytics and Condition Monitoring data – everything is presented in one convenient overview. Even downstream processes such as bending are visible through Oseon connectivity. As well as saving time, this overview offers the clarity needed to make decisions. With this **simple, efficient and digital solution,** operators can instantly spot deviations, analyze performance in just a few clicks and make targeted improvements to workflows.

Service fit for the future: spot more, pay less

TRUMPF is continually improving its service offerings and contract models to make things even easier for its customers over the long term. By servicing their machines regularly and using digital tools, customers gain the double benefit of fewer failures and better conditions. At the same time, TRUMPF is constantly expanding its digital solutions. In the future, this will make it even simpler for customers to spot problems early on and fix them remotely – with no on-site visit required. **Service that thinks ahead – and pays dividends.**



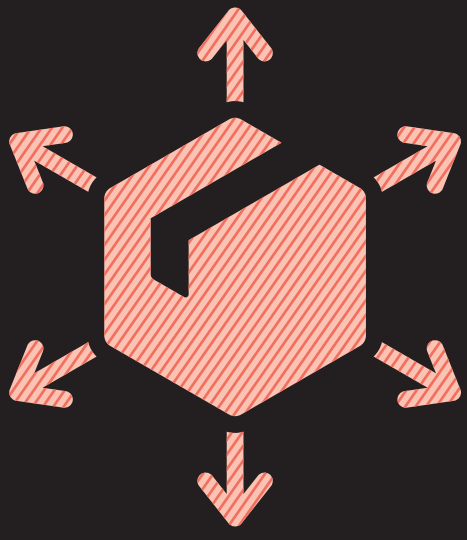
Check it out!

SPARE PARTS IN RECORD TIME

When a machine breaks down, every minute waiting for the right spare part costs the customer money. At **TRUMPF's logistics center in Ditzingen,** technology, digitalization and teamwork run in top gear: 1,500 spare parts leave the warehouse every day, often on the same day the order comes in. By maintaining this rhythm, TRUMPF is setting new benchmarks for speed and precision in the industry.

1,500

orders a day leave TRUMPF's logistics center on average – many within hours of being placed. High availability and a rapid response keep its customers' production lines running without interruption.



TRUMPF's logistics center in Ditzingen is the backbone of the company's global spare-parts supply chain and one of the most advanced of its kind in the industry. **85,000 spare parts** are kept permanently in stock here. This enormous capacity allows even seldom-used items to be shipped immediately – ensuring fast, frictionless delivery without long waits.

In **99%** of cases, shipments leave the TRUMPF logistics center on the exact day scheduled. In the last fiscal year, the team hit a streak of

100%

on 100 consecutive days! That means customers can plan with confidence, with no unpleasant surprises and no unnecessary delays.

85%

of all orders ship the same day and reach the customer the very next day. For customers, this means spare parts are available on-site in next to no time, ensuring minimal downtime and maximum productivity.

Besides Ditzingen, four additional warehouses in **China, Singapore, the US and the Netherlands** make sure that customers receive their spare parts swiftly and reliably. Together, these sites handle around **1.4 million orders** a year.

300

Behind this global logistics powerhouse is a finely tuned team of **300 employees,** supported by smart systems and committed to a shared goal: providing TRUMPF customers worldwide with the best possible service. Fast. Precise. Reliable.

75%

of all spare parts are stored in an automated small-parts warehouse. An elevator delivers parts to the picking stations – so efficiently it seems like magic! For customers, this means faster delivery and maximum availability, even at short notice.

Barcodes, scanners and dashboards enable seamless digital tracking. Only the delivery note is still on paper for legal reasons. For TRUMPF customers, this means maximum transparency, allowing them to check the status of their shipment at any time.

Five meters above the floor, an endless conveyor belt circles through the warehouse, known simply as the

LOOP.

