

# TRUMPF

THE MAGAZINE FOR SHEET METAL EXPERTS

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**Fascinating:** Many of the gadgets from the TV series **Star Trek** have beamed their way into real life. For example, the communicator used by Captain Kirk and his crew looks remarkably similar to one of the earliest Motorola cell phones. Richard Arnold, a research consultant employed on the series, came up with the idea of a Personal Access Display Device, or PADD, in the late 1960s. It served as a handheld interface to the on-board computer and **a kind of digital notebook**, a bit like today's iPad. So it's never a bad idea to have a few science-fiction fans in your development team.

Because who knows what the **vast expanses** of space might inspire them to create ... ■





Fashion designer **Coco Chanel** liked to break with convention – and the pioneer of women’s pants often drew inspiration from men’s fashion. Perhaps the most famous example is her iconic tweed suit, which consisted of a collarless jacket and a well-fitted skirt. Today, this classic Chanel look is seen as the epitome of feminine glamour. Her famous ‘Little Black Dress’ ushered in a whole new era by transforming a color previously reserved for mourning into something chic. **Pushing boundaries** is a good tactic for entrepreneurs, too, **providing inspiration** not just for their **own creative endeavors**, but for those of others. ■

IMAGE: Douglas Kirkland / Contributor



**A sticky business:** Geckos have grippy feet that can stick to even the smoothest surface. With each step, a gecko sheds large particles of dirt from its toes, while smaller particles are deposited between the microscopic hairs, or 'setae', on the soles of their feet and in the skin folds below. This principle inspired an international team of researchers. The result of their work is the first **adhesive strip** that is not only as **sticky** as a gecko's foot, but that also offers a similar self-cleaning ability. Entrepreneurs can also **draw inspiration from the animal kingdom**, transferring tried-and-tested principles to achieve **technological breakthroughs**. ■

IMAGE: ALAMY



IMAGE: TRUMPF

## Driven by inspiration



Dear Readers,

Innovation is fueled by good ideas. That's why we've dedicated this issue to the topic of inspiration, which is the spark that ignites invention. If we want to keep our industry competitive, especially in relation to China, we simply can't do without inspiration and innovations. But what's the secret to turning ideas into marketable technologies?

At TRUMPF, we believe it comes down to creative freedom, risk capital and, in some cases, a willingness to take the long view – but it's also a question of having the best minds in the business. That's why we launched our "Internehmertum" initiative back in 2017, an intrapreneuring and incubation program that allows employees to spend a portion of their working hours focusing solely on their own business ideas. Some of the ideas they've come up with could even benefit you (p. 30).

We're also taking innovative steps to help alleviate the supply bottlenecks, port blockades and spiraling energy prices that are affecting all our lives. TRUMPF is doing everything in its power to deliver its machines as rapidly as possible. Fortunately, our high level of vertical integration has been a major help in our efforts to overcome the past two years of global supply shortages. And we were one of the first German companies to charter an ocean-going container ship, which delivered some 50 machine tools to the USA. As part of our climate strategy, we're also focusing on expanding our use of renewable energy and reducing energy consumption at our plants, for example by making better use of waste heat. This is helping us counter the high energy prices driven by the war in Ukraine but, more importantly, it is our contribution to tackling the climate crisis.

But let's return to the fascinating topics featured in this issue. Which technologies inspire companies to make their production fit for the future? In our case, it has to be digital connectivity. That's why EuroBLECH will mark the launch of our new digital business model Pay-per-Part for our fully automated TruLaser Center 7030, which we'll be rolling out for customers in some countries as a full-scale service (p. 46). The idea is to sell the use of our equipment on a

per-part basis: TRUMPF takes responsibility for running the entire production process remotely at the customer's facilities, including planning, operation and maintenance, while users pay a fixed price for each fabricated part without having to make any further investments. This business model has already proved its worth: we were able to make significantly better use of our test customers' machine capacity during the initial phase of the project. It's also a useful way to cope with the shortage of skilled workers.

Of course, we're not the only ones inspired by digital connectivity. Our customers are also exploiting it with great success. Japanese company Canycom manufactures specialized utility vehicles for tough terrain (p. 16). In 2021, the company built a new production facility and equipped it exclusively with TRUMPF machines. It now enjoys a seamless flow of materials in both production and logistics thanks to state-of-the-art connectivity solutions that have reduced overall production time by 40 percent.

And you don't need to have a fully connected smart factory to boost your productivity. A glance at global markets shows that many companies can achieve the gains they want with simpler, lower-cost models. That's why we've expanded our range of products in this segment to include our new TruBend 1000 bending machine. Together with our cutting and welding solutions, we can now provide companies with the technologically sophisticated machinery they need to get started in all the key areas of sheet-metal fabrication.

Inspiration is something we're also lucky enough to get from our partners. We rely on leading manufacturers to supply us with technologies that lie outside our core areas of expertise. Recently, we acquired the remaining stake in the Indian software company Meta-mation. Their CAD and CAM applications are already a standard feature on our bending machines.

I very much hope you enjoy reading this issue of TRUe – with any luck it will also provide some inspiration for your own work!

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

TRU<sup>e</sup>

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#16/2022

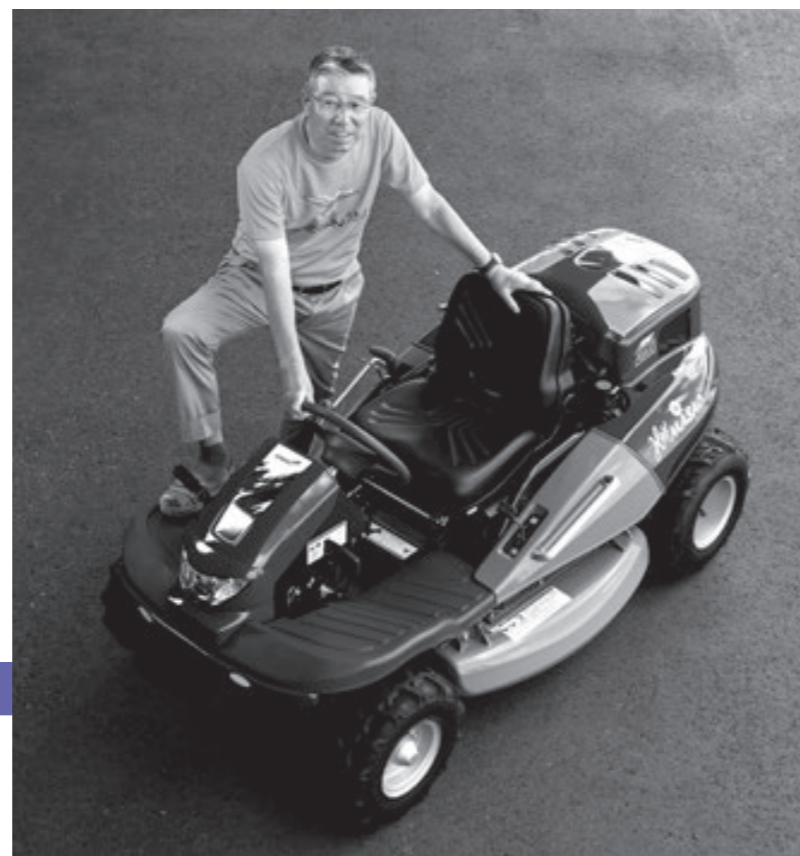
# INSPIRATION ...



## 02 ...in Ukiha

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Japanese company Canycom spent much of the COVID-19 pandemic building a new production facility at its Ukiha headquarters to build its utility vehicles. TRUMPF had to pull out all the stops to get the machines up and running, but everything's been running like clockwork since the start of this year.



## 01 ...in Touguinha

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A family business north of Porto is gearing up to conquer new European markets with its stainless-steel refrigeration systems and commercial furniture. CEO Carlos Azevedo explains what inspires the team at Friconde – and what role digitally connected production machinery will play in his plans for future growth.

BIZ+  
SHORT CUTS  
34

## 03 ...in Hettingen

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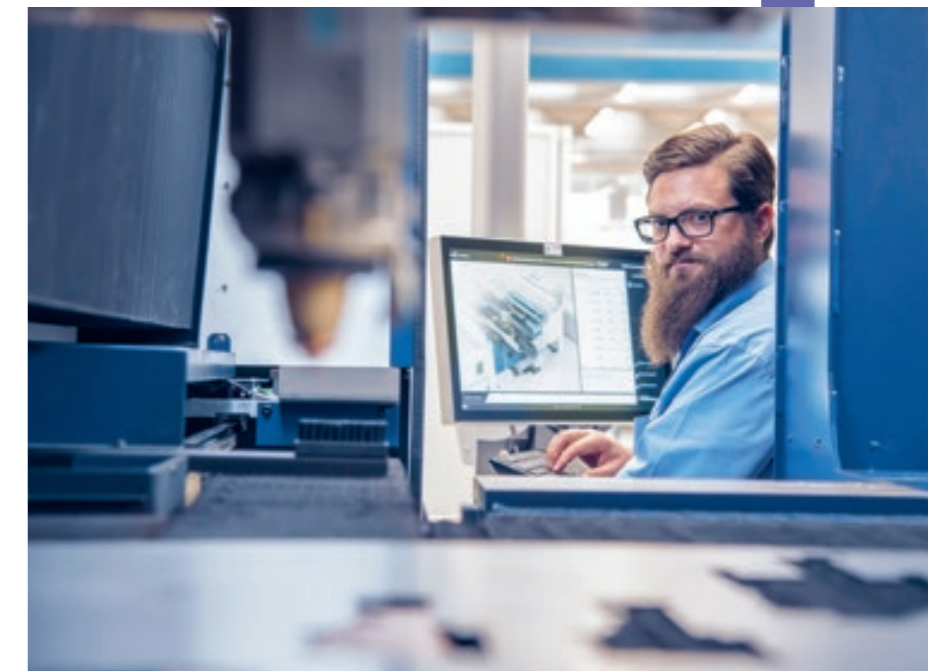
Start-up company EGYM asked Steinhart Metallwarenfabrik to build its smart fitness machines, which give personal trainers a run for their money at the gym. Steinhart makes all the machines to order with fixed delivery dates, so there's no room for problems on the shop floor. Fortunately, MyTRUMPF and the TRUMPF Service app are on hand to help.

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## 04 ...in Ditzingen

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TRUMPF allows its employees to create their own start-ups in its intrapreneurship program. We paid a visit to a wildly creative space that has already given birth to software companies Scale NC and Optimate.



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Friconde has built up an international reputation for its commercial and domestic refrigeration equipment. CEO Carlos Azevedo and his team have gradually **digitalized their production** processes – and now they’re starting to **think outside the box** and focus on even bigger goals. Digital manufacturing has opened up all sorts of possibilities, from one-off custom pieces to large items of hospital equipment.

01

PORTUGAL

*Inspiration in Touguinha*

# CREATIVE BOOST

IMAGES: Eduardo Martins



**Steady growth:** Friconde CEO Carlos Azevedo (left) and production manager Paulo Barros use digitally connected production systems to manufacture commercial refrigerators.

If you’ve ever visited one of the local ‘tabernas’ in Portugal, you will probably have come across products made by the family-owned company Friconde. They make the refrigerated cabinets that chill Portugal’s refreshing vinho verde wines, as well as the glass and stainless-steel display cases that house the dishes of the day. “You’ll find our products in hotels, restaurants and bars right across Portugal, but we also have a major international presence,” says CEO Carlos Azevedo. Friconde exports 90 percent of its commercial stainless-steel furniture to Spain, France, Germany and other countries, including worktables, sinks, exhaust hoods and many other items.

## From a pet spa to a morgue

But Friconde is not resting on its laurels: “Two years ago, we produced 1,000 stainless-steel ventilators for respiratory support during the COVID-19 pandemic. And we even kitted out a morgue with refrigeration systems for a customer in Barcelona,” says Azevedo. Friconde has also fabricated a stainless-steel tub for a pet spa as well as stainless-steel hoppers for food production. The company employs some 70 people at its headquarters north of Porto in the Portuguese parish of Touguinha – and they are well accustomed to handling these kinds of bespoke orders.

