

TRUe

THE MAGAZINE FOR SHEET METAL EXPERTS

01 Taichung

Chang's courageous journey:
a female CEO in Taiwan battles to create her
connected factory

02 Dillenburg

Second-generation growth: two brothers join
forces to take H. K. Neun into a digitally
connected future

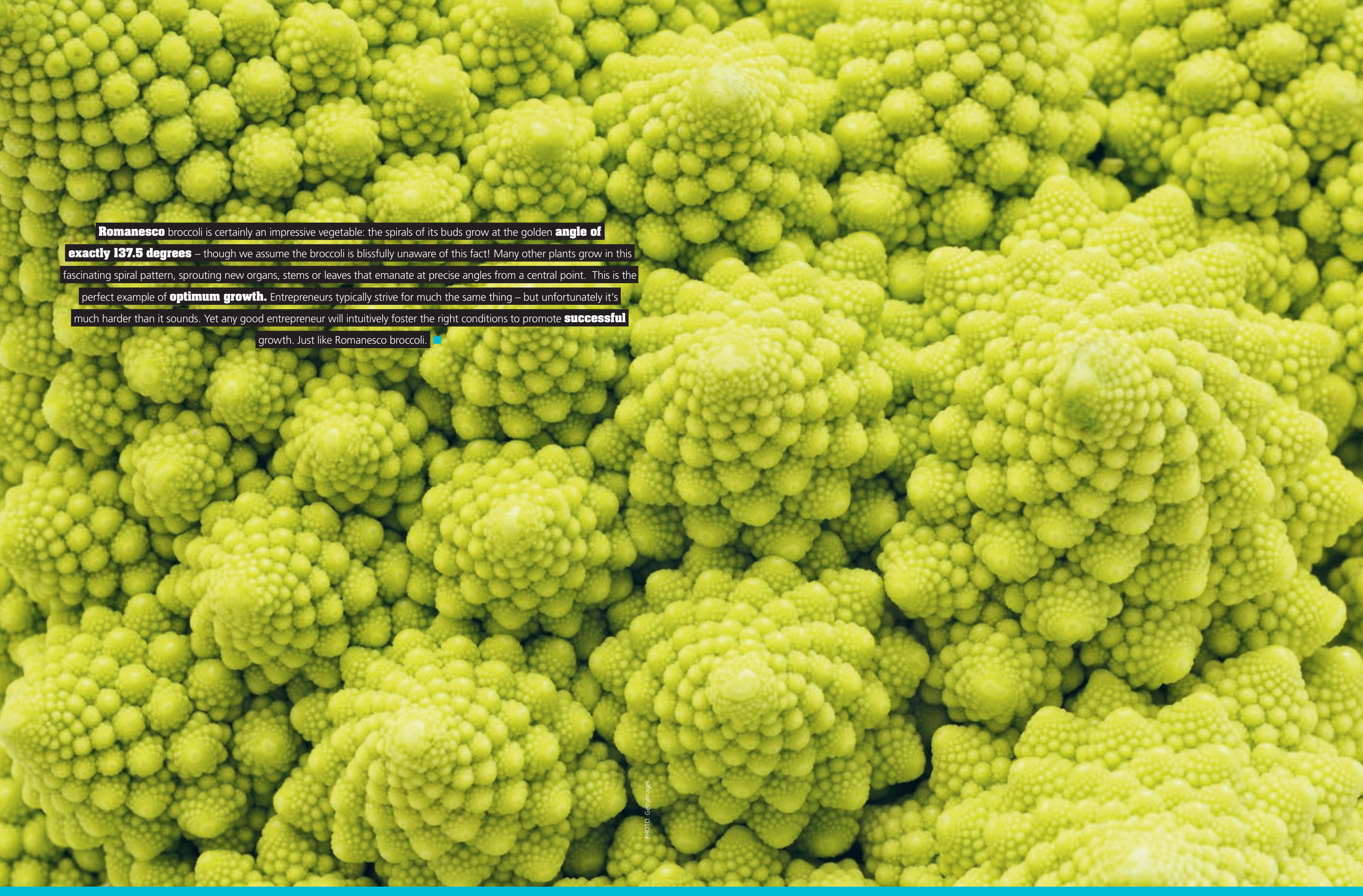
14# 2021 GROWTH

03 Moerkerke

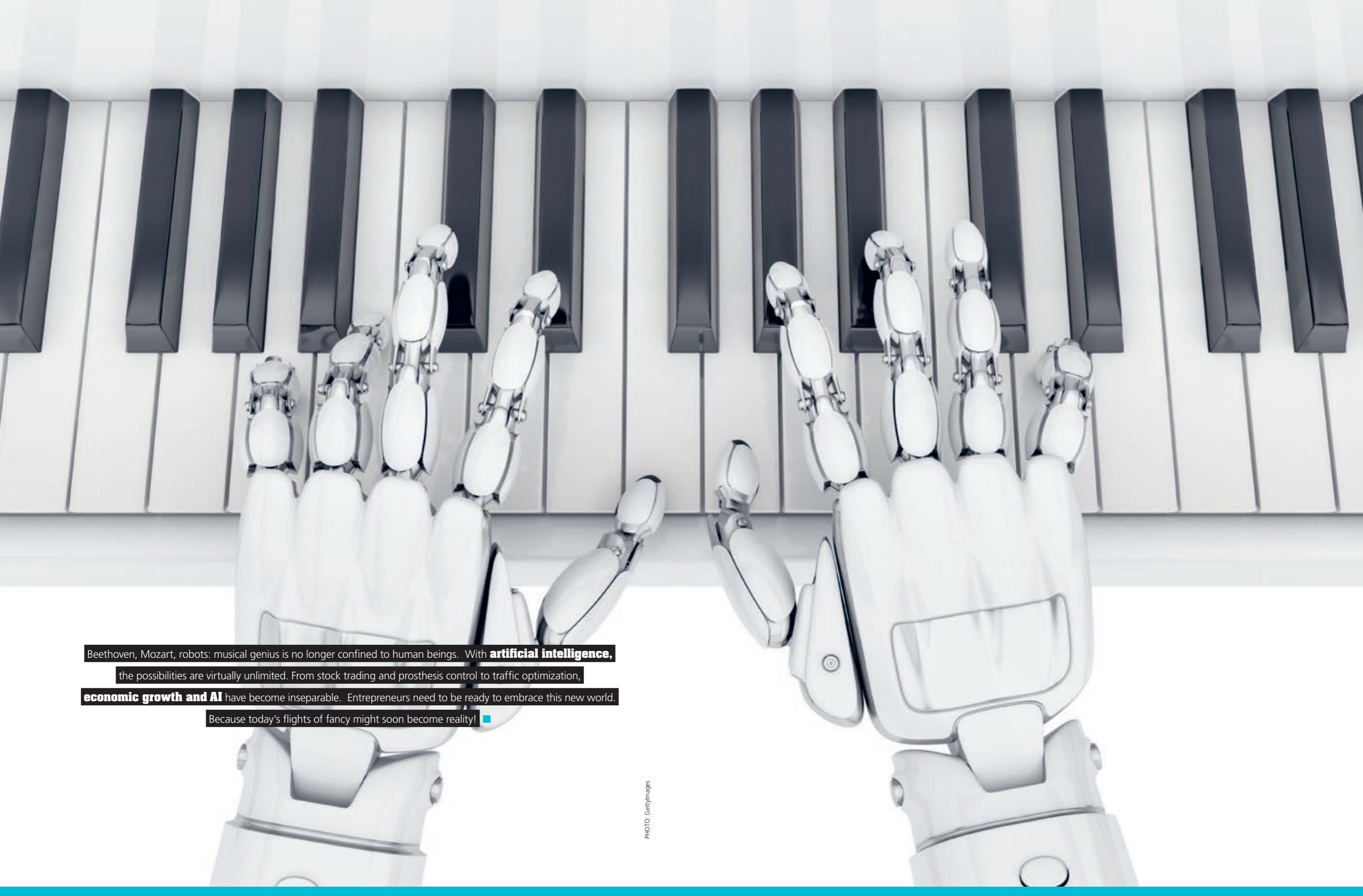
Belgium's best bending business:
whatever their size, Dezwaef's bending
machines get the job done!