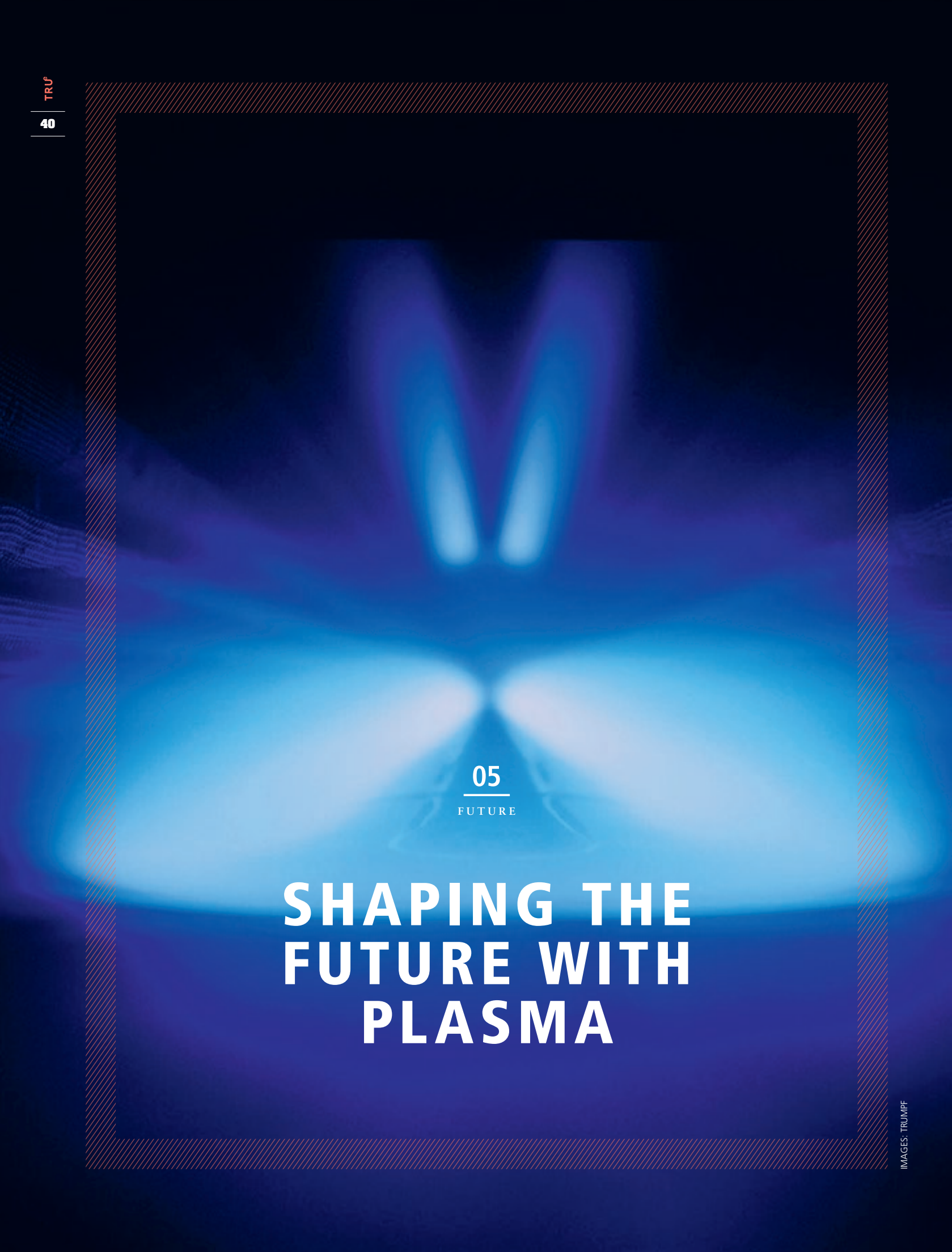
It can carry up to **160 boxes** of parts at once, delivering them automatically to the right stations. Without the Loop, everything would grind to a halt.

Top-notch performance every day
6:00 a.m. – Early shift begins
7:00 p.m. – Last truck leaves the dock
Goal: 1,800 shipments a day

Light signals show which part belongs where. This **pick-by-light system** is intuitive and accessible to everyone, regardless of language or experience. It guarantees error-free picking and maximum delivery accuracy, giving TRUMPF customers the planning certainty they need.

An **intelligent scale** automatically compares package weight with order data, preventing errors and guaranteeing the quality of every shipment.

Behind a glass wall, the team in the **control center** keeps an eye on the warehouse and orchestrates processes worldwide – including in the US and Asia. Dashboard monitors provide live updates on each part's location. If something goes wrong, the system instantly sounds the alarm and the team steps in. TRUMPF customers benefit from a supply chain that runs smoothly and seamlessly – worldwide.



05

FUTURE

SHAPING THE FUTURE WITH PLASMA

IMAGES: TRUMPF

Many industrial companies have committed to fighting climate change and are keen to cut their CO_2 emissions. **Electrically powered plasma torches** could become a driver of decarbonization in the chemical, medical and steel industries by replacing conventional heating and cooling processes. Equipped with new generators offering greater precision and efficiency, such as those made by TRUMPF, they have the potential to become a genuine **game changer.**

In a production hall, a tunnel furnace is roaring. It used to be fed by an energy-hungry gas burner; but today only the hiss of a 250-kilowatt plasma torch can be heard, powered by renewable electricity. This torch reliably brings the furnace up to temperature while saving thousands of metric tons of CO_2 every year. For now, this is still just a hypothetical scenario. But what is already working in pilot projects could become an industry standard within a few years.

Over 60 percent of the energy consumed by German industry is used for process heat – generating high temperatures for operations such as melting steel or sterilizing medical devices. Enormous amounts of energy are also needed for process cooling. In chemical plants, for example, reactors must often be kept at a constant low temperature so that reactions do not spiral out of control.

Food producers cool entire halls or storage tanks to keep meat, milk and beverages fresh. Together, these two segments account for roughly 30 percent of industrial carbon emissions. In the steel sector, emissions can reach 1.9 metric tons of CO_2 per ton of crude steel. Worldwide, the sector is responsible for between seven and nine percent of all greenhouse gas emissions – about the same share as global passenger-car traffic.

What plasma can do

Plasma is often called the fourth state of matter. When a gas is supplied with a high amount of energy, it ionizes and becomes electrically conductive. An electric arc forms between the nozzle and the electrode, heating the gas to temperatures of up to 30,000 degrees Celsius. This concentrated energy beam can coat, expose and etch microchips, but it can also be used to generate process heat in a rapid and targeted manner without an open flame.