## Plenty of scope to expand

Chatting to Azevedo and his right-hand man and head of production Paulo Barros, it’s clear that they have ambitious plans for the future. “We adopted digitally connected solutions very early on,” says Barros proudly. “Our machines already do a great job, but the software we’ve incorporated into the process gives us the confidence that our products will be designed and built to a high standard of quality. There’s plenty of scope for us to continue that well into the future.” Barros explains that Friconde is currently only using 30 percent of the capabilities of TruTops Fab, now transitioning to Oseon. “We’re conscious that there’s lots more potential we could be exploiting,” he says with a smile. “But it’s great to have the reassurance of knowing we can do that in the future.”

## Support for TRUMPF solutions

“TRUMPF was the first company to show us how to make this a reality,” says CEO Azevedo. “It started with the process of bending and welding the corners of stainless-steel tables. The corners are key to creating a high-quality product. Badly made corners can lead to injuries in hospitals and restaurants, and they’re a lot harder to clean and disinfect.” Friconde was looking for tight tolerances in the millimeter range, but none of TRUMPF’s competitors could provide the solutions they needed, says Barros. Without those tolerances, they would be faced with welding defects that would need to be manually corrected. Some of the Friconde developers were familiar with TRUMPF and recommended giving the high-tech Ditzingen-based company a go. “We decided to carry out a test. It had previously taken us 20 minutes to weld four corners, but TRUMPF enabled us to produce a stainless-steel counter-top in just two minutes, including all four corners!” Delighted with the results, Friconde acquired its first TruBend 3100.



**How it all began:** Friconde’s first TRUMPF machine was a TruBend 3100.

## Top-class software

Over time, the TruBend 3100 was joined by a TruLaser 5030 fiber with a LiftMaster and PartMaster as well as a TruBend Center 7030. Friconde's production facilities steadily grew in size to today's 19,000 square meters. This year, the company intends to add another TruBend 5130; its existing machines are already working 16 hours a day, and its order books are full. But the CEO and production manager are happy to meet the challenge, especially now that the team has access to TruTops Fab software, which TRUMPF is currently merging with Oseon. "With TruTops, we were suddenly able to optimize our entire production process," says Barros. All of Friconde's products are now stored in the software together with their corresponding parts. "When we put an order into the system, it automatically initiates the end-to-end production of all the components required to fulfill that order."

## Hard work brings success

The new system required lots of hard work up front. As well as teaching TruTops Fab the design and definition of Friconde's parts and products, the team also had to code and categorize every item and define each individual step in the manufacturing process. But it was definitely worth it, says Barros: "The effort paid off, and we now have a completely linear process. And that's not all: when we develop new products, we start by looking at the bending step, and the first bending process is correct every single time. We don't even need any prototypes or multiple trial runs; we simply get the finished part right away!"

## Pulling ahead

They realized some time ago that digitalization offered genuine added value: "It's a huge advantage," says Azevedo. "There are other companies with similar products, but they can't offer the same quality as us, and the customers know that. When we do something, we get it right the first time rather than trying out a



**Flexibility in action:** Friconde's 70-odd employees have the production engineering skills to handle special requests and create custom products.

"We want to **consolidate** our existing markets and **tap into new ones.**"

Carlos Azevedo, CEO Friconde, SA



dozen different things." Barros is equally happy with how the software has brought everything together: "TruTops connects up all the machines, so we always know where each part is and whether it's currently being bent, cut, welded or sorted." Scrap rates have dropped dramatically as a result.

## Optimistic in the face of rising steel prices

Last year, Friconde's sales were around 25 million euros, 7 million euros of which were generated by stainless-steel products. In the medium term, Azevedo aims to increase revenue in this area to ten million euros. The company even managed to successfully navigate the COVID-19 pandemic: "We saw a particular boost in sales of our refrigeration systems, because our biggest Chinese competitor ran into problems delivering its products," says the CEO. The only downside is high steel prices, which are continuing to climb. The material has more than doubled in price since the outbreak of war in Ukraine, says Barros.

## Targeting new markets

But this hasn't stopped the CEO or his head of production from further expanding digital connectivity in their fab. Their plans include not only the new TruBend 5130, but also an automated storage system and further automation of the production process. "We want to consolidate our existing markets and tap into new ones," says Azevedo. Friconde certainly has the scope to expand its manufacturing operations – and its digital connectivity capabilities mean it can look forward to an inspiring future of healthy order books and efficient production.

IMAGES: Eduardo Martins

01

*A closer look:*

# Oseon software solution

**Portuguese company Friconde** relies on connected manufacturing. It uses TRUMPF's **Oseon** software solution to support **digital production control and material flow management**. We explain why the switch makes sense even for sheet-metal fabricators that use older machines and manual logistics processes.



*In brief*

# Oseon keeps production flowing smoothly

**Oseon** is a new TRUMPF software package that combines production scheduling and control with warehouse and transport management. Users benefit from **enhanced connectivity on the shop floor** and **productivity gains of between 20 and 30 percent**. The software makes production more transparent by enabling users to track all the processes on monitors or tablets from any location. It also seamlessly synchronizes the flow of materials with the production schedule. Workers can view all the relevant information on their jobs and tasks on a screen in their work environment, without having to switch program.

Data is generated at many different points of the manufacturing process. Oseon gives users access to all the information they need – at the right time, and in the right place. To do this, the software reconciles information from the production schedule with the logistics requirements. Standardized interfaces make it easy to integrate existing machines, automation solutions and systems. The result is a seamless flow of information from job receipt to final delivery of the finished parts.

## Focus on users

Tightly scheduled production lines rely on having all the key job information available when it's needed. Nobody wants to waste valuable time searching for the latest status updates. Oseon helps users avoid typical sources of error and ensures no jobs "disappear". All the workers get the exact details they need to carry out their particular part of the process. The software is easy to learn and simple to use. Even new employees will quickly get up to speed thanks to its role-based design and guided work steps. The result is a reduced risk of error and less time spent on non-productive activities.

## Customer details

### Friconde SA

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## Machinery

- TruBend 3100
- TruBend Center 7030
- TruLaser 5030 fiber
- LiftMaster Compact

## Efficient flow of materials

Oseon obtains information from many different sources on the shop floor. Machines from TRUMPF and other manufacturers send Oseon a constant stream of process data. The software also collects information on the location of carts and automated guided vehicles (AGVs) and on the loads they carry. Each pallet has a barcode which workers scan after loading it with parts, thereby "wedding" the pallet to the load. They then push the cart into one of TRUMPF's special docking stations and use their tablet to release the load for pick-up. Alternatively, the material can be transported from A to B by an AGV. As soon as a cart or AGV is "docked", the docking station sends the corresponding information to Oseon. This provides the software with all the data it needs to organize the efficient flow of materials and to automatically assign transportation jobs to a worker with a cart or to an AGV.

## Oseon: Go, Grow or Flow

Oseon can make any shop floor smarter. TRUMPF offers three versions of the software, so companies can choose exactly the right degree of digitalization and automation to match their objectives and their current level of connectivity.

- **Oseon Go** digitalizes all the core processes and makes key production work flows more robust.
- **Oseon Grow** is an extension of Go in the areas of storage, logistics and interfaces.
- **Oseon Flow** aims to achieve fully automated production – the smart factory.

02

JAPAN

*Inspiration in Ukiha*

## THE JOY OF MOWING

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Combining **Japanese craftsmanship** and **industrial manufacturing expertise** is a great way to create world-beating products. The agile **utility vehicles** from Canycom are a good example. Easily recognizable thanks to their eye-catching design, they keep moving even when the going gets tough. Equally at home on American construction sites and Italian vineyards, these nimble carriers and dumpers can carve out a path in even the most inaccessible terrain.



Canycom's specialized utility vehicles are a popular choice in over 50 countries around the globe – and it's not hard to see why. Combining high-quality workmanship and practical ingenuity, they keep things moving in even the toughest terrain. "Work can sometimes feel exhausting and demoralizing, but we do everything we can to make it more fun!" says Canycom chairman Hitoshi Kaneyuki.

### The art of manufacturing

Owned by the same family for 20 generations, Canycom is steeped in tradition. The Kaneyuki family can trace its ancestry back to a master Samurai swordsmith in the early 14th century who was renowned for the craftsmanship of his curved katana blades. As much a work of art as a weapon, these swords often took weeks of painstaking work to create. Although this mid-sized manufacturer no longer produces Samurai swords, it is still inspired by the idea of making the perfect product.

### The importance of play

Yoshimitsu Kaneyuki, who took over the day-to-day running of the business from his father in 2015, argues that Canycom's success is based not only on reliability and robustness, but also on a healthy dose of playfulness. "It's quite an achievement to make tedious work fun – it might even be the main reason customers choose our products over others," he says. That's why the Japanese principle of *asobigokoro* – or 'doing something in a playful way' – plays such a central role in all Canycom's products.

### Masao ride-on brush cutters

Perhaps the most striking example is the Masao, an industrial ride-on brush cutter that could easily be mistaken for a go-kart. Its popularity comes as little surprise to chairman Hitoshi Kaneyuki: "Mowing grass and vegetation used to be such hard work, and I was constantly asking myself how we could make it more fun. Nowadays people really enjoy using our nifty and agile brush cutters. Before you know it, the job's done. I've often found myself searching for more patches of grass just so I can keep going, and I know I'm not the only one!" says Hitoshi Kaneyuki.

### Canycom – a reliable partner

Canycom products are renowned for their remarkable versatility. For example, the task of harvesting fruit and vegetables requires vehicles with a low body height. This makes it easier for farmers to navigate swiftly between bushes and trees without grazing the branches or damaging the fruit, and it ensures barrier-free access when it comes to loading and unloading the vehicle. Forestry throws up very different challenges, such as collecting logs in steep, inaccessible terrain and transporting them back to base. Canycom's timber carriers are on hand to help, offering a rugged solution with truly outstanding maneuverability.

### Steady growth

"Japan still relied heavily on horses and cattle for transportation even as late as the 1970s. That was when we embarked on an initial wave of mechanization," says Hitoshi Kaneyuki. Canycom came



IMAGES: Damien Robertson



**Vertical integration:** Canycom's 280 employees design and build most of the company's vehicle components in-house.

“ Our **products** are designed for **flesh-and-blood people** to use, not for some faceless statistic. ”

Hitoshi Kaneyuki, Chairman Canycom Inc.

to dominate the forestry and construction sectors and started to expand overseas. The company's rubber-tracked buggies, compact carriers and ride-on mowers are now hugely popular in Europe and the US – two regions where Canycom hopes to see strong international growth in the future. In 2021, the company posted sales of 7.1 billion yen (approx. 51 million euros), 40 percent of which were generated outside Japan. This figure has been increasing at a steady rate of between six and seven percent a year.

### New production hall in Ukiha

Canycom has traditionally carried out the design, development and manufacturing of its products at its headquarters in Ukiha. A city of 30,000 people located in southern Japan's Fukuoka prefecture, Ukiha is some two hours from Tokyo by plane. The climate



and geography are similar to that of Switzerland, and the region is a major producer of fruit. Canycom built a new manufacturing facility there just last year to meet growing demand. The production lines at the new facility, which it began installing in July 2021, are exclusively kitted out with machines and systems made by TRUMPF.