04 Ditzingen

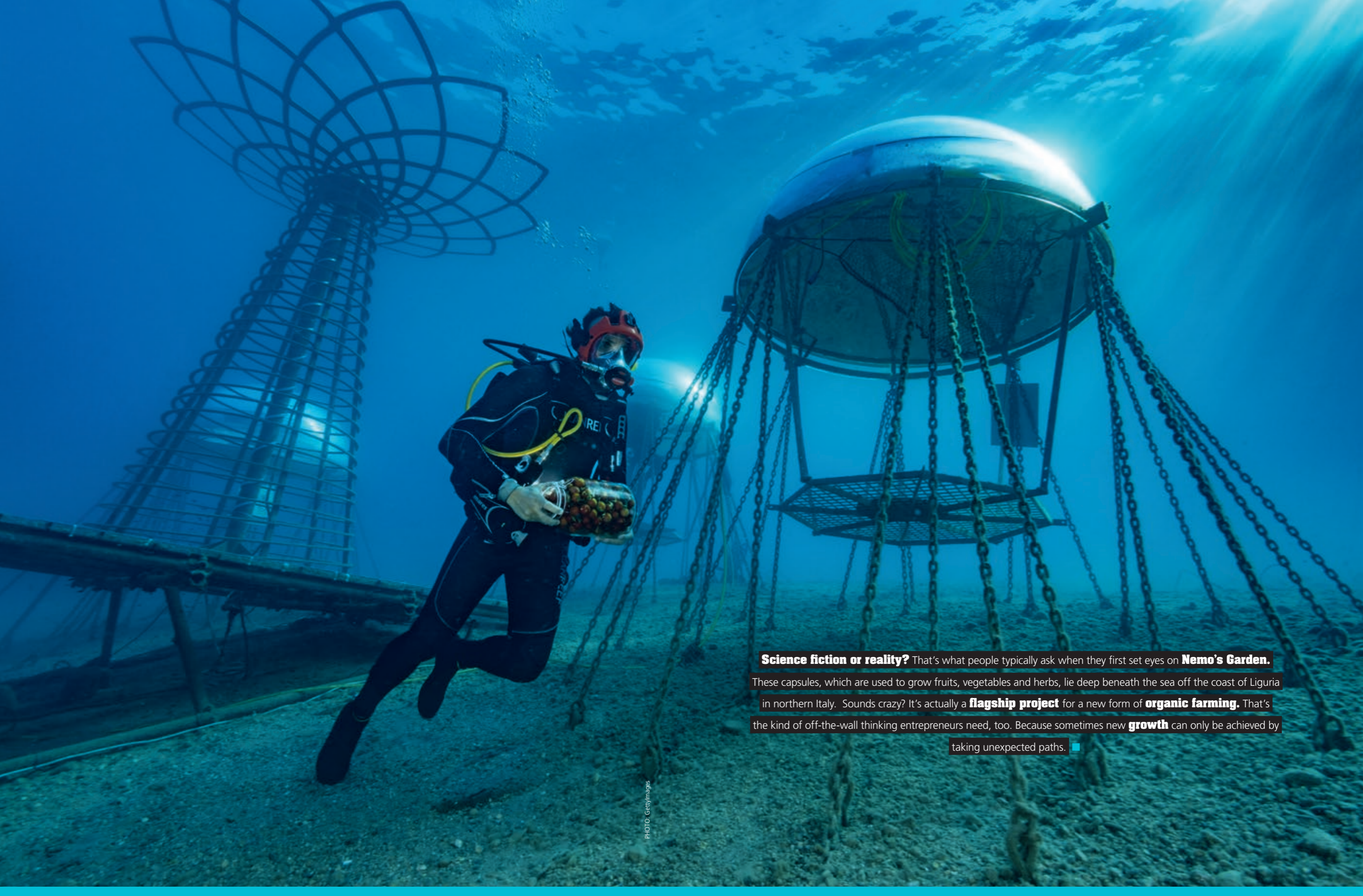
New cells for a greener world:
a U.S. start-up seeks to shake up the auto
industry with its recycled batteries



Romanesco broccoli is certainly an impressive vegetable: the spirals of its buds grow at the golden **angle of exactly 137.5 degrees** – though we assume the broccoli is blissfully unaware of this fact! Many other plants grow in this fascinating spiral pattern, sprouting new organs, stems or leaves that emanate at precise angles from a central point. This is the perfect example of **optimum growth**. Entrepreneurs typically strive for much the same thing – but unfortunately it's much harder than it sounds. Yet any good entrepreneur will intuitively foster the right conditions to promote **successful** growth. Just like Romanesco broccoli. ■



Beethoven, Mozart, robots: musical genius is no longer confined to human beings. With **artificial intelligence**, the possibilities are virtually unlimited. From stock trading and prosthesis control to traffic optimization, **economic growth and AI** have become inseparable. Entrepreneurs need to be ready to embrace this new world. Because today's flights of fancy might soon become reality! ■



Science fiction or reality? That's what people typically ask when they first set eyes on **Nemo's Garden**.

These capsules, which are used to grow fruits, vegetables and herbs, lie deep beneath the sea off the coast of Liguria

in northern Italy. Sounds crazy? It's actually a **flagship project** for a new form of **organic farming**. That's

the kind of off-the-wall thinking entrepreneurs need, too. Because sometimes new **growth** can only be achieved by