Unlike gas burners, heat here is produced not by combustion but by electrical energy, using a process that can be precisely regulated and is both clean and pinpoint-accurate. TRUMPF's generators, for example, are already being used with great success by customers, though for competitive reasons they would prefer not to be named in connection with this new breakthrough. At one mid-sized plant engineering firm, for instance, a plasma torch runs on a permanent basis. Every day, it enables machining of components made from high-strength steel that previously had to be painstakingly pre-heated with gas burners.

Today, the process runs on electricity: it is more uniform, cleaner – and uses about 20 percent less energy. Each year, this saves the company several hundred metric tons of CO_2. Shop floor workers appreciate not only the efficiency but also the quieter, more controllable operation with no open flames. And the benefits of plasma torches extend beyond their carbon footprint: their enclosed design, digitally controllable power input, and option of remote monitoring make them safer and more robust than open burners. No explosive gases are produced, and process parameters remain stable even in continuous operation. For many companies, that's a decisive plus in day-to-day operations.

PLASMA IN ITS PUREST FORM: The vivid colors pictured here are at the heart of modern heating and cooling processes.

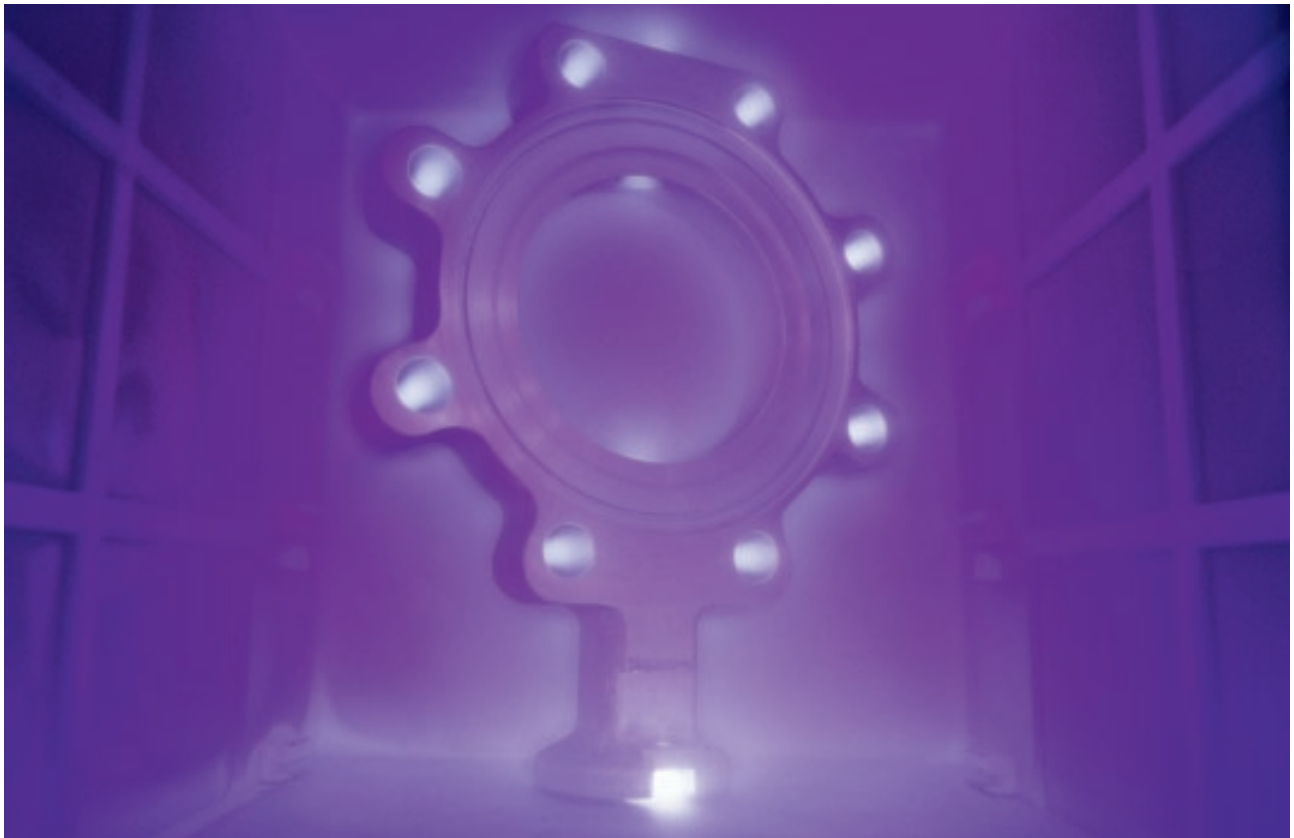
Decarbonization: potential equivalent to 300,000 wind turbines

If European industry alone were to electrify its process heat with green electricity, it would generate around 0.8 petawatt-hours of fossil-free energy each year – more than the annual electricity consumption of all German households. For comparison, producing that amount of energy with a wind farm would require roughly 300,000 modern turbines running at full capacity for an entire year. Decarbonizing the German steel industry would additionally require around 400 terawatt-hours of CO_2-free electricity by 2050 – seven times the sector's current consumption. That's equivalent to the annual output of 40 nuclear power plants, with their monthly electrical net output of approximately one gigawatt, or the electricity demand of more than 100 million households.