### Complete switch to TRUMPF

It's not every day that a Japanese company chooses to switch to a new supplier. TRUMPF installed a TruLaser 3030 fiber 2D laser-cutting machine in combination with an automated SortMaster system, plus a TruMatic 6000 fiber punch-laser machine, press brakes including the TruBend 5130 and 7036, and a TruBend Center 5030 bending system. This was the first time that many of these machines had been supplied to Japan, and the normal approach would have been to send assembly engineers from Germany to Ukiha. However, this was impossible due to COVID-19 travel restrictions, so all the support required to install and set up the machines had to be provided via a remote connection established by the TRUMPF experts. TRUMPF's head office in Germany worked closely with its regional office in Japan to ensure that everything ran according to plan. All the machines are now up and running and Canycom is delighted with the results. "Opting for TRUMPF turned out to be an excellent decision," says CEO Yoshimitsu Kaneyuki.

### Focus on the customer

It was 2017 when Canycom first considered equipping its new manufacturing facility exclusively with TRUMPF systems. During that time, it had regular contact with TRUMPF Japan, which offered advice, expert input and on-site visits. After two years of careful consideration, Canycom finally placed the order. "We were



**Practical ingenuity,** high quality workmanship: Canycom combines Japanese craftsmanship with industrial manufacturing expertise.



IMAGES: Darlen Robertson

**High part throughput rates:** The meticulously planned layout of the new production facility and the configuration of the TRUMPF machines has reduced production time by 40 percent.

**Setting an example:** Chairman Hitoshi Kaneyuki is the face of Canycom. He has been shaping the family business for nearly 50 years.



struck by how TRUMPF prioritized our needs and wishes. Canycom shares that belief of putting the customer first. The fact that we have this philosophy in common has convinced us to opt for TRUMPF machines in the future, too", says Yoshimitsu Kaneyuki. The results to date are even better than he had expected.

### High flexibility, short cycle times

Everything about the new manufacturing site is impressive, from the meticulously planned layout to the configuration of the TRUMPF machines and the seamless flow of materials on the logistics side. Part throughput rates are higher than ever, and the punching and bending processes are a full nine hours faster than before thanks to laser-measured angles and fully automated tool changes. Overall production time has fallen by 40 percent. The TRUMPF systems guarantee both precision and efficiency in equal measure. What's more, the Canycom factory in Ukiha now has the flexibility to carry out high-mix/low-volume manufacturing, something that is particularly important to Yoshimitsu Kaneyuki. He appreciates how the TRUMPF machines offer both high flexibility and short cycle times. "That's the perfect formula to push our profitability even higher."

The TRUMPF machinery in the new factory building in Ukiha has been fully operational since the beginning of this year. Canycom primarily uses the facility to manufacture construction dumpers and powered wheelbarrows for overseas markets. The company is also planning a new spare parts warehouse as part of its dynamic growth strategy.



**Bestseller:** Canycom's ride-on brush cutters could easily be mistaken for go-karts! They are one of the company's best-selling products, especially in Europe and the USA.

“ Harnessing the **play instinct** makes tedious work fun – it might even be the **main reason** customers choose our products over others. ”

Yoshimitsu Kaneyuki, President Canycom Inc.

### The perfect mix of parts

Canycom designs and builds most of its vehicle components itself, though it also relies on external partners for parts that require specialist expertise, such as engines and rubber tracks. “By joining forces with the very best suppliers, we can provide our customers with products that exceed their expectations,” says CEO Yoshimitsu Kaneyuki.

### Experience in the field

At the same time, Canycom actively pursues the Japanese management philosophy of “going to Gemba”. From fields and plantations

to forests, the company's design engineers spend as much time as possible going to “the place where the work is done” (Gemba) to discover exactly where value is created for its customers. Meanwhile, Canycom's sales team conducts regular video interviews and encourages users to offer feedback and suggestions for improvement as well as criticism and complaints. This inspires Canycom to constantly reflect on its customers' needs and to tailor its products accordingly.

“Our products are designed for real flesh-and-blood people to use, not for some faceless statistic,” says Hitoshi Kaneyuki. He believes his team of developers needs to have first-hand experience of how customers use their products in real life. This approach can give rise to radical new ideas and solutions – a philosophy that both Canycom and TRUMPF see as vital to their business.

### Making improvements together

The importance of getting close to customers is not the only philosophy Canycom and TRUMPF have in common. Both companies know what they need to prioritize to achieve great results: a partner that listens to feedback, presses ahead with topics that will make a difference, and actively supports efforts to put them into practice. That's the recipe for success that lies at the heart of Canycom's new “Enka no Mori Ukiha” factory.

IMAGES: Darien Robertson

02

*A closer look:*

# XTREME solutions

The carriers and other utility vehicles made by **Japanese company Canycom** can tackle even the most extreme challenges. Sheet-metal fabricators also face Herculean tasks in laser cutting, welding and bending – but fortunately TRUMPF machines do a **great job with even the biggest, most unwieldy parts.**

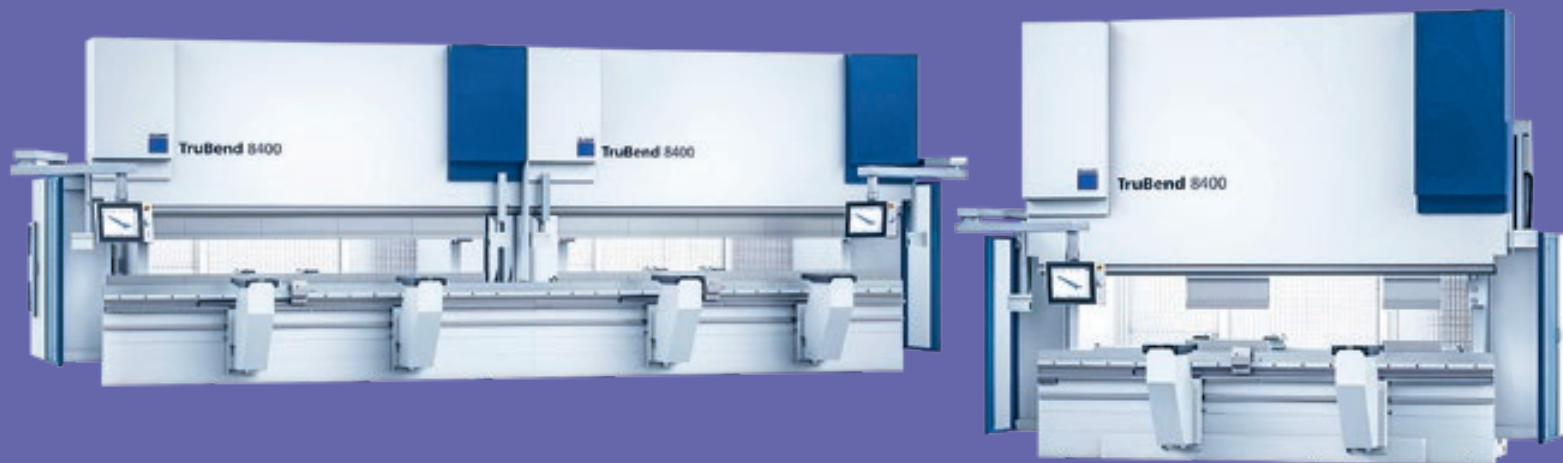
Read on to find out more!



*In brief*

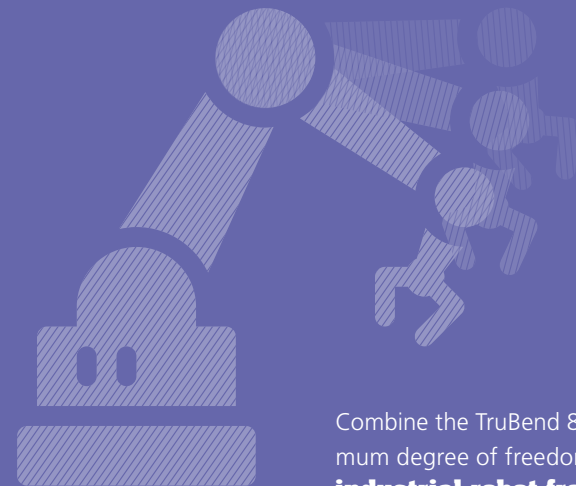
# Ready for the big time

TRUMPF's machines for oversized formats are ready to tackle whatever **XXL challenge** you might face – whether it's cutting long parts with precision, speed and versatility, cutting long heavy tubes with millimeter accuracy, or bending large batches of heavy parts, long or short.



## For Herculean bending tasks: TruBend 8000 Standalone and TruBend 8000 Tandem

Designed to handle extra-large parts, this system can bend large batches of long or thick components with **press forces** of up to **2,000 metric tons**. A single TruBend 8000 offers **bending lengths of up to 12 meters**, while a tandem configuration of two adjacent machines can push that figure as high as 16 meters. The TruBend 8000 can even bend short, thick parts with high angle accuracy thanks to the machine's heavy-duty tool systems. Height-adjustable **bending aids for heavy loads weighing up to 300 kilograms** provide enhanced ergonomics. Users can also choose between numerous special options to tailor their XXL system to their exact needs.



Combine the TruBend 8000's maximum degree of freedom with an **industrial robot from Starmatik** and you get the perfect solution for automated bending of oversized sheets weighing **up to 400 kilograms** or measuring **up to eight meters in length**. Thanks to its specialized tool systems, the machine can set up tools for a variety of sheet thicknesses in a matter of seconds. The TruBend 8000 also supports **automated loading and unloading**, including material handling features such as an ejector unit on the press beam and a front gage system.

## Automation on the TruBend 8000



up to **eight meters** long



up to **400 kilograms**

## Cut long parts faster: TruLaser 3060 fiber and TruLaser 3080 fiber

This 2D laser-cutting machine offers a **fast and versatile** way to cut metal sheets of any thickness measuring **up to eight meters in length**. Productivity is boosted by the combination of a TruDisk 12001 laser and a fully adaptive lens system. The BrightLine fiber function ensures high-quality cut edges in thick sheet metal, while the CoolLine function keeps parts cool enough to cut intricate contours even with the laser power set on high. The machine can be automated by adding a Starmatik loading and unloading unit.



Equipped with a solid-state laser, this powerhouse of a machine can clamp and cut tubes weighing **up to 370 kilograms** and measuring **up to 254 millimeters in diameter** and **12.5 meters in length** – all with millimeter accuracy. The six-kilowatt TruDisk laser with 2-in-1 fiber slices through **tube walls up to 14 millimeters thick** to deliver high quality parts. Users can load the fully automated machine with material profiles up to 8.05 meters in length, with four metric tons per storage cassette. Productivity can be pushed even higher by connecting the machine to a STOPA tube storage system.

## For extra-large tubes: TruLaser Tube 7000 fiber



## Customer details

### Chikusui Canycom

**Location:** Head Office & Factory  
90-1 Fukumasu, Yoshii-machi,  
Ukiha-city, Fukuoka 839-1396, Japan

### Chairman:

Hitoshi Kaneyuki  
Phone: +81-943-75-2195  
Fax: +81-943-75-4396  
[www.canycom.jp/eng](http://www.canycom.jp/eng)

## Machinery

TruBend 7036, TruBend Center 5030,  
TruBend 5130, SortMaster 1530, TruDisk 4001,  
LiftMaster Store, TruLaser 3030 fiber,  
TruStore 3030, TruMatic 6000 fiber



03

GERMANY

*Inspiration in Hettingen*

# MIGHTY MACHINES AND MUSCLES OF STEEL

IMAGES: TRUMPF

Sport can work wonders as a **source of inspiration**. Studies have shown that regular exercise makes us physically fitter, but it also offers a variety of mental benefits, such as relieving stress, boosting alertness, enhancing concentration and improving long-term memory. Making workouts more fun and inspiring is the goal behind EGYM's **smart fitness equipment**. Its high-quality machines are produced by German metal fabricator Steinhart Metallwarenfabrik – with a helping hand from TRUMPF.



**Powerful and precise:** The TruMatic 7000 cuts and shapes high-quality aluminum checker footplates for the EGYM machines without leaving a single scratch.