taking unexpected paths. ■

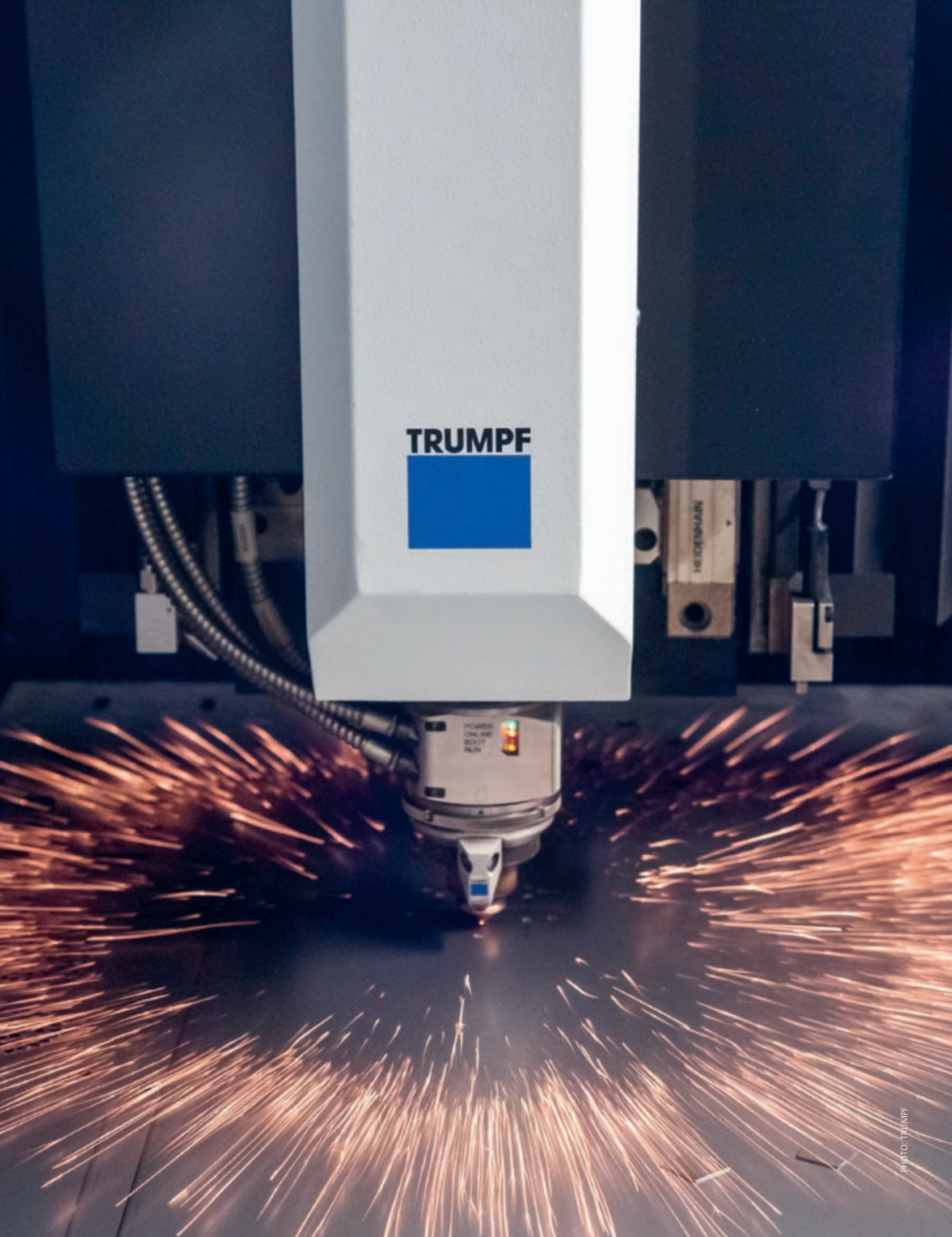


PHOTO: TRUMPF

TRUMPF: A reliable partner for sustainable **growth**



Dear readers,

This issue of TRUe is dedicated to the topic of growth. After 18 months of concerns over case numbers, vaccine rates and social distancing, some readers may view a focus on growth as overly optimistic. Yet the pandemic-induced downturn seems to be easing, and there are signs that our industry is growing once again.

It's time for some hope and optimism – time to look forward to a decade of new beginnings. It's not just the economic outlook that is brighter, but also the promise of technological progress. The coronavirus outbreak has accelerated the trend toward digitization. Home offices and online meetings may not quite equate to a connected factory, but surely even the biggest skeptics must now have laid their doubts to rest!

The challenge now is to bring connectivity onto the shop floor and embrace the ongoing journey of digitization – and that's where we can help. Generally, it all starts with a smart factory consultation, a chance for us to sit down together, analyze your factory and identify the potential for future growth (p. 36). Of course that needn't mean a sudden shift to fully connected manufacturing. Sometimes all you need to exploit untapped potential is a simple machine working in single shift operation. At the end of the day, our goal is to provide the right solutions to help our customers run a successful business.

The Dezwaef family from Belgium is a great example of how this can work in practice. Employing around a dozen people, the Dezwaef family business supplies slurry tankers to farmers all over the world. Flexibility is essential, because each and every one of their slurry spreaders is custom-built. That's why our Belgian sales team helped them combine two bending machines to handle extra-large bending lengths. They also found a new partner, VAC, which installed an innovative angle measuring system at Dezwaef, leading to even better results on the shop floor (p. 22).

Another customer who has joined forces with us to upgrade her production facility is Larrisa Chang from Air Force Laser in Taiwan. Fortunately for her, she had so many orders on her books that digitization was the only way to keep up! Over the past two years, we've helped her to install various smart factory solutions. Quality standards on the shop floor have improved noticeably over that period, lead times are down, and efficiency has risen by 50 percent (p. 12).

Our goal is to provide solutions for the entire sheet-metal process chain. Our machines are obviously a key part of this mission, but we also focus on upstream and downstream processes – from order receipt and manufacturing logistics right through to invoicing. We're constantly building on our manufacturing expertise and working to improve all the processes involved in production. This includes our own smart factory, which has been making sheet-metal parts for our own machines since the fall of 2020. This continuous process of improvement and development makes us a reliable partner for even the largest-scale projects (p. 18).