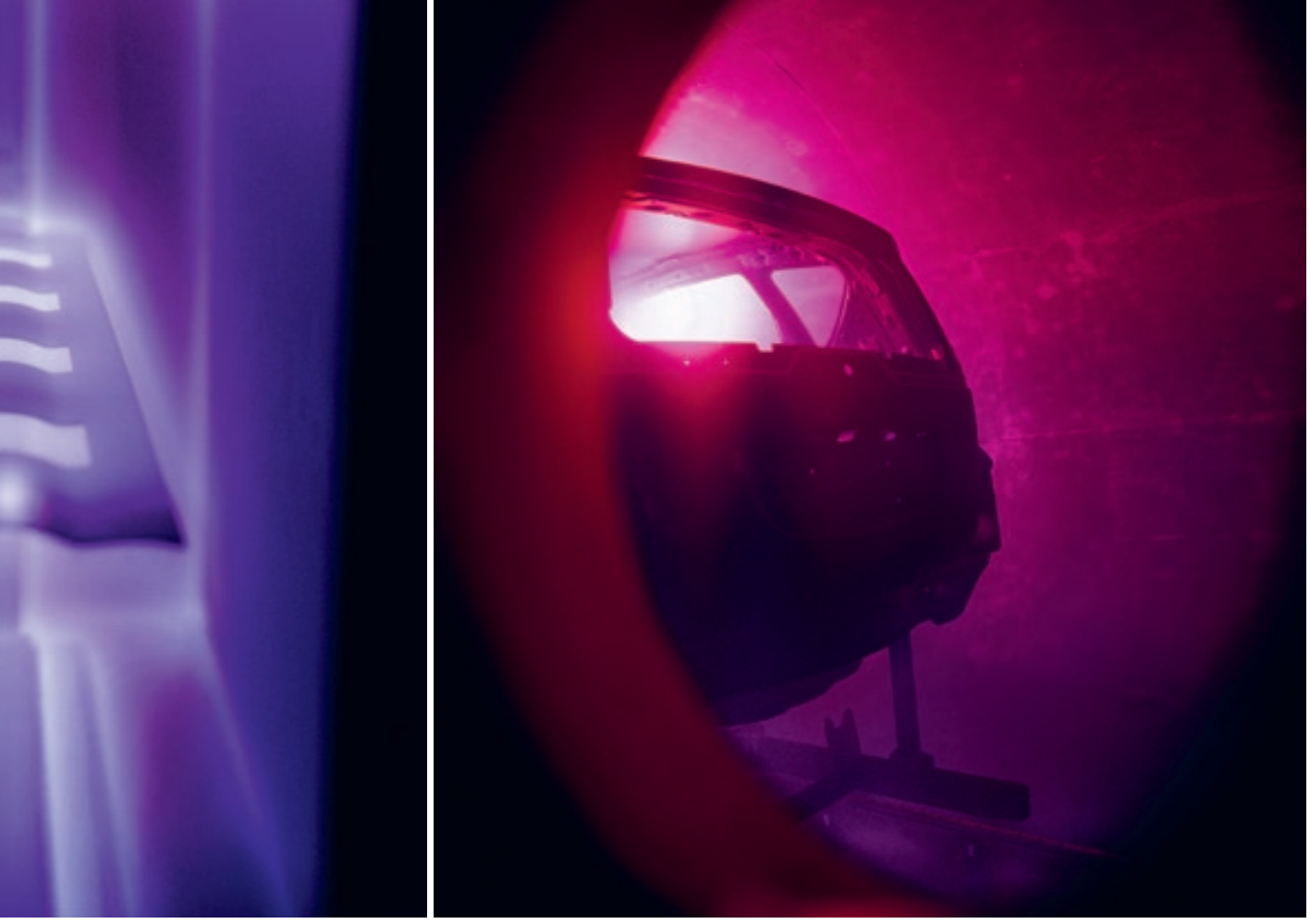
These magnitudes show the scale of the leverage involved. Pilot projects in other countries show that it can be done: in Sweden, an industrial consortium has successfully replaced a gas furnace with a 250-kilowatt plasma torch, reliably bringing the system to its target temperature with zero CO_2 emissions. In Canada, a concrete producer is trialling plasma jets in rotary kilns and reporting falling operating costs. Meanwhile, a German plant manufacturer is developing hybrid solutions that combine electricity and gas.

TRUMPF forms the bridge

To unlock this potential, the right technology is crucial. TRUMPF's Electronics division doesn't supply the torches themselves, but rather their core component: the power source. Its high-frequency generators deliver electricity to the torch that is precisely tailored to each process. They form the bridge between green electricity and industrial application, and are the only way to scale the technology in an economically viable way. It is not necessary to make the transition all at once. Many companies are opting for hybrid systems that combine electricity and gas. This gives them time to