It's not easy to tempt people off the sofa for another tedious weightlifting session at the gym. That's why modern fitness centers invest in sleek new equipment that promises to give users quicker results. But even with the most cutting-edge machines, many new gym members quickly lose their motivation as they struggle to work out which weight to use, how many repetitions to do, and which machines they should prioritize to get closer to their fitness goals. All too frequently, they end up feeling frustrated and losing their enthusiasm. The best thing would be if everyone had their

own personal trainer – and that's what inspired two students from Munich to create a software program that provides personalized workout routines. Gym members get a card that stores all their personal fitness data and workout goals, plus a training program specially tailored to their needs. Then they simply scan their card on an EGYM machine to transform it into their very own personal trainer. The software specifies which exercises to do and how long to do them for, but it also tracks and visualizes the sequence of movements to ensure users perform each exercise correctly.

## Everything from a single source

In 2011, the EGYM founders approached Steinhart Metallwarenfabrik in Hettingen to ask for their help in designing and manufacturing their first fitness machine. Production manager Patrick Genkinger still recalls that first meeting: “They had already written the software and were looking for a single-source provider to build the appropriate exercise machines. We worked together on a prototype that dovetailed perfectly with our manufacturing capabilities.”

Steinhart certainly ticks all the boxes in sheet-metal fabrication. As well as a punch-laser combination machine, it also has a bending cell and three laser tube-cutting machines. “We only use machines from TRUMPF,” says Genkinger. “And when it came to designing the frame for the first EGYM machine, our top-notch expertise in laser tube-cutting came in particularly handy!” Seventy percent of the frame is built from eye-catching oval tubes made of sturdy structural steel. “We use both our TruLaser Tube 5000 and our TruLaser Tube 7000 to process the materials. Both come with the bevel-cutting option and can produce threads.” A job that would



have required several steps in a conventional fab can be completed in just one operation using TRUMPF’s laser tube-cutting machines. The aluminum checker footplate comes out of the TruMatic 7000 without a single scratch, and the TruBend 7036 Cell makes light work of the bending edge required to attach it to the frame. Steinhart relies on its suppliers for electronics and some of the plastic parts. Once the frames have been powder-coated, the various components are assembled into complete units.

Steinhart now produces numerous EGYM machines every month. The EGYM Smart Strength machines are popular in high-end fitness centers right across Europe. “We produce them to order, which means we have fixed delivery dates,” says Genkinger. “So it’s important that all our production machinery is in great shape all the time, because we can’t afford any downtime.” Fortunately, plenty of support is available from the MyTRUMPF online customer portal and the TRUMPF Service app.

“ When it came to designing the frame for the first EGYM machine, our **top-notch expertise in laser tube-cutting** came in particularly handy. ”

Patrick Genkinger, production manager

## One-click spare parts

Steinhart has access to a personalized MyTRUMPF portal that includes a comprehensive list of all its machinery, equipment and software. A 24-hour e-shop makes it easy to order spare and wear parts as well as bending and punching tools. The portal also allows users to view orders and download invoices, as well as to browse service incidents and track their progress. “All I have to do is log in and select the relevant machine. The portal then presents me with several options for choosing and ordering the spare or

**The human touch:** Production manager Patrick Genkinger appreciates the benefits of personalized services: MyTRUMPF and the Service app are perfectly tailored to his fabrication business. So there’s plenty of time left for a workout!

IMAGES: TRUMPF



**Stylish powerhouse:** The frame of an EGYM fitness machine consists mainly of oval steel tubes. These are processed on a TRUMPF laser tube-cutting machine and then powder-coated to create an elegant dark gray finish.

wear part I need. It only takes a few minutes, so it’s a real time-saver,” says Genkinger. His favorite method is to locate the part using the Exploded View feature, which shows all the machine’s parts in a single application. To place an order, he simply clicks on the relevant part. Alternatively, Genkinger can enter an order number using the Quick Order feature. “And if it’s a part I ordered recently, I can just search for the order number in my MyTRUMPF order history to make things even quicker.” Genkinger is also impressed by the search function for punching and bending tools in the e-shop: “It works brilliantly. Nowadays I buy almost all my tools from the e-shop.”

## More time for inspiration

Genkinger also appreciates the time he saves by using the TRUMPF Service app: “Whenever I encounter any kind of problem, I can create a service incident in the app by simply selecting the machine from the list in my personal portal. That saves me the hassle of searching for a machine number! And I’m always impressed by how quickly the service department responds,” says Genkinger. “I love the way you can upload photos to give the technician a clearer picture of the problem and help them sort it out.” Once a service incident has been created, Genkinger can track its progress at any time via the app or MyTRUMPF. When it comes to helping people

**One for all:** Steinhart only buys in the electronics and plastic parts for the fitness machines. Genkinger’s employees fabricate the rest of the parts on site.







**Keeping their machinery in shape:** Thanks to the MyTRUMPF online customer portal, Patrick Genkinger can keep constant tabs on the status of his production machinery: "The Exploded View feature helps me order spare or wear parts in a matter of minutes."

to help themselves, he also appreciates the "Technical Guides", a series of tutorials that can be accessed through the Service app by entering error codes. "We've had very few service incidents over the past couple of years, but thanks to the tutorials we were able to fix those we did have ourselves," he says.

The MyTRUMPF online platform and Service app demonstrate how customized solutions can offer real added value. Genkinger now sees this personal touch as an essential part of both his fabrication business and his own fitness training. It's an approach that saves him huge amounts of time – just what he needs to get inspired!

.....  
" I love the way you can **upload photos** to give the technician a clearer picture of the problem and **help them sort it out.** "  
.....

Patrick Genkinger, production manager

"I'm not a fan of service incidents – but I'm a big fan of the Service app!" says Patrick Genkinger. TRUMPF Technical Guides help him sort out most error messages on his own.



IMAGES: TRUMPF

03

*A closer look:*

## Automated laser-tube cutting

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Three laser tube-cutting machines from TRUMPF help sheet-metal fabricator Steinhart Metallwarenfabrik design and build fitness machines. To boost **production efficiency** even further, TRUMPF and STOPA have come up with a solution that connects machines to storage to enable automated loading of laser tube-cutting systems. We discovered how it works.

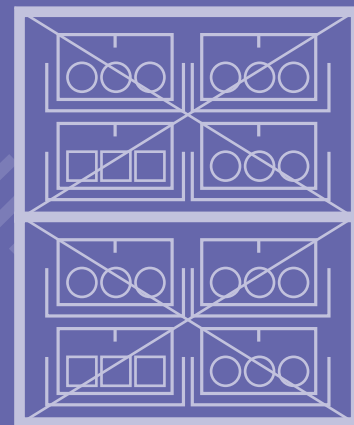
*In brief*

# Automated loading of laser tube-cutting machines

TRUMPF joined forces with storage-system manufacturer STOPA to develop a new solution that automatically transfers tubes from storage racks to the TruLaser Tube 7000 fiber tube-cutting machine. This is a crucial first step toward fully automated tube manufacturing. The new storage connection solution reduces non-productive time and boosts overall productivity on the shop floor. It also allows companies to switch between different materials more quickly and produce small batches cost-effectively. This increased flexibility on the shop floor gives them a competitive edge.

## Fully automated journey from the storage system to the cutting head

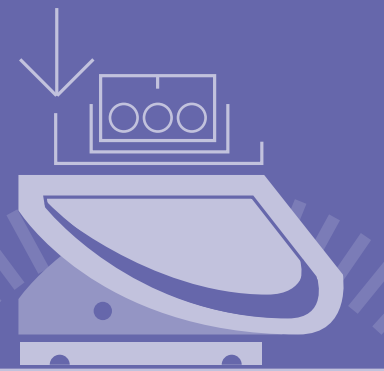
The solution brings together three new digitally connected components: a rack storage system for the tubes, a tilt-and-lift station, and a conveyor unit.



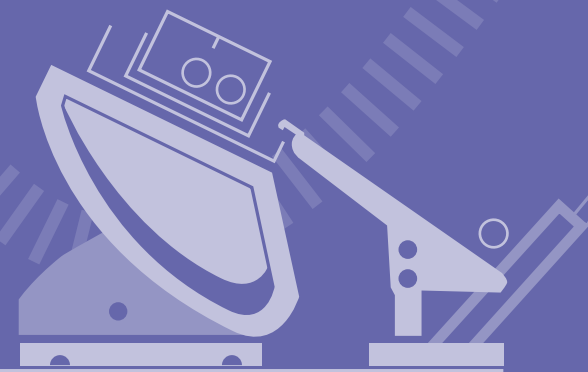
The STOPA system stores the raw materials in special storage cassettes.



The operator sends a request to the storage system from the machine.

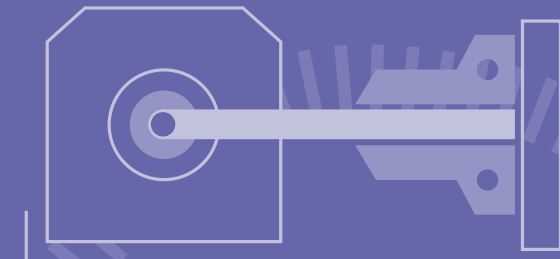


A cassette containing the required materials is automatically lowered to floor level by the lift and transferred to the tilt-and-lift station.

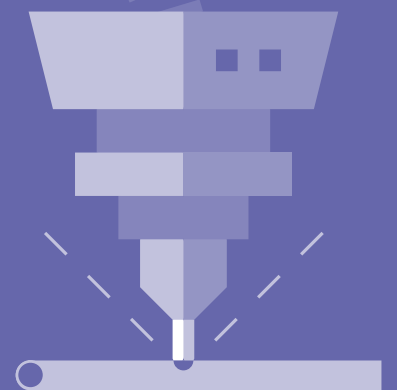


The tilt-and-lift station moves into position next to the machine and unloads the cassette containing the tubes onto the conveyor unit.

The conveyor delivers the tubes to the LoadMaster Tube system, either individually or in layers.



The LoadMaster Tube places the tubes in the machine clamps.



From here, the tubes are automatically moved toward the cutting head.

Any tubes that are not required for the job are automatically returned to the storage system.

## Customer details

**H. Steinhart Metallwarenfabrik GmbH & Co. KG**

### Location:

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72513 Hettingen  
Germany

Phone: +49 7574 9308-0

Email: [info@steinhart-metall.de](mailto:info@steinhart-metall.de)

[www.steinhart-metall.de](http://www.steinhart-metall.de)

## Machinery

- TruBend 5085
- TruBend 7036
- TruBend 5170S incl. ToolMaster
- TruBend 5085S incl. ToolMaster
- TruBend Cell 7000
- TruLaser 3030
- 3 TruMatic 7000 FMC
- TruLaser Tube 7000
- 2 TruLaser Tube 5000

The new system is ideal for any company looking to increase its production efficiency through automation. It's easier to get materials in the right place at the right time without workers having to make time-wasting trips to the warehouse. Programming is also easier, because this solution handles many of the machine settings automatically.



- The solution is available for the TruLaser Tube 7000 fiber laser tube-cutting machine and **can also be retrofitted** to existing systems.
- Suitable for tubes up to **8.05 meters** in length.
- Compatible with TRUMPF's new **Oseon** software for production scheduling and control (see p. 29).
- STOPA storage systems come in various sizes and configurations, which makes them simple to **customize** and easy to **integrate** into existing factories.



04  
GERMANY

*Inspiration in Ditzingen*

# MEET THE MAKERS

TRUMPF employees often have “eureka moments” at work – the sudden inspiration of a brilliant business idea that they just can’t get out of their heads. Fortunately, support for in-house entrepreneurs is on hand from the company’s **intrapreneurship and incubation program**, which boosts employees’ chances of turning their **start-up idea** into **a successful venture**.