Radical upheaval is inevitable over the next ten years, whether in the form of digitization, e-mobility (p. 30) or quantum technology (p. 40). Many challenges lie ahead, but there will also be plenty of opportunities. Whatever happens, one thing is certain: TRUMPF will continue to be a reliable partner that you, our customers, can rely on.

As the new CEO of TRUMPF Machine Tools, I will support you in your efforts to identify and exploit key trends in the future of sheet-metal fabrication. In doing so, I will build on the excellent work of my predecessor, Heinz-Jürgen Prokop, who left TRUMPF after 13 years of service having reached the company's contractual retirement age. I started in my new post this July – and I look forward to embracing the decade of opportunities that lie ahead in the sheet-metal fabrication industry.

DR.-ING. STEPHAN MAYER
Chief Executive Officer for Machine Tools (CEO MT)
Member of the Group Management Board

TRU^e

Contents

#14/2021

GROWTH ...



03

...in Moerkerke

Fabricators of the future: at Belgian company Dezwaef, the next generation of the family business is already waiting in the wings. The parents are investing in custom solutions, determined that their son, Vincent, will eventually take over a flourishing company.

Page 22



...in Dillenburg

A new generation has joined the helm of family-run sheet-metal fabricator H.K.Neun. The company is now firmly on a path of automation and digitization – and both father and sons seem equally happy with the new direction.

Page 18



02



...in Ditzingen

Everyone's talking about e-mobility – but battery production is still not really sustainable. Start-up Battery Resourcers hopes to rectify that with its unique recycling technology.

Page 30



04

Editorial	08
01 Chang to the rescue	12
02 Generation growth	18
03 Belgium's best bending business	22
04 Cell therapy at its best	30
BIZ+ shortcuts	34
Smart Factory Consulting	36
Sustainability at TRUMPF	38
05 Future: ideas to change the world	40
TEC+ shortcuts	44
TruLaser Serie 1000	46
EdgeLine Bevel	47
Smart savings: TRUMPF part optimization	48
pARTgallery	49
Column	50

01



...in Taichung

From underdog to smart factory star: Larrisa Chang's courage and out-of-the-box decisions have transformed Air Force Laser, boosting the company's efficiency by a remarkable 50 percent.

Page 12



01

TAIWAN

Growth in Taichung

CHANG TO THE RESCUE

PHOTOS: Propaganda Studio Ltd.

When **Larrisa Chang** lost her managing director, she suddenly felt very much alone. As a woman in a male-dominated industry, she faced prejudice at every turn. She also had to cope with a shortage of skilled workers and the headaches caused by handwritten routing slips. But her perseverance paid off, and she eventually turned **Air Force Laser** into a flagship of Taiwan’s sheet-metal fabrication sector. Efficiency rose by 50 percent thanks to her entrepreneurial skills, the right choice of **software and automation**, and a major shift in corporate culture.

A feel for the future: Larrisa Chang never imagined that highly automated sheet-metal fabrication could be so successful. But she was determined to follow her vision. Today, Air Force Laser is on track to become a truly outstanding smart factory.

When Larrisa Chang casts her eyes over Air Force Laser’s 7,300-square-meter production facility, her pride and satisfaction are plain to see. She spent the past 15 years forging this highly automated production line in Taiwan’s industrial hub of Taichung, ultimately transforming a traditional production plant into a beacon of Industry 4.0. The fact that she achieved this feat in an industry largely dominated by men is just one aspect of her remarkable success story.

Taking on the sheet-metal challenge

Air Force Laser was founded on the basis of courageous decisions and a refusal to accept the status quo. The machine maker where Larrisa Chang was employed as a purchaser was constantly struggling with unreliable deliveries and shortages in the supply of sheet metal parts. In 2004, she decided to leave the company and set up her own sheet-metal fabrication business together with her husband. The couple put an experienced managing director at the helm – but things took a drastic turn when he left the company without warning three years later.

Roll up your sleeves

“Suddenly I was on my own,” says Chang. “So I rolled up my sleeves and set to work.” Taking on the mantle of CEO, she delved deep into the workings of the business. “I analyzed every last detail and quickly built up a solid understanding of what it takes to be a successful sheet-metal fabricator.” The expertise she acquired was remarkable: “Ms. Chang has a truly encyclopedic



knowledge. People expect her to know twice as much as anyone else in this male-dominated industry – and she does!” says Wulf Chang from TRUMPF in Taiwan.

Fighting for female empowerment

Asian tiger Taiwan may be a world leader in gender equality – coming sixth in the UN rankings and first among Asian countries – but sheet-metal fabrication, machine-making and mechanical engineering are still very much the domain of men. “A lot of people didn’t take our company seriously at first because we had a female CEO,” says Chang, recalling how customers seemed to prefer working with male managers. But Chang rose to the challenge once again – and this time she was also battling on behalf of her four daughters. Grace Chang, the eldest, has already joined the company in a managerial role and is now responsible for logistics and machine programming.