IMAGES: TRUMPF



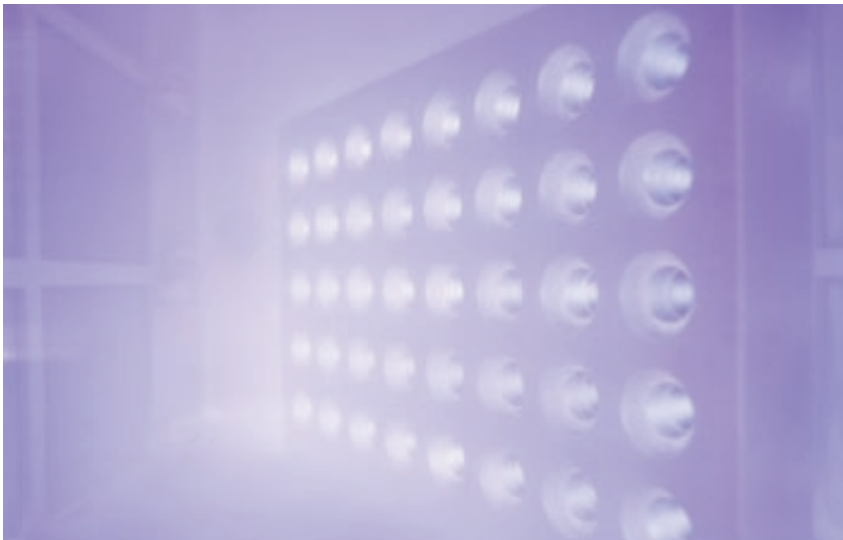
gather experience and make staged investments to gradually reduce the fossil-fuel component. While high industrial power prices are slowing adoption in Germany, interest abroad is accelerating.

In Canada and the Nordic countries, companies benefit from cheaper green energy, enabling faster payback on investments. These markets serve not only as testing grounds but also as proof that large-scale electrification of process heat is technically and economically feasible. Beyond heat, process cooling is another energy-intensive component of industrial operations. In the food and pharmaceutical sectors, electrical plasma systems could eventually not only provide heating, but also contribute toward efficient cooling, doubling their appeal and making investments even more attractive.

From hybrid to fully electric

As renewable electricity becomes more widely available, plasma torches could find their way into even more industries – from chemicals to glassmaking. The technology is mature, the applications are many and diverse, and policy is shifting ever more decisively toward decarbonization. Early adopters will gain not only technological advantages, but also a clear competitive edge.

Today, plasma torches are an established part of many manufacturing processes – from melting in metallurgy to surface treatment in electronics production. But there is still plenty more potential to tap. "The technical capabilities have long been there – the question is whether we have the will," says Carsten Winnewisser from TRUMPF's Electronics division. With increasing availability of green electricity and high-performance generators, the role of plasma torches could shift from being a niche tool to a driver of net-zero industry. Companies that switch to electric processes today can cut emissions while boosting their efficiency, reliability and future-readiness. Sometimes a single electric torch is enough to light up an alternative path.



PRECISION: This luminous matrix of plasma nozzles delivers precisely targeted, electrically generated heat for a host of industrial applications.

TEC+

SHORT CUTS

Innovations, technologies and future trends.

TRUMPF presents the new TruBend 3000

TRUMPF will be unveiling an all-new generation of its **TruBend 3000** bending machine series at **Blechexpo 2025.** Adopting key technologies from the premium TruBend 5000 line, the new model is faster, more precise and more energy-efficient. It also boasts a roughly 40-percent reduction in throughput times compared to its predecessor. "In this price segment, the TruBend 3000 is a front-runner in the market in terms of both productivity and part accuracy," says product manager Wolfgang Weingartsberger. Capable of handling most parts in sheet-metal fabrication, the machine offers 85 to 230 metric tons of press force and bending lengths of between two and four meters, depending on the model. The automated ACB Laser angle measuring system delivers consistently high quality from the very first part, reducing scrap and costs. Offline programming is easy thanks to TecZone Bend, which automatically determines the bend sequence and performs collision monitoring. The on-demand servo drive cuts energy use by up to 30 percent, while the BendGuard with camera and sensor technology keeps operators safe. Thanks to its digital interfaces, the TruBend 3000 slots perfectly into a smart-factory environment. And with TRUMPF services such as Condition Monitoring and Remote Control, it helps minimize unplanned downtime.

Rethinking laser welding with the TruLaser Weld 5000

TRUMPF's new TruLaser Weld 5000 offers a state-of-the-art solution for **automated laser welding,** combining top-tier weld quality with intuitive operation and programming. Upgrades over the previous model include a new safety enclosure that provides better access and shorter installation times, an energy-efficient fiber laser, low-power robot controls and enhanced TeachLine sensors that make reteaching easy via the HMI. Technologies such as BrightLine Scan and BrightLine Weld ensure stable processes and flawless seams – even with aluminum. And thanks to its modular design, the system allows for flexible configuration of everything from enclosure size to positioning and handling options for parts of all sizes.

A simple solution for automated material handling

Developed with SAFELOG, TRUMPF's new Material Flow Kit automates the material flow in sheet-metal fabrication without requiring full **digitalization of the production environment.** Mobile robots transport palletized parts among as many as nine stations, including machines, workstations and shipping points. These can be controlled via a web app on any mobile device on the company network, allowing staff to create transport orders with just a few clicks and then get back to focusing on value-adding tasks. The robots can carry up to one metric ton and adapt their routes as needed. The system is quick to set up and sets the stage for companies to deploy TRUMPF's Oseon software to fully synchronize material flow.