“ The main focus is on **inspiring and learning from each other** by networking and sharing ideas. ”

Dina Kohler, manager of TRUMPF’s intrapreneurship program



It can be tricky to find the entrance to the Steyg co-working space, which is tucked away in narrow courtyards not far from Stuttgart’s main train station. To get here, you have to follow a series of handwritten signs. The 2,000-square-meter space was previously home to banks and the local health authorities, but recent years have seen up-and-coming companies give it a whole new lease of life.

### Dive into a different world

Steyg proved to be the perfect location for “Internehmertum”, an intrapreneurship and incubation initiative launched by TRUMPF in 2017. It allows employees from any part of the company to try out new business ideas and – if the conditions are right – to put them into practice. The space was deliberately chosen to break with TRUMPF’s normal working environment; with its radically different

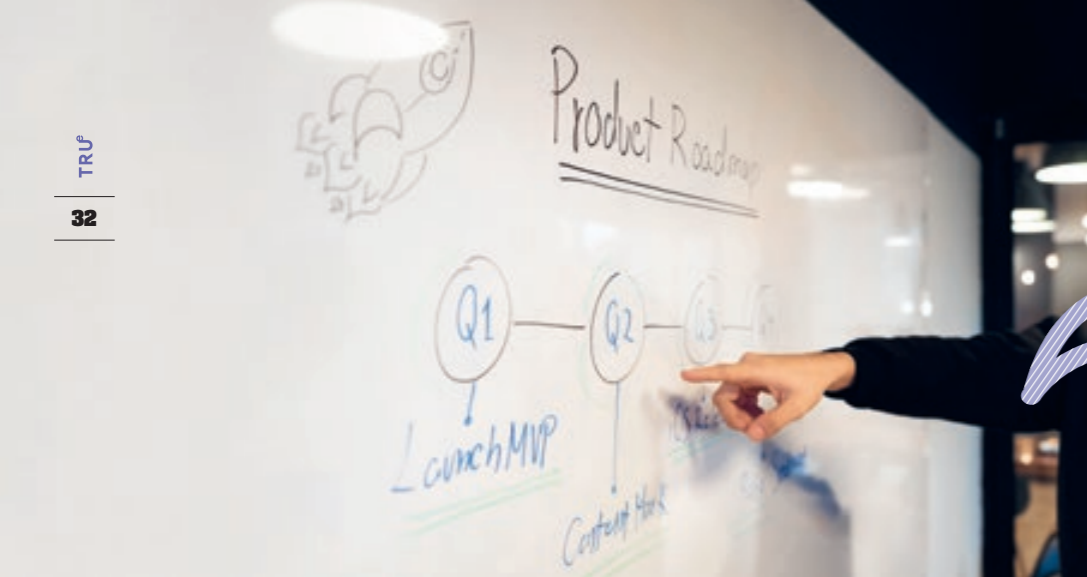


**Sell, design, program:** Dina Kohler and the intrapreneurship team champion efforts to foster agility and to combat entrenched corporate mindsets.

pace, look, atmosphere and culture, it inspires new ways of thinking. The time the participants spend here feels like diving into a whole new world.

### Focus on inspiration

With its rough-and-ready plywood walls and tables, Steyg is a versatile space that offers flexible work areas, plenty of team rooms and multifaceted event spaces. “The main focus here is on inspiring and learning from each other by networking and sharing ideas,” says Dina Kohler, who has been running the program for the past year. In mid-July, another Internehmertum incubation round came to a successful conclusion. The five start-up teams had spent nearly three months evaluating the technical feasibility and market opportunities of their concepts, with TRUMPF allowing them to spend half of their contractually agreed working hours on the project.



## Better sheet-metal parts with AI

Martina Trinczek, Jonas Steiling and Max Hesselbarth have long since made the leap into self-employment. Their Optimate start-up was incorporated in TRUMPF's intrapreneurship program in late 2019 and has set the benchmark for every project since. The trio launched an AI-based software solution that enables sheet-metal fabricators to optimize part design and reduce manufacturing costs. Users simply upload the CAD data for their parts to the online platform, and the AI instantly calculates where they could pare down their use of material or replace welds with bends. The algorithm also detects design errors, such as cut-outs that are too close to a bending edge.

## Design engineers love Optimate

"By offering 30 years of sheet-metal expertise in 30 seconds, we're bringing part design into the digital age," says CEO Jonas Steiling, summing up Optimate's mission. His inspiration originally stemmed from TRUMPF's part design consulting service. As a consultant, he ran workshops and training sessions for customers to show them how parts designed with cost in mind are the key to efficient production. Seeing how little online access there was to

these kinds of sheet-metal fabrication skills, he decided to open it up to the global community. Optimate was a 'first mover', the first business to provide a product of this kind, and it has been steadily gaining new users ever since the platform launched. The next milestone is to teach the software to identify assemblies that have potential for optimization and to make it available as a plug-in solution directly integrated into the design tools of well-known CAD providers.

## Say thank you with Kukudos

Ever since working together in TRUMPF's corporate IT department, former colleagues Yannick Dickel, Tim Taraba and Dennis Knotz have been driven by the goal of promoting a culture of recognition and appreciation in the workplace. "Saying thank you to colleagues, especially those in different teams, is an important skill, even if it's just showing appreciation for something small! We believe it's key

to a positive culture of communication – and it strengthens people's sense of belonging," says Tim Taraba from the start-up Kukudos. Ultimately, every company can benefit from the results, which typically include more-motivated employees, innovative ideas and a drop in staff turnover. Yet, if anything, praise is in even shorter supply in the wake of COVID-19 and increased homeworking, and many employees feel sidelined or ignored.

## Planting the seed in TRUMPF IT

Kukudos offers virtual notice boards where employees can leave electronic Post-it notes. These offer a designated space where people can express mutual praise and appreciation – not just in individual teams, but also across separate departments and different hierarchical levels. At the heart of this initiative is the 'Kukudos ritual', a periodic team meeting where people can give voice to positive comments recently posted to the board. This creates a positive spiral of giving and receiving praise. An initial version of the application has been up and running in the TRUMPF IT department since 2019, and it is also available to any other departments on request. The team is currently working on apps for the



IMAGES: unsplash / slidebean

“ TRUMPF's **Internehmertum** program taught me everything I needed to know about founding a company. It was my very own **personal learning journey.** ”

Elisa Hertzler, CEO of Peers Solutions in Berlin

Android and iOS mobile operating systems and will subsequently look at integrating Kukudos into communication tools such as Microsoft Teams and Slack. "That will make it feel even more natural for people to post brief notes expressing their appreciation," says Taraba. The three founders will remain part of the TRUMPF community until June 2023, gradually developing the technology and brand behind their idea. After that, the Kukudos entrepreneurs will branch out on their own to market the solution on a global scale. Their business plan envisages charging companies two euros a month for each user..

## Learn faster from mistakes

The business cases that pass through TRUMPF's intrapreneurship program don't always prosper. Program manager Dina Kohler confirms that around half of the start-ups quit the program after three months. Putting business ideas under such intensive scrutiny sometimes reveals weaknesses nobody had noticed before, such as problems with the technology or the make-up of a team. "That's to be expected – and it's why we're here to help! We want

the participants to encounter that feeling of making mistakes as early as possible so they can learn how to do things differently and better," says Kohler. And even if the team ultimately decides to drop the idea, it still ranks as a useful learning experience.

## Learning to set up a company

Elisa Hertzler knows just how hard those first weeks and months can be. She participated in the incubation program in 2018 and went on to establish her own start-up. Today, the ex-employee of the TRUMPF strategy department is CEO of Peers Solutions in Berlin and has made a name for herself as an expert in business model innovation. "TRUMPF's intrapreneurship program taught me everything I needed to know about founding a company. It was my very own personal learning journey."

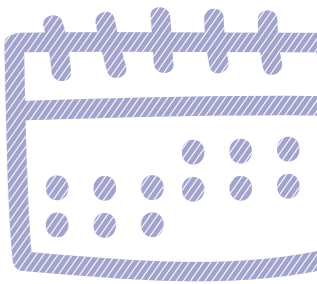
The Peers Solutions platform provides access to personalized digital learning programs. Using artificial intelligence, it assembles different courses into an individualized learning journey within a matter of minutes. To do this, it finds programs in the training and development market that match the personal goals of individual employees and entire teams. As well as offering training materials from partner companies, Peers Solutions also suggest sources such as YouTube videos, TED talks, podcasts, e-learning packages and in-person learning events.

## Close ties

Three years after founding her start-up, Hertzler still feels a close bond with the Internehmertum initiative. At the end of her latest funding round in June, the young entrepreneur seized the opportunity to run a pitch training session in the Steyg co-working space, combined with a business coaching and fundraising session. "It took me right back to my roots and brought back so many great memories of where Peers Solutions started."

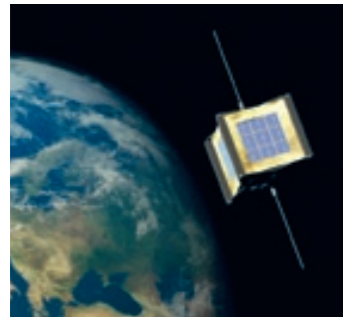
## Internehmertum goes global

Dina Kohler is determined to see many more start-ups reap the benefits of the incubation program and achieve rapid commercial success with or without financial investment from TRUMPF. She already plans to significantly expand the intrapreneurship program's geographical reach by the end of 2022. This will allow employees from any of the countries in which TRUMPF is active to submit applications for upcoming funding rounds over the intranet. Her goal continues to be to foster creativity and boost entrepreneurial thinking. And she is as confident as ever that the international TRUMPF community has the necessary inspiration to bring that goal to fruition.





*Fascinating facts and exciting innovations*



### Using quantum sensors to control satellites

Quantum technology start-up Q.ANT has formed a partnership with Bosch, TRUMPF and the German Aerospace Center (DLR) to develop **space-qualified attitude sensors** based on quantum technology. The aim is to deploy these sensors to enable high-precision attitude control of miniaturized satellites and to improve worldwide data communications. The sensors' ability to maintain **precise orientation** of the satellites in relation to each other will enable high-speed data connectivity – and that makes them a vital piece of the technology puzzle. “This strategic partnership shows the tremendous potential that lies in the collaborative development of pioneering technologies. The deployment of quantum technology in the aerospace industry is a huge opportunity for Germany as a major industrial hub,” says Q.ANT CEO Michael Förtsch.



### ScaleNC seeks growth in Germany and USA

TRUMPF has invested some four million euros in the **start-up ScaleNC**. The company will use this investment to fuel growth in German-speaking countries and branch out its services to customers in the USA. ScaleNC is a wholly owned TRUMPF subsidiary that processes manufacturing data for small and mid-sized customers and programs their machines. As well as using **AI and data-based algorithms**, it also gets experienced **CAD/CAM specialists** to double-check the programming. This combination enables the company to handle even the most challenging jobs at short notice. Customers seeking to plug gaps when skilled workers are in short supply can draw on ScaleNC's services at a flat rate without any contractual commitments. Alternatively, they can make the process even more cost-effective by opting for a service contract.



### Machines ahoy! TRUMPF charters ocean-going container ship

Transporting goods by sea continues to pose challenges due to supply chain disruptions, the war in Ukraine and port closures in China stemming from its COVID-control policy. These problems are also affecting the U.S., where logistics costs are rising and ships often wait for weeks outside ports to be loaded and unloaded. Determined to think outside the box, TRUMPF recently became one of the first industrial companies in Germany to charter its **own ocean-going container ship**. In August, heavy-duty cranes in the Port of Hamburg loaded the vessel with 49 laser-cutting machines and an array of production components.

The freight reached New York some two weeks later. With sales of 655 million euros, the U.S. is TRUMPF's second-biggest market. “We don't expect global supply chain problems to ease up anytime soon,” says Frank Nesselberger, who is responsible for global machine logistics at TRUMPF. “That's why we're constantly on the lookout for alternative routes that are both **economical and reliable**.” The chartered container ship certainly ticked all the boxes: with no need to call at the usual distribution terminals along the way, it avoided long waiting times at those ports and got the machines to their destination up to four weeks faster than by conventional shipping.