A good feel for the market

What fueled Air Force Laser's growth was not just Chang's expertise, but also her intuitive feel for the market. She spotted the trend toward small-batch production much sooner than many of her competitors. "We were determined to leave traditional high-volume production behind and focus on the niche market of flexible sheet-metal fabrication," she recalls. Their goal was to become a full-service sheet-metal fabricator that could respond quickly and flexibly to each customer's individual requirements. The first thing they did was to streamline their production lines and stop chasing big, high-volume orders.

Routing slips lead to errors

Initially, this realignment put them on a good path; the company grew and acquired new customers. But they soon realized that their existing system for managing production operations was unable to keep pace with demand. One of the biggest challenges was the workers' language skills. "It's not easy to find well-trained specialists in Taiwan," says Larrisa Chang. "That's why many of our employees come from Vietnam – but the problem is that many of them can't read or understand Chinese." This led to recurring errors in processing and executing routing slips, all of which were filled out by hand.



Efficiency boost: TruTops Fab forwards jobs to the machines automatically while optimizing capacity utilization. The result? A 50 percent rise in efficiency within a single year.



PHOTOS: Propaganda Studio Ltd.

“ Sometimes all it takes to **succeed** is a little bit of **courage!** ”

Larrisa Chang,
CEO Air Force Laser, Taichung

The future of sheet-metal fabrication

Chang decided to eliminate these errors by digitizing and automating the production process. "Back then, I was skeptical that we could succeed with a highly automated sheet-metal fabrication system," she admits, but the company's processes were coming under increasing pressure. Chang decided the best option was to invest in TRUMPF's TruConnect solutions. After seeing TruTops Fab Quickjob and TruTops Fab Production in action at TRUMPF's sheet-metal fabrication facility in the Chinese city of Taicang, she quickly realized they were the right tools for the job. "I was really impressed by the TRUMPF facility; for the first time, I could picture how our sheet-metal fabrication business might look in the future." What's more, the software would run on their existing TRUMPF machines without a hitch.

Efficiency up by 50 percent

Yet the impact of the new manufacturing execution system actually exceeded her expectations. "It felt like shining a bright light into the darkness; we suddenly had a much deeper and clearer understanding of our own processes. The result was better quality and shorter lead times," says Chang. TruTops Fab forwards jobs to the machines automatically, so the company can now execute multiple orders in parallel, optimizing both capacity utilization and throughput time. The results speak for themselves: from the launch of the software in November 2019 through to the end of 2020, the company boosted its efficiency by 50 percent. Air Force Laser recently purchased a



Greater clarity: It used to be tough to understand how the processes at Air Force Laser worked. But now everything is much clearer.



Reliable and motivating: Air Force Laser's workforce relies on TRUMPF software to overcome language barriers and prevent unnecessary errors.

TruLaser 3030 fiber cutting machine with a compact storage system and Liftmaster and is currently in the process of acquiring another bending machine.

Greater potential for optimization

As well as new machinery and greater efficiency, the benefits have also extended to Air Force Laser's corporate culture, says Larrisa Chang – though some employees were skeptical at first. "They were afraid of being monitored or replaced." Chang showed them how TruTops Fab could optimize the quality of their work. "The software helps organize what you need to get each job done. For example, we previously used print-outs of master drawings for bending, but

now we access them directly through the system in a digital format." Getting to the bottom of how the processes worked used to be a headache – but now any employee can use real-time data to identify potential for improvement and put forward suggestions at the shop floor meeting held every morning in front of the TruTops Fab monitor. "They are far more involved in the production process, and they communicate more with their supervisors," says Chang.

Courage is key

The path to a smart factory is a long one, but Larrisa Chang is clearly heading in the right direction. "I haven't always taken the obvious decisions at Air Force Laser. But now I can see I followed the right path!" she says. "We've made radical changes to our order management and reporting processes on the shop floor. Our throughput times are down and we're producing parts faster with less scrap. Shorter lead times also improve our ability to respond to each customer's specific needs." Larrisa Chang has transformed Air Force Laser from an underdog into a flagship business that prompts admiration from visitors and will likely be emulated in the future. She remains humble about her achievements and argues that the secret to her success is simple: "Sometimes all it takes to succeed is a little bit of courage!"

New ideas: TruTops Fab empowers workers to identify potential improvements and present suggestions at their morning shop floor meetings.

PHOTOS: Propaganda Studio Ltd.