IMAGES: TRUMPF

TruPunch 2000 makes a comeback

TRUMPF is reintroducing its compact **TruPunch 2000** punching machine to the European market, offering an economical entry-level solution for automated punching or a flexible way to handle peak loads. With 165 kN of punching force, up to 900 strokes per minute and an electrohydraulic drive, the machine can process a broad range of parts cost-efficiently, even at low rates of utilization. An open design and a 180 × 500-millimeter part chute provide excellent accessibility, while short setup times and high flexibility set the machine apart from traditional turret punch presses. Optional automation with the SheetMaster Compact ensures uninterrupted material flow, and the built-in linear magazine makes tool changes quick and easy.

TRUMPF's fastest mobile bending cell gets even more flexible

Flex Cell – the fastest mobile bending cell in the TRUMPF line-up – enables automated operation of the high-performance TruBend 7050. And thanks to **TecZone Bend** software, the solution is now even more flexible. Users can program the bending cell offline, say from the office, while the machine keeps producing parts, thus boosting shop-floor productivity. Programming is now quicker and simpler, too: the complete bending and robot program can be created in a single step, including real-time collision monitoring. "The program is created at the push of a button and can be flexibly adjusted at any time. All the user needs to do is upload the part's CAD data into the software and let it generate the program," says TRUMPF product manager Wolfgang Radler. Previously, programmers had to create separate bend and robot programs, a process that could take up to two hours; with TecZone Bend, programming time drops to just a few minutes. The new software also eliminates the former limit of four bends per part, making it possible to program even more complex geometries. Thanks to its high flexibility, the Flex Cell is suitable for a wide range of companies and industries. It's a genuine game changer for manufacturers, especially those running small to medium batch sizes with recurring parts.

The easy way to keep even more machines up to date

TRUMPF is expanding its **Online Update service.** From now on, all new machines receive security updates as standard, and flatbed machines also get regular machine software releases with bug fixes and enhancements. Owners of compatible machines that do not have the service activated by default can subscribe to updates free of charge in the **MyTRUMPF customer portal.** As soon as a new software version is released for a given machine, the operator is notified on the control panel. At that point, they have the flexibility to decide whether and when to start the secure update process, with no extra effort required on their part. Customers gain not only the latest features and improvements, but also greater convenience and transparency in daily operation, keeping their TRUMPF machines up to date at all times without extra work for users.

In the long run, there is no alternative

For many companies, the circular economy is little more than a buzzword. At TRUMPF, it is both a strategic mission and a business model. In this interview, program manager Thomas Rauser explains how the high-tech company ensures that refurbished products meet the same quality standards as new machines, how this helps cut CO_2 emissions – and what additional benefits it offers customers.

Mr Rauser, you're the head of Circular Economy at TRUMPF. What drew you to this field?
For me, the circular economy brings together three things that are very close to my heart: technology, commercial viability and sustainability. I spent many years immersed in the technical and financial sides of the business, but at some point that wasn't enough for me. I wanted to play an active part in making today's world more sustainable, and the circular economy seemed like an ideal field to focus on. It's the one principle that really works when you have to manage finite resources.

What do you mean by finite resources?
Most companies behave as though raw materials were limitless, but that's an illusion. The typical pattern is: extract resources, turn them into materials, make products, use them for a while – and then discard over 90 percent of them. But we don't have a bottomless supply of raw materials, so we must learn to do things differently. Nature has been running as a circular system for billions of years: new growth continually emerges, despite finite resources. And that's exactly how industry needs to function.

What does the circular economy mean in practical terms for TRUMPF and its customers?
We deliberately defined this issue to create a threefold benefit: for the customer, for TRUMPF itself and for the environment. That was our starting point. From there, we identified four strategic strands: refurbishing complete machines; reusing spare parts; using reconditioned materials in new products; and recovering valuable components and materials at the end of a machine's service life. For our customers, it means getting a product that meets TRUMPF's normal quality standards at an attractive price and with a significantly smaller carbon footprint. At the same time, they still enjoy the same service and upgrade options as with brand-new machines.

Can you give us some figures on cost and carbon savings?
Certainly. The carbon footprint of a used machine is generally less than three percent of that of a new machine. A remanufactured spare part costs around 70 percent of the new price – with no compromise on quality. That's a clear gain for the customer. For machines it's harder to generalize because it depends on age and condition. But even here we offer attractive pricing as well as full access to our service network.

How are customers responding?
The interest is definitely there. In the consumer sector, this shift started some time ago – people are increasingly buying high quality refurbished products such as cell phones, coffee machines and washing machines. In capital goods, we're still at an early

IMAGES: Klaus Schwaiger, TRUMPF

In action: A TRUMPF employee refurbishes a used machine.

Circularity beats waste: For Thomas Rauser, it's the only viable path for industry to conserve resources, cut CO_2 emissions and preserve value over the long term.

stage, but the direction is clear. In Europe, the Netherlands and France are leading the way; refurbished products already play a far greater role there than in Germany, for example. And now we're seeing a similar development in our industry.

The Xchange program is a key element. How does it work?
The Xchange program focuses on spare parts. If a valuable component fails during a product's service life, we actively retrieve it, refurbish it professionally and return it to the market. The customer gets a tested, fully functional part at a reduced price – and we keep valuable resources in the loop.