IMAGES: TRUMPF



### India: a key location for software development

TRUMPF has held a majority stake in Indian **software manufacturer Metamotion** since August 2014. This summer, it acquired the remaining 49 percent of the company. The transaction shows how much importance TRUMPF places on having a local presence in the cluster of international software firms located in the eastern Indian city of Chennai. This move is a key part of TRUMPF's global software strategy and offers excellent conditions for further growth. Metamotion employs some 40 programmers who specialize in the development of CAD and CAM software applications and machine control solutions. These applications are now a standard feature in all TRUMPF bending machines.



### Particle sensors: Q.ANT and Festo join forces for a successful future

Energy and environmental technologies offer fertile ground for collaborative projects. Examples include the large-scale cultivation of **biomass using artificial photosynthesis**, a promising approach that has long been the subject of a joint venture by Q.ANT, a wholly owned subsidiary of TRUMPF, and automation specialist Festo. At Hannover Messe 2022, the two companies cemented their collaboration and announced a strategic partnership. Their aim is to cultivate biomass on an industrial scale using a combination of automation technology from Festo and quantum technology from Q.ANT. Algae offer particularly high potential in this context. Their photosynthetic efficiency in their natural environment

allows them to bind ten times more carbon dioxide than land plants. And when they are grown in bioreactors equipped with appropriate sensors, this efficiency jumps even higher. The Q.ANT sensor provides precise, real-time information on algae growth inside the reactor; it can also optically analyze individual cells, enabling the system to precisely determine the amount of biomass. Cell vitality can also be monitored with the aid of artificial intelligence.



### TRUMPF records growth in sales and orders

The TRUMPF Group posted a significant increase in sales in fiscal 2021/2022. According to preliminary calculations, sales amounted to 4.2 billion euros as of June 30, **up by an impressive 20 percent** on the previous year. The Netherlands is now the company's best-performing market with sales of around 840 million euros. The company's second-biggest market is the US with sales of around 655 million euros, followed by Germany with sales of approximately 590 million euros. TRUMPF begins the new fiscal year with a bulging order book: order intake rose by 42 percent to some 5.6 billion euros. TRUMPF CEO Nicola Leibinger-Kammüller pointed to encouraging signs of strong economic momentum in the US and across Europe. However, the uncertainty caused by disruptions to global supply chains is likely to affect the company for some time to come.

# The easy route into sheet-metal fabrication

Choosing the right machines is a vital step for any company looking to enter the sheet-metal business or to expand its manufacturing expertise. The best cost-effective machines are powerful and reliable – and they don't compromise on quality. So how do you get the best performance for your money? TRUMPF's expanded range of cost-effective machines holds the answer. It includes solutions for all the key sheet-metal fabrication jobs – from laser-cutting to welding and bending. These machines are specifically designed to help companies transition into sheet-metal fabrication – without breaking the bank.



Programming the machine is quick and easy and doesn't require any prior specialized knowledge.

These models don't have as many features as high-end systems. "But they're in no way inferior in terms of quality and reliability," says Stephan Mayer, CEO Machine Tools at TRUMPF. The company continues to offer its high-end range of market-leading solutions – automated, connected systems that offer maximum throughput for the sheet-metal fab shops of the future. But not every situation calls for full-scale automation solutions; in some cases, all that's required is a simpler feature, such as a robot arm for automated machine loading.

## Tried-and-true functions

TRUMPF's new machines are perfectly tailored to the needs of entry-level users and companies that operate in one or two shifts. Its TruLaser Series 1000 machines for 2D laser cutting come with various tried-and-tested TRUMPF features that allow for fast, precise cutting. For example, the Highspeed Eco function uses a specially designed nozzle to direct the cutting gas onto the metal with even

greater precision. This increases feed rates by up to 70 percent while simultaneously reducing gas consumption by around 60 percent.

## Easy to operate

Programming the machine is quick and easy and doesn't require any prior specialized knowledge. The only features that TRUMPF has omitted are those that are clearly oriented toward highly automated high-volume production. This enables it to offer the machine at a much more affordable price.

Safe, reliable operation is a top priority in the cost-effective segment.



## No compromise on safety

TRUMPF puts the same emphasis on laser safety in its simple machines as in the rest of its portfolio. "We make sure no laser light escapes, and we use laser-safety viewing windows or auto-retracting protective barriers to protect the operator's eyes. Those are the features users should be checking for, especially in cheaper machines," says Stephan Mayer.

## Laser welding, bending and tube cutting

In addition to its TruLaser Series 1000 for laser cutting, TRUMPF also offers a TruLaser Weld Series 1000 machine for automated laser welding. This is a superbly user-friendly option for newcomers to the world of lasers. By automating time-consuming welding jobs, the TruLaser Weld Series 1000 saves time and eliminates costly rework. Since fall 2022, TRUMPF has also catered to companies that wish to offer sheet-metal bending services: the TruBend Series 1000 system makes programming easier than ever and



TRUMPF offers the right machine for the first foray into bending with the TruBend Series 1000.

comes with TRUMPF's proven technology data for bending. More solutions are already in the pipeline, including an even more affordable tube-cutting machine that is perfect for starting out in this segment.



With the TruLaser Weld Series 1000, TRUMPF offers its customers the ideal solution for getting started with laser welding.



Increases feed rate  
by up to **70%**



Reduces gas consumption  
by some **60%**

Check it out!

## REDUCE MATERIAL USE TO HELP THE ENVIRONMENT

Rarely have the day-to-day costs of running a sheet-metal fab shop been so high. Faced with supply-chain disruptions and higher energy and raw material costs, companies need to **use less material** wherever possible. There are also sound ecological reasons for being more sparing in the use of steel, copper, aluminum and other metals. TRUMPF has developed a number of technologies that can help **reduce material use** while simultaneously boosting productivity on the shop floor.

**14%**

less scrap

is generated by companies that use laser-cutting machines with the “**Drop and Cut**” feature, which helps users make optimum use of leftover sheet metal.



### Upcycling

Even if a machine no longer meets the latest standards, that's no reason to scrap it. Many older machine models can simply be retrofitted with new technologies. This include, for example, OPC UA interfaces for data exchange or the **Retrofit Box**, and monitored by TRUMPF.

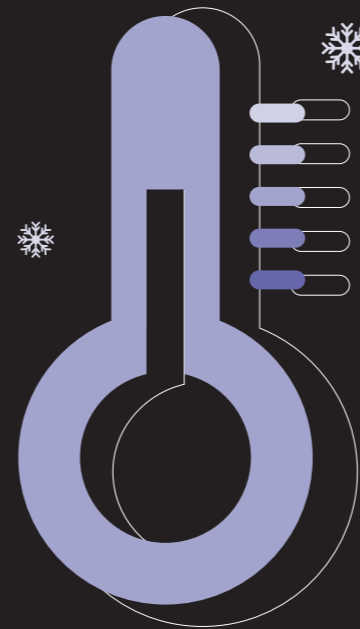
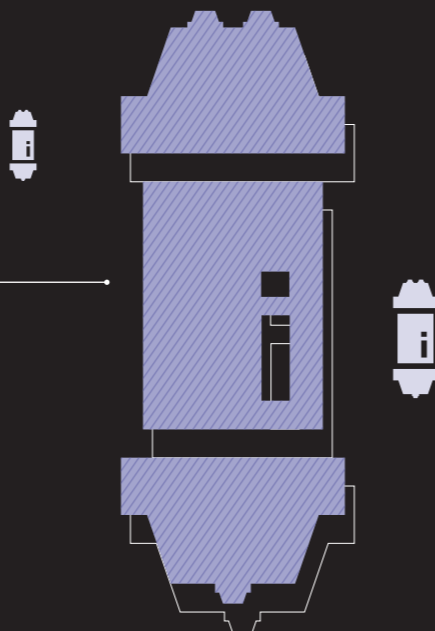
### Setting the pace

Active Speed Control determines the fastest possible feed rate during laser cutting and automatically readjusts it as necessary – a process it repeats **many hundreds of times a second**. This significantly reduces material wastage and scrap parts.



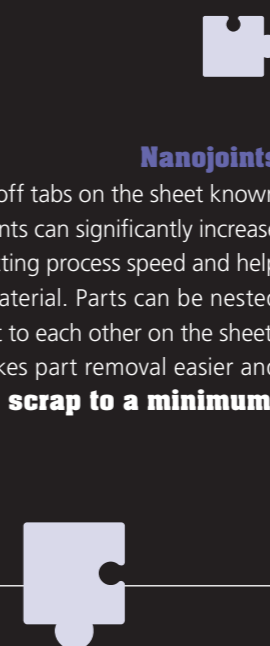
### Eco Cooler

During sheet-metal cutting, components such as the laser and the machine must be kept cool. The new Eco Cooler is the first system to use water for this purpose. It reduces the energy required for cooling by **up to 80 percent**, potentially saving **some 10,000 euros a year**.



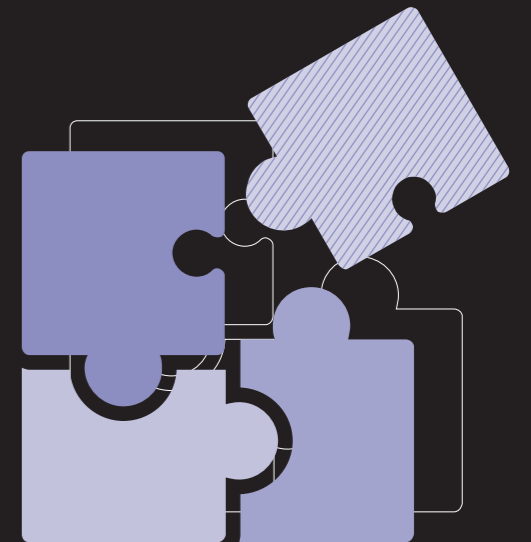
### Less waste

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



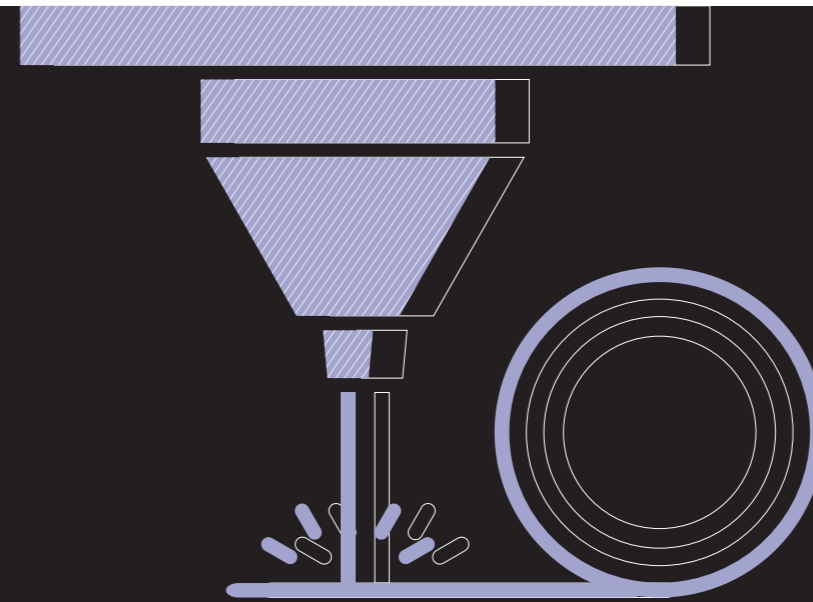
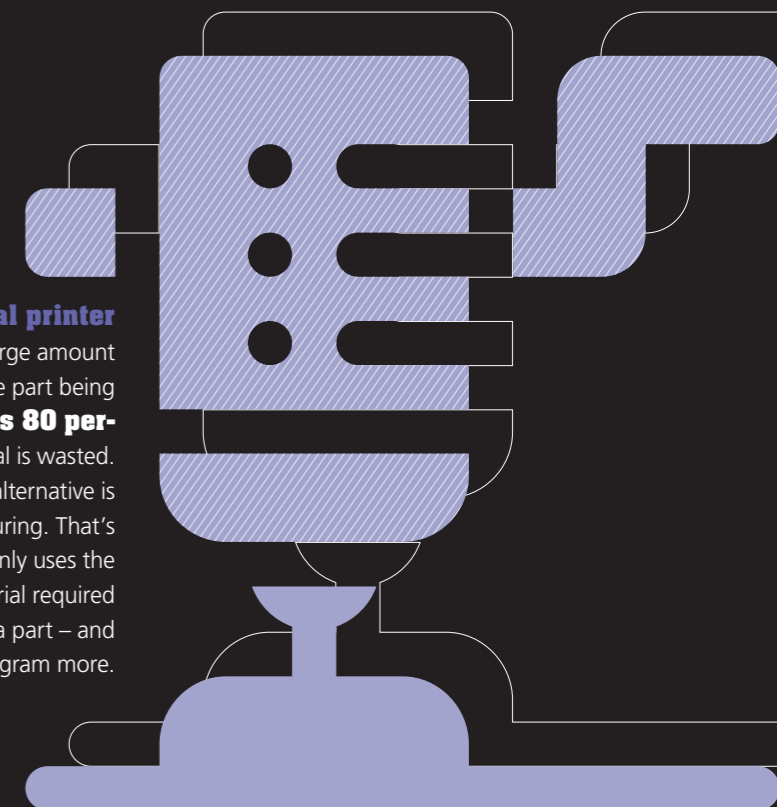
### Nanojoints