01

A closer look:

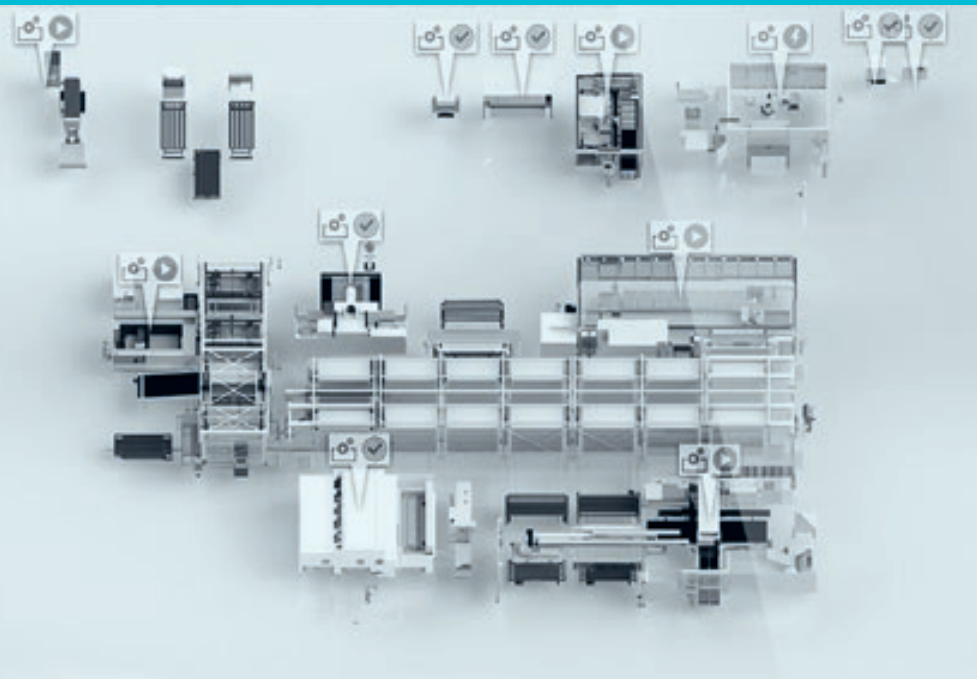
Taiwanese company **Air Force Laser** made an early start on the path toward digitally connected industry – and TRUMPF was on hand to offer advice right from the outset. The sheet-metal fabricator ultimately opted for the TRUMPF production control software **TruTops Fab Quickjob and TruTops Fab Production** – and it hasn't regretted its decision for a single moment.



In brief

TruTops Fab Quickjob and TruTops Fab Production

The day-to-day reality of sheet-metal fabrication involves plenty of challenges, from shrinking batch sizes and increasing complexity to a shortage of skilled workers. Fortunately, TRUMPF has the solution: **TruTops Fab** is a family of software specifically designed for sheet-metal fabricators that makes processes simpler, more transparent and more efficient.



The central hub: TruTops Fab Quickjob

This module allows companies to manage their production environment and process jobs on the shop floor clearly and efficiently. All they have to do is connect their machine or laser system to the software. **TruTops Fab Quickjob** offers a number of advantages over manual production control:

01

MANAGE JOBS

Jobs are generated automatically from ERP/PPS systems or from Excel. This saves valuable time by removing the need to transfer them manually. The current status of each job appears in an overview together with any relevant messages or deadlines.



02

CONTROL MACHINES

The machines automatically work their way through the production schedule while providing continuous updates on the job status. This transparency and real-time feedback helps to avoid delays. Operators can ask the system to send them an email or SMS if any problems arise during job processing.



03

SET DEADLINES

TruTops Fab Quickjob helps companies keep track of the capacity utilization of each machine and workstation. Production capacities can be rescheduled quickly and easily if a customer requests an urgent job.



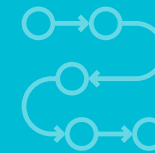
Everything on-screen: TruTops Fab Production

The TruTops Fab Production module gives fabricators a clear overview of all the production steps – from assembly and painting to outsourced production. Regardless of whether a step is manual or automated, it's easy to control the sequence of operations and work plans for each part or assembly. **TruTops Fab Production** builds on the capabilities of the TruTops Fab Quickjob module.

01

MULTISTAGE MANUFACTURING

Maximum flexibility: parts and assemblies can be manufactured across all workstations, including programming, laser cutting, bending and packaging.



02

CREATE WORK PLANS

Putting together work plans comprising multiple production operations is simple. The program can even handle production steps carried out externally, with everything displayed in one clear overview.

03

COMBINED ASSEMBLIES

Parts that belong together can be combined into an assembly. The corresponding job order provides an overview of the production status of each individual part.



Better together

By combining the TruTops Fab Quickjob and Production modules, companies can cover all operations in their production – from programming to laser cutting, bending, punching and welding or from assembly to quality assurance.



Customer details

Air Force Laser Co. Ltd.

Managing directors: Larrisa Chang and Grace Chang
No. 125, Aly. 418, Ln. 506, Sec. 1, Xinan Rd., Wuri Dist., Taichung City 414, Taiwan
Email: airf.laser@msa.hinet.net
www.airforce.com.tw

Machinery

- TruLaser 3030 fiber, TruStore 3030, LiftMaster Compact
- TruBend 5320 ToolMaster
- TruLaser 3040
- TruBend 5230
- TruPunch 3000



02

GERMANY

Growth in Dillenburg

GENERATION GROWTH

PHOTOS: TRUMPF



Family brainstorming: Teamwork is important at H.K. Heun. Raphael Willgenss (left) is the team's IT specialist. He sees automation and digitalization as the best option in the future.