Could you give us an example?
Take our laser cutting unit, the diode power supply or specific control units, for example – these are all components that we already refurbish as a matter of course. We're seeing rising demand for these products in the second life market. And our EUV division, which supplies systems for semiconductor manufacturing, has gone a step further, using high quality refurbished components even in new products.

What challenges does the shift towards a circular economy involve?
The biggest hurdle is changing people's mindsets. In circularity, we talk about the R principles: repair, refurbishment, remanufacturing, recycling and – above all – rethink. For decades, industry was geared to linear processes: extract raw materials, manufacture products, sell them. But now we're seeing materials coming back into the loop, being assessed and refurbished, and then returned to the production process. That's a big change in terms of processes, product design and supply chains. And it requires a shift in perspective among manufacturers, suppliers and users.

How do you promote this new way of thinking?
With examples of best practice. You just need to start the ball rolling with specific products and components, gather experience and feedback, and share those stories as widely as you can. The response tends to be very positive. It's obvious that reuse is a major opportunity – it's not only good for the environment, but, in the long term, good for business.

> " Those who invest early in **circular business models** will reap **financial benefits** in the future. "
>
> Thomas Rauser, head of Circular Economy at TRUMPF

Is there an overarching vision behind this circular strategy?
Absolutely. Our aim is to keep TRUMPF products in operation for as long as possible through refurbishment, modernization and reuse. That preserves value for our customers and conserves resources.

How important is collaboration in this context?
Extremely important. Circular strategies only work if you have strong partnerships along the entire value chain. TRUMPF doesn't manufacture every component itself; it sources some from suppliers. We're already working with some key suppliers on take-back and refurbishment strategies. And we're cooperating with certified partners on refurbishing used machines and in other areas. We also need a willingness on the part of our customers to return high quality components rather than scrapping them.

What would you like to see from industry more broadly?
I'd like more companies to recognize the potential of the circular economy, because in the long run there's no alternative. The days of relying on unlimited access to raw materials are over. Those who invest early in circular business models will reap financial benefits in the future.

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 showcases a different application to illustrate how this process works.

This issue:

Cost-effective laser welding – unlocking optimal production with smart part design

Many manufacturers already use laser welding, but few are getting the full benefits. To justify the higher equipment costs compared to conventional methods, parts must be designed with the process in mind from the very start. "The impressive economics of laser welding only become clear when the design and the process are perfectly aligned," says Sergej Darst, a consultant at TRUMPF Part Design. Take a simple example: a housing with four side welds that participants analyzed in a TRUMPF part-design workshop. With roughly 600 millimeters of continuous, easily accessible seam, it's an ideal candidate for laser welding – and the difference to conventional welding couldn't be more striking.

Sergej Darst, senior consultant TRUMPF Part Design

High travel speeds, precise heat input and automated handling produce gas-tight seams without the need for costly rework. "We hardly need any grinding or polishing anymore – and that's a huge advantage, especially for visible parts," says Darst. The seal quality is equally impressive: "The laser's precision delivers consistently high-quality seams, which is critical in fields such as medical technology." The reason for this success lies in the part geometry. Instead of simple butt joints, TRUMPF's specialists introduced strategic overlaps and interlocking features.

"Functionally nothing changes; we simply made the part laser-friendly, which is the key to a robust, repeatable welding process," says Darst. Compared to conventional welding, the cycle time for the sample housing was halved, mainly thanks to faster welding and less rework. "The effort required to modify the part is modest and quickly pays off once you have batches of 20 or more units," says Darst.