Tiny break-off tabs on the sheet known as nanojoints can significantly increase laser-cutting process speed and help save material. Parts can be nested directly next to each other on the sheet. This makes part removal easier and **keeps scrap to a minimum**.



### Economical printer

Metal milling produces a large amount of chips. Depending on the part being produced, **as much as 80 percent** of the raw material is wasted. The most economical alternative is additive manufacturing. That's because a 3D printer only uses the exact amount of material required to produce a part – and not a gram more.



### Versatile duo

Combining a **coil and a laser** is a great way to produce high volumes while maintaining high flexibility. TRUMPF and ARKU are developing a complete turnkey solution for this purpose. The system **reduces material costs by up to 30 percent** while significantly boosting productivity.



05

FUTURE

Bioeconomy

# TURNING WASTE INTO RESOURCES

IMAGES: Fraunhofer IGB

From building materials made by algae reactors to metal-recycling microorganisms and artificial muscles for robots, some companies are already harnessing **innovative biological methods** of sustainable manufacturing. Increasingly, they are relying on the recycling of scrap and other industrial waste, a concept known as the **circular economy**. In doing so, companies are responding to consumer demand for the use of renewable resources while also targeting a global market worth billions.

“ We can provide **better protection for the climate, the environment and natural resources** by transitioning toward biobased processes of manufacturing, working and living. ”

Markus Wolperdinger, Director of the Fraunhofer Institute for Interfacial Engineering and Biotechnology IGB in Stuttgart



Imagine a refinery producing biogas or diesel from agricultural waste such as straw and manure. Or a consumer-goods manufacturer extracting proteins for food and cosmetics from the biowaste generated in wine and sugar production. Or a machine-maker developing a reactor that can grow algae as a raw material for producing cars or sausage packaging – at a rate hundreds of times faster than nature itself!

These real-life examples give a flavor of how broad swathes of industry may look if the EU sticks to its goal of reducing net greenhouse gas emissions to zero by the middle of this century, thereby making Europe the first continent to achieve climate-neutral production.

## Biomass to combat climate

Sales of biobased industrial products in Europe have already reached 12-digit figures: the total for 2020 alone was 196 billion euros, and this trend is rising sharply. The EU Commission’s “Green Deal”, which it presented in 2019, envisages harnessing biomass to reduce CO<sub>2</sub> emissions by around 144 million metric tons by 2050 – a figure equivalent to approximately one-twentieth of current emissions. This transition is well underway, with global industry already using some 3.5 billion metric tons of biomass to produce fuels or other materials for industry sectors such as construction and chemicals.



## Mining gold with bacteria

Some machine-tool experts might be rolling their eyes and wondering how this is connected to their work. The short answer: more than you might think! Few issues will shape 21st-century industry as radically as sustainability. Special microorganisms are already being used to extract gold and other precious metals from electronic waste. And the environmentally harmful acids used for metal derusting are gradually being replaced by completely biodegradable alternatives such as iron-binding substances. Bio-degreasing has a similar objective: it aims to phase out the highly toxic solvents that are currently used to remove the oily film left on part surfaces by lubricants during mechanical metal processing. Once again, scientists have turned to

microorganisms to convert the greasy residues into naturally occurring substances. Bio-degreasing will ultimately pave the way for technically flawless surface coating and finishing work, even on an industrial scale.

## Core concept of the circular economy

For years, experts all over the world have been debating which manufacturing processes could replace fossil fuels with renewable resources. They have been doing their best to get biobased innovations out of the lab and onto the shop floor. Now, as resources dwindle and material shortages start to bite, the bioeconomy is seeing a new surge of interest. Government, scientists and increasing numbers of industrial companies are turning to the principle of a circular economy modeled on nature. The basic idea is that the material from the end of one product's life cycle provides the input for another product's life cycle. Ideally, this eliminates waste by transitioning every substance into a new cycle, even if this means stripping it down to a molecular level.

## New ways of thinking

Yet however simple nature's model may be, applying it in the real economy poses significant challenges. Rather than just calling for the replacement of fossil fuels, it seeks to prevent waste entirely by regenerating complete products and processes. "Getting closer to this target will require a major rethink in every sector and every company. The technological opportunities of the bioeconomy must inevitably lead to structural transformations in

**Programmed for growth:** Festo's algae reactor includes a quantum sensor from TRUMPF subsidiary Q.ANT which monitors algae reproduction.

IMAGES: Fraunhofer IGB

industry," says Markus Wolperdinger, director of the Fraunhofer Institute for Interfacial Engineering and Biotechnology IGB in Stuttgart and vice chairperson of the German government's Bioeconomy Council.

## Ready for industrial use?

Wolperdinger argues that any kind of goods manufacturing should now be viewed in terms of cycles, and that we should focus more on re-using products. Some progress has already been made, he says: "Many of the alternatives have already demonstrated their suitability for large-scale industrial use. We can provide better protection for the climate, the environment and natural resources by transitioning toward biobased processes of manufacturing, working and living." Yet if biobased solutions are to establish themselves on the shop floor, they will need to fulfill at least the same quality and cost requirements as traditional methods.

## Precursor to the bioeconomy

The basic principles of the bioeconomy are nothing new. The German Bioeconomy Council defines the bioeconomy as "the production and use of biological resources to provide products, processes and services in all economic sectors within the framework of a sustainable economic system". This may sound academic and abstract, but it has actually been a fundamental part



**Insect biorefinery:** organic residues and biowaste such as larvae skins are a valuable resource for generating technically viable products.

of our economy for centuries. Whether building with wood, making purple dye from snails, or producing wine, beer and bread with the aid of bacteria, people have always drawn on nature's power and resources. With the advent of industrialization and the exploitation of seemingly unlimited raw materials in the 19th century, much of this understanding was lost; but rising energy and raw material costs, resource scarcity and climate change are now bringing it firmly back into focus

## Opportunities for industry

Production processes contain huge amounts of often unrecognized potential. For example, the agricultural industry makes little use of its biomass by-products and waste aside from burning it to capture energy. "It would be ridiculous to say that we are fully exploiting these materials. The molecular structures of plant biomass give it properties that we could also be harnessing in other ways," says Wolperdinger, who holds a doctorate in chemistry. He sees parallels between today and the beginnings of industrial society. Then, too, the development of technology, productivity and science was accompanied by a radical transformation of working and living conditions. "If we look at the challenges of today's global crisis as an opportunity for change, then the bioeconomy can become a key component of the next paradigm shift. As well as strengthening rural areas, it will also create new jobs and offer business opportunities to industry."

**2,59  
billion tons**

**of global waste will be  
produced annually by 2030 -  
a trend that is continuing to rise.**



*Innovations, technologies and future trends*



### TruLaser Serie 5000 mit doppelt so viel Laserpower

TRUMPF has equipped its TruLaser Series 5000 with an impressive 24 kilowatts of laser power. The result is a huge reduction in processing times for sheet-metal fabricators, plus improvements in part quality and potential productivity gains of **up to 80 percent**. This doubling of laser power enables the machine to cut mid-to-high-thickness metal parts significantly faster for applications such as construction and agricultural machinery. It can handle any type of material up to 50 millimeters thick. For the first time, it also enables the TruLaser Series 5000 to process sheets up to 20 millimeters thick using nitrogen as a cutting gas. This reduces the need for rework compared to cutting with oxygen. TRUMPF will launch the TruLaser Series 5000 with **24 kW of laser power** in late October 2022.



### Eco Cooler saves energy and protects the environment

The new Eco Cooler from TRUMPF cools laser machines with pure water during the cutting process. The water flows around heat-generating components such as laser diodes, optics, drives and control cabinets to keep them cool. The heated water then returns to the Eco Cooler where it is chilled by an **innovative process of evaporation, compression and condensation**. Compared to conventional cooling systems, the Eco Cooler reduces the energy required for cooling by up to 80 percent, potentially **saving some 10,000 euros a year** and reducing carbon emissions by an average of 15 metric tons. This sustainable solution also eliminates the

need for chemical refrigerants such as fluorinated gases, the disposal of which damages the environment. This reduces operating costs and avoids a further 12 metric tons of CO<sub>2</sub>. TRUMPF's Eco Cooler solution helps sheet-metal fabricators to cut their consumption of F-gases, as covered by the Kigali Amendment to the Montreal Protocol. This agreement from 2016 mandates a gradual reduction in the global use of environmentally harmful refrigerants.



### New multigripper increases bending efficiency

The automated production of small batches in the sheet-metal industry is generally regarded as uneconomical. This is because the operator has to adjust the gripper to each new workpiece – but that's now a thing of the past! TRUMPF has come up with a new **innovative multigripper** that can be adjusted in a matter of minutes. All the necessary adjustments can be made by the operator directly through the system. This makes it quicker to set up the bending cell and increases productivity. The new vacuum gripper can be used with the **TruBend Cell 5000** and is available in two variants: small (S) for transporting workpieces up to four kilograms in weight, and medium (M) for workpieces up to 35 kilograms. The latter variant also enables each of the suckers to be activated individually. This is useful when handling workpieces with complex geometries.

IMAGES: TRUMPF



### Better quality and robustness in laser welding

New BrightLine Scan technology allows users to guide the laser beam during welding not just via the welding robot – previously the only option – but also using the laser scanner. This combination makes it possible to supplement the forward motion of the robot with a further, **freely programmable movement of the laser** in any direction. The resulting “oscillating motion” is facilitated by the use of specially developed lightweight mirrors. By enabling scan frequencies in the kilohertz range, this new technique **doubles the thickness of sheets** that can be processed in heat conduction welding, upping it from three to six millimeters. The new technology allows users to tailor the parts' bonding surfaces – which are melted directly by the laser beam – to suit each particular application. This increases process reliability and part quality and makes it easier to achieve tighter tolerances.



### Spatter Guard makes tube-cleaning easy

TRUMPF's new “Spatter Guard” technology greatly simplifies the task of keeping the inner surfaces of tubes clean. During cutting, metal slag spatter is deposited on the inside of the tube. This spatter often has to be manually removed, which is a laborious and time-consuming task. Mounted on the LoadMaster Tube, Spatter Guard travels through the tube during the loading process and **automatically** applies an even coating of a spatter release agent to the inner surfaces. While the machine is cutting the first tube, Spatter Guard is busy preparing the next tube for cutting. This **makes life easier for workers, reduces the need for post-processing and improves the quality of the inside surfaces**. Spatter Guard is available for the TruLaser Tube 3000 fiber and the TruLaser Tube 5000 fiber.