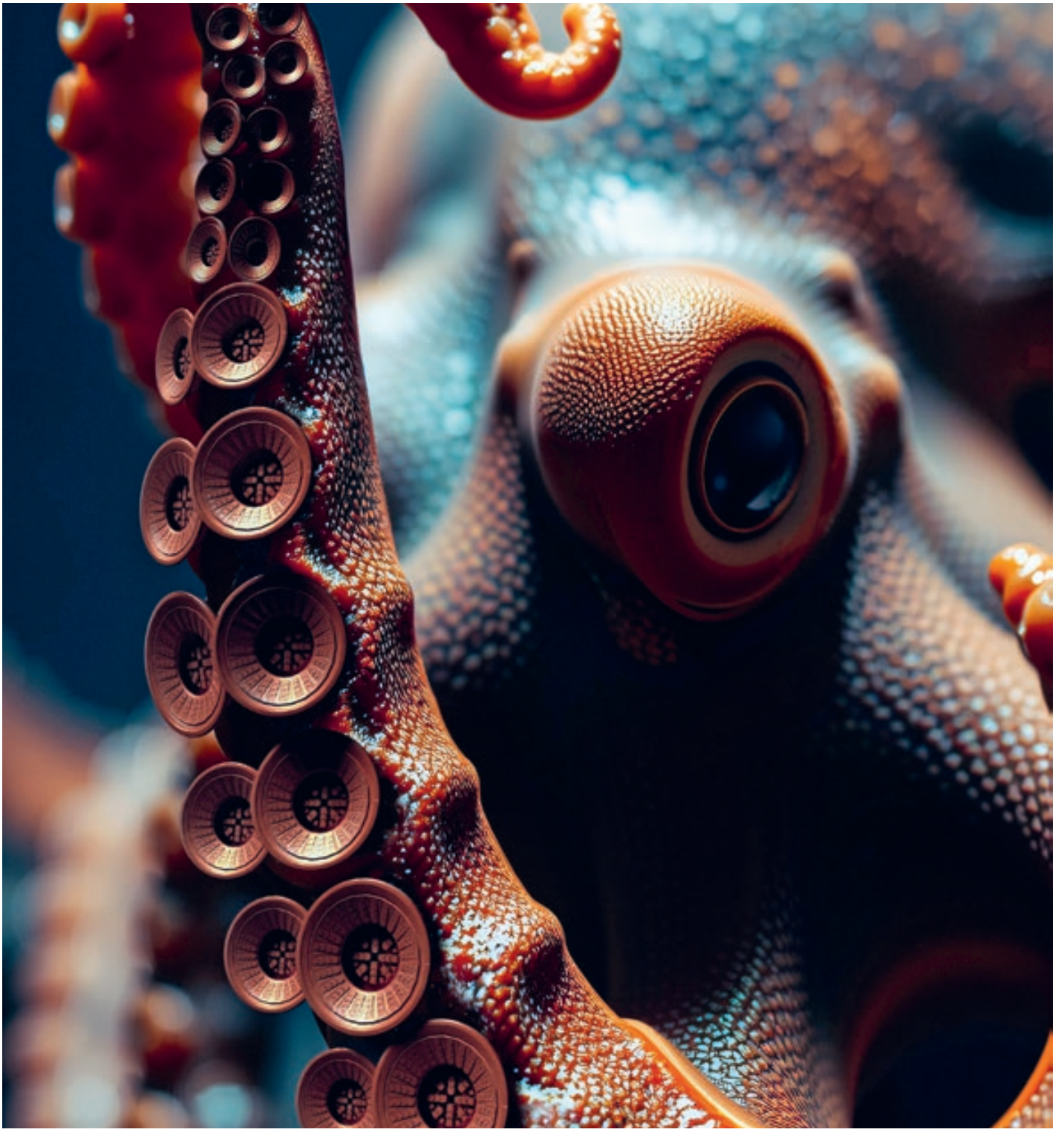
And the bigger the part, the bigger the gain: "In conventional welding, doubling the seam length nearly doubles the cycle time," Darst says. "But with laser welding, it stays almost flat, which saves a huge amount of time and money." TRUMPF's workshops show design engineers how a handful of targeted adjustments can unleash the full potential of laser welding, achieving shorter processes, higher quality and significantly lower costs.

BEFORE AFTER

IMAGE: TRUMPF

#22

pARTgallery



Presenting parts in a new light is something we do in every issue of TRUe. This image shows a **vacuum gripper** like you've never seen it before. An indispensable component of many automated systems, including the BendMaster, the gripper adapts to nearly any part size and can safely move even large, heavy workpieces. **AI artist Stefan Eisele** took the gripper out of its industrial habitat and into the animal kingdom, drawing inspiration from the octopus and the suckers on its arms, which can grab things with the same mix of precision and power.

Safe and secure?

We live in contradictory times. By any objective measure, life has probably never been safer: global life expectancy is rising, living standards have improved in many places and deaths on the roads are steadily falling. Last year, for instance, Helsinki, the capital of Finland, recorded not a single traffic fatality. Workplace accidents are also becoming less common, with numbers dropping by 50 percent over the last 20 years.

And yet our sense of insecurity has seldom been greater. A flood of information, sensationalist media coverage and increasingly frequent disinformation campaigns leave us feeling unsettled. Both real and imagined risks loom larger in our minds, often overwhelming us until we lose track of what is actually safe.

IT security is a good case in point, whether at work or at home. Firewalls and pricey anti-virus software create a comforting illusion of protection, but they are useless if software, apps or operating systems are not kept up to date. Passwords are another stumbling block. Company policies insist on a mix of upper- and lower-case letters, numbers and special characters, yet few of us can remember such complex strings. They often end up scrawled on sticky notes that, in the worst case, are left in plain view. In industry, many firms place their faith in the certificates that accompany new machines, trusting they prove compliance with DIN or ISO standards. As the examples in this issue of TRUe show, that faith can be misplaced: sub-standard safety glass in laser machines, missing protective barriers or forged CE certificates are far more common than we would like to think.

The gap between real, perceived and apparent safety is wide and affects us all. Fortunately, there are simple steps anyone can take to feel genuinely safer. A home safe is reassuring – unless the combination is 1234, in which case you might as well not have bought one. A smoke alarm helps us sleep more soundly – but only if the battery is still working. Many business travelers feel secure discussing confidential matters on their cell phone on the train, yet the noise forces them to speak so loudly that fellow passengers might easily overhear names or even bank details.

Feeling safe is important, but being in control is often better. It's genuinely worth double-checking that the stove or iron is really switched off, and changing your Wi-Fi password if it still happens to be 000000. And when it comes to buying machinery, companies should insist that it comes with CE certification issued by an accredited testing authority – especially with low-cost imports. **Because it's always better to be safe than sorry.**

Jürgen Brand

TRUe #22

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