### TruBend 1000 is ideal for getting started with bending

The TruBend Series 1000 is TRUMPF's first bending machine that specifically caters to the needs of smaller companies. The TruBend Series 1000 uses the new Right Angle (RA) control system to make programming easier than ever, and it comes with TRUMPF's proven technology data for bending. Operating the machine is easy thanks to the new **highly intuitive user interface**. Users can choose between two variants of the TruBend Series 1000 – Classic and Comfort – with press forces ranging from 60 to 320 metric tons and edge lengths from two to four meters. This makes the machine suitable

for a broad range of bending parts. This new model is considerably cheaper than TRUMPF's high-end products, yet it's still a match for them in terms of **reliability, robustness and durability**. The Classic variant costs around two-thirds less than a TruBend 5000. All the information about the new machine is available on a dedicated website; customers can also order their chosen model online. Because the machines are already factory-configured, they can be delivered in a particularly short time.

# Pay-per-Part business model



i

## Benefits of the Pay-per-Part model

- “From owner to consumer” is TRUMPF’s motto for its Pay-per-Part business model.
- Customers who opt for the Pay-per-Part model receive a TruLaser Center 7030 machine from TRUMPF. Because no payments are due on the machines, they end up saving money which they can invest in other areas.
- A special pricing algorithm calculates the cost per part.
- Customers know the exact price even before they start producing a part – and they only pay for the parts that are actually produced.
- As well as covering the use and financing of the machine, the price per part also includes all incidental costs, such as personnel for programming and job planning, remote troubleshooting, maintenance, spare parts and consumables.
- By carrying out programming, system monitoring and many other services remotely, TRUMPF experts help counter the acute shortage of skilled workers.
- From day one, users will see an increase in productivity and capacity utilization compared to average machines in this field.
- The package also includes protection against downtime: TRUMPF experts monitor the system and provide support via remote access where required to ensure parts are ready on time.

Today’s sheet-metal fabricators don’t necessarily have to invest in expensive machines to run a successful business. TRUMPF can provide them with access to machines, software and services, as well as remote production planning and control and all the required programming and maintenance. The customer simply pays an agreed price for each fabricated sheet-metal part. If you think it sounds too good to be true, just ask the companies that are already benefiting from the Equipment as a Service model (Pay-per-Part). Here we present two examples.

Reiff Umformtechnik,  
Laupheim (Germany)

“ The Pay-per-Part model makes us **more flexible**, responsive and effective. It helps us adapt better to our current order situation. ”

Hansjörg Reiff, owner and CEO of Hansjörg Reiff GmbH Umformtechnik

## A competitive edge

Reiff started using the TruLaser Center 7030 and TruStore storage tower in May 2022 alongside its existing machinery. During the initial phase, some consultation was required on key production issues, such as optimizing nesting layouts. Both partners wanted to make sure they got the most out of the machine. At the same time, Reiff Umformtechnik was starting to come up with new ways of offering its products: “We wanted people to see that we were becoming more flexible and competitive.” Even at this early stage, it was already clear that the new system was working to a higher capacity than average machines in the field. That has been the case ever since the first week when the machine received TÜV certification. “But there’s still more to come!” says Hansjörg Reiff.

In an emergency, TRUMPF can remotely access the customer’s fully automated laser machines from its Neukirch site in Saxony.

Hansjörg Reiff’s family business is situated in Germany’s Ulm-Augsburg region. This is an area of full employment, so the company spends much of its time on efforts to attract and retain qualified employees for the long term. “When I see new, cutting-edge machines at trade fairs, I always jokingly ask whether the machine operator comes as part of the package!”

## Greater freedom and flexibility

Company CEO Reiff – a skilled toolmaker – is delighted with the freedom and flexibility he has gained through TRUMPF’s Pay-per-Part model. When he first looked into adopting this model, he was struck by the advantages of having access to such advanced automation: “I need every machine to run smoothly and reliably right from the start. If Pay-per-Part can help me guarantee that in the future, it clearly represents a groundbreaking benefit for our business.”

Gysi AG,  
Baar (Switzerland)

In 1900, two brothers, August and Eugen Gysi, decided to set up a locksmith and hardware store in the Swiss municipality of Baar. At that time, their safes, stoves and specialized elevator systems still required a huge amount of manual labor. So they would have been astonished by the capabilities of a TruLaser Center 7030, which combines all the laser-cutting processes in a single machine.

## Partners, not test customers

Today, two TruLaser 7030 systems have pride of place on Gysi AG’s shop floor. CEO Andreas Riguzzi is keen to expand his long-established company into a major laser-cutting hub. When he first heard about the new Pay-per-Part business model in fall 2020, he was immediately intrigued. Eager to strike while the iron was hot, he spontaneously cleared one of his production facilities and teamed up with TRUMPF to install the new system. “I quickly realized they were treating Gysi not as a test customer, but as an equal partner that could actively represent the user perspective.”

## Obvious benefits

TRUMPF delivered the first of the two machines from stock in January 2021, and it didn’t take long to get it up and running. Andy Riguzzi remembers the ramp-up phase as a whirlwind of activity, but Gysi AG soon saw just how much potential

Pay-per-Part offered on a day-to-day basis. The business model enabled the company’s 40 employees to increase production efficiency without putting their existing capacity under additional strain. TRUMPF programs and monitors the systems remotely around the clock, so any faults can be rectified by the TRUMPF team immediately, even if they occur at night. Previously, Gysi’s production manager scheduled all the incoming jobs and coordinated the production line accordingly – but now Gysi simply sets the deadlines to ensure its customers receive their products on time. “At first, it felt a little bit like losing control! But now our production is more efficient: we make better use of machine capacity and don’t switch between materials as frequently.”

“ I believe our Pay-per-Part business model heralds a **new era** in sheet-metal fabrication. ”

Andreas Riguzzi, CEO of the Riguzzi Group and CEO of Gysi AG



IMAGES: TRUMPF



## SMART SAVINGS: TRUMPF PART OPTIMIZATION

More quality at less cost: TRUMPF's part optimization workshops teach users how to get the best out of their machines and parts in order to make production more economical and efficient. Each issue, the TRUe editorial team takes a look at a different part to illustrate how this process works.

### This issue: Material-saving design

From supply bottlenecks and rising raw material costs to environmental protection, there are many good reasons to minimize the amount of material we use to fabricate sheet-metal parts.

Part redesign offers fabricators some major opportunities. A cantilever bracket is an excellent example of how much companies can potentially save by redesigning parts. Cantilever brackets form part of the fixtures used to support air-curtain fans, such as the ones above department-store entrances. Engineers attach the bracket to the wall to hold the fan in place. The fan produces an air curtain that prevents hot or cold air from entering the indoor space. "Cantilever brackets are subjected to high loads, which is why the original design used the traditional method of taking ten-millimeter-thick metal plates and welding them together. It does



**Markus Schaller,**  
part-design training instructor

the job, but it uses a lot of material," says Markus Schaller, a part-design training instructor. Instead, he recommends replacing this design with a new version that includes a bent section, which makes it possible to achieve the same stability with a thinner piece of metal. "We advise users to carefully consider the way in which the part is used and the forces acting on it and then bend it in a way that optimizes its load-bearing capabilities. That can help save materials and reduce costs and CO<sub>2</sub> emissions."

In the case of this particular bracket, the bent profile reduced the thickness of the metal from ten to 6 millimeters. Even if only a couple of these were produced, this would still reduce the use of material by 45 percent, as well as cutting CO<sub>2</sub> emissions by 51 percent and costs by 53 percent. That's three good reasons for companies to rethink how their parts are designed!



**BEFORE**  
10 mm-thick metal  
Four pieces of metal drilled  
and welded together

**AFTER**  
6 mm-thick metal with  
the same rigidity  
One piece of metal,  
drilled and bent

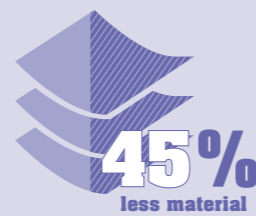


IMAGE: TRUMPF

#16

# pARTgallery



This picture shows the **RollBend RBK bending tool** as you've never seen it before. When bending visible parts, it's important not to leave any marks on the sheet metal. That's where RollBend RBK comes in: its plastic turning jaws do a great job of preventing any marks and scratches on bent parts. By taking this bending tool out of its normal environment, photographer **Michael Hogrefe** helps us see it in an entirely new light.

## Why does inspiration strike in the shower?

Where do good ideas come from? Otto Loewi's famous experiment, which involved placing the still-beating hearts of two frogs in connected flasks filled with saline solution, came to him in a dream. When he woke up, he noted down the experimental set-up. This eventually enabled him to prove his hypothesis that nerve and muscle cells utilize chemicals to transmit impulses. Sewing machine inventor Elias Howes also drew his inspiration from recurring nightmares in which he was repeatedly stabbed by spears. Some people might describe these inspirational moments as fortuitous, others simply as good old-fashioned luck!

But some flashes of inspiration are not serendipity at all, but rather the ability to spot a careless coincidence. Take Alexander Fleming, for example, who returned from his holiday in September 1928 to find a mold growing on a bacterial culture in his lab. He had forgotten to put away a Petri dish of Staphylococcus bacteria, a sloppy mistake that ultimately led to the discovery of penicillin. This example offers further proof that new insights can be gleaned from just about anything if you approach it from the right perspective.

In "The act of creation", Arthur Koestler memorably described this as "arrivals at the right destination by the wrong boat". Turned on its head, it recalls Columbus and the idea that new discoveries often stem from failure: Plan A goes awry, but we are rewarded with something new, the potential of which is not even apparent at first. Many of Columbus's explorations didn't go according to plan. Just like the German version of Scotch tape, which was originally intended as a plaster for the skin. Or Sildenafil, the active ingredient in Viagra, which was developed to treat cardiovascular problems. Or the internet, which was originally fashioned as a kind of hyper-text notebook. All of them were ideas that went astray, like so many of the great discoveries in science and technology. Pek Van Andel, a Dutch medical researcher and expert in flukes, compiled more than a thousand examples of such serendipitous finds.

But anyone who thinks they can just wake up one morning having dreamed of the most incredible invention might need to think twice. According to chemist Louis Pasteur, we must be diligent and inquiring in our research and receptive to good ideas, because



"chance favors only the prepared mind". Get it right, and a seemingly unremarkable event, well observed and incubated, could lead to our eureka moment!

The best option might be to get soapy: a study by cognitive psychologist Scott Barry Kaufman calculated that 72 percent of people had their best ideas in the shower. It sounds like an urban myth about creativity, but in fact it has a sound scientific basis. In the shower, you're relaxed and alone with your thoughts, and your brain switches into default mode rather than pursuing the straightforward, strategic course it assumes when you're stuck at your desk.

This is why Google gives its software engineers one day a week to work on whatever they like. And why Bill Gates adopted his famous reading sabbatical, a "Think Week" where an intense bout of reading sets atoms careering around in new creative directions. Walking can also work wonders, sparking your synapses into a joyful frenzy. When Swiss engineer George de Mestral noticed hundreds of pesky burrs stuck in his dog's fur on a mountain hike, it inspired him to create one of the most useful inventions of modern times: Velcro.

So if you're a sheet-metal fabricator looking for your eureka moment, maybe it's time to take a shower. Immerse yourself in the hot water and steam and let those neglected sparks of inspiration emerge from the back of your mind! Or, if rising energy costs have made a shower too expensive, you could always place your trust in TRUMPF's full-time creative idea managers. But where they get their ideas from – the shower, the garden, or anywhere else – is our trade secret.

*Daniela Müller*



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