Yannick and Raphael Willgenss spent 18 months turning their father's company upside down – with his blessing. As the second generation of the family business, **sheet-metal fabricator H. K. Heun**, the two brothers have already introduced digitalization and smart factory solutions from TRUMPF. But their journey is only just beginning – and they're certainly not short of ideas.

Managing director Marc Willgenss and his sons Yannick and Raphael may not see alike on many issues, but they all agree that the success of the company comes first. Their discussions on how to achieve it sometimes get heated, but they have learned to accept each other as they are: "We're just as headstrong as our dad!" say the two sons. Marc has long been inspired by his entrepreneurial sons, and he relies on them even more now that the focus has shifted to digitalization

Young talent

Twenty years have passed since Marc took over at the helm of the metalworking company H.K.Heun, based in Dillenburg, Hesse. He always hoped his two sons would eventually get involved in the business. In 2009, Yannick joined the company as a 19-year-old sheet-metal fabricator. Three years later, his brother Raphael, then aged 24, signed up as an IT specialist.

From one-off pieces to entire assemblies

H.K.Heun manufactures one-off, custom parts as well as complete assemblies. "We're a one-stop shop for consulting, design and manufacturing," says Raphael. Heun's products include enclosures for laser cells, assemblies for wastewater systems and secure cabinets for safe manufacturers.



Company headquarters: two generations working side by side.

25 millimeters? No problem!

But that's only one side of the Heun Group. In 2013, the Willgensses acquired part of a neighboring company that specialized in commercial kitchen construction. They named the new business Primetall, and it's 45-strong workforce now fabricates stainless steel parts for customers in the catering, medical and aircraft industries. While Primetall works with metal sheets up to four millimeters thick, Heun uses structural steel with sheet thicknesses as high as 25 millimeters. Together, the two companies cover a broad range of applications.

Enter TRUMPF

It was this acquisition that first led Raphael and Yannick to TRUMPF. Primetall installed eight new TRUMPF machines and a STOPA storage system in its new production facility, which was a big contrast to Heun's existing machinery. "We'd been using equipment from a different manufacturer for years," says Raphael. "The machines weren't bad, but they couldn't match the outstanding service that TRUMPF was offering and the reliable way they help customers plan maintenance and repairs."

A risk-free leap into new technology

Finally, they got the opportunity to make the switch: a major customer offered them a framework contract to produce tubes, and Raphael and Yannick were finally able to fulfill their dream of acquiring a laser tube cutting system. "The contract guaranteed us 40-percent capacity utilization for one of those machines, so we got a new technology at pretty much zero risk," says Raphael.

All-in-one solution

Still, Marc Willgenss and his two sons didn't take the decision lightly. As a family business, Heun's reputation for reliability extends not just to its customers, but also to its suppliers. "We even considered buying one machine from our former supplier and one from TRUMPF! But eventually we decided that our best approach was to adopt an integrated solution from a single source," says Raphael. Following a visit to Ditzingen, all three of them were confident that the TruLaser Tube 7000 was the perfect choice.

Taking IT to the next level

Soon after, Raphael paid a visit to the Smart factory at the TRUMPF Customer Center in Ditzingen. "It was obviously fascinating for me as an IT specialist," he says. "Especially since I'm the one pushing digitalization at our company." The young computer scientist does a lot of programming himself with the company's open enterprise resource planning (ERP) system. "That's why I was so impressed by the solutions TRUMPF offers in the areas of production control and programming software."



A dream come true: the TruLaser Tube 7000 has made tube manufacturing much simpler.

"The best approach for us is an **integrated solution** from a single source."

Raphael Willgenss, Junior Managing Director

Investment slashes electric bills

But there was still more optimization potential to tap. "Even with our automated order processing and inventory management systems, we still weren't getting the orders in. The problem was that our old machines were too slow, and our fixed costs were too high," says Raphael. The two brothers calculated they were spending up to 18,000 euros a month on electricity. They reckoned that new, more efficient machines would reduce those costs to such a degree that the investment would soon pay for itself. "We replaced three of our existing machines with two new TruLaser 3030 machines, one of which included Liftmaster. And we also invested in a TruLaser Cell 7040 for Primetall," says Yannick

Taking digitalization further

The new laser systems are just the start, with the bending machines next in line for replacement. In addition, Heun will soon be introducing the TruTops Fab manufacturing execution system from TRUMPF, which is already installed at Primetall. "Automation and digitalization will continue to play a big part in our business in the future," says Raphael. "The ability to link my ERP programs with TRUMPF solutions via standardized interfaces is exactly the direction I want to take."

Family business: Marc Willgenss (second from left) and his sons Yannick and Raphael (from right) admit to being headstrong – but that's how they keep each other motivated!

PHOTOS: TRUMPF

02

A closer look:

Cut & Pay

Some companies rely on savings or emergency reserves – but there are other options. **TRUMPF Financial Services** offers various financing models, including **Cut & Pay**. This model is a great way to get started with laser cutting. It offers maximum flexibility, transparency and reliable planning – without having to purchase a machine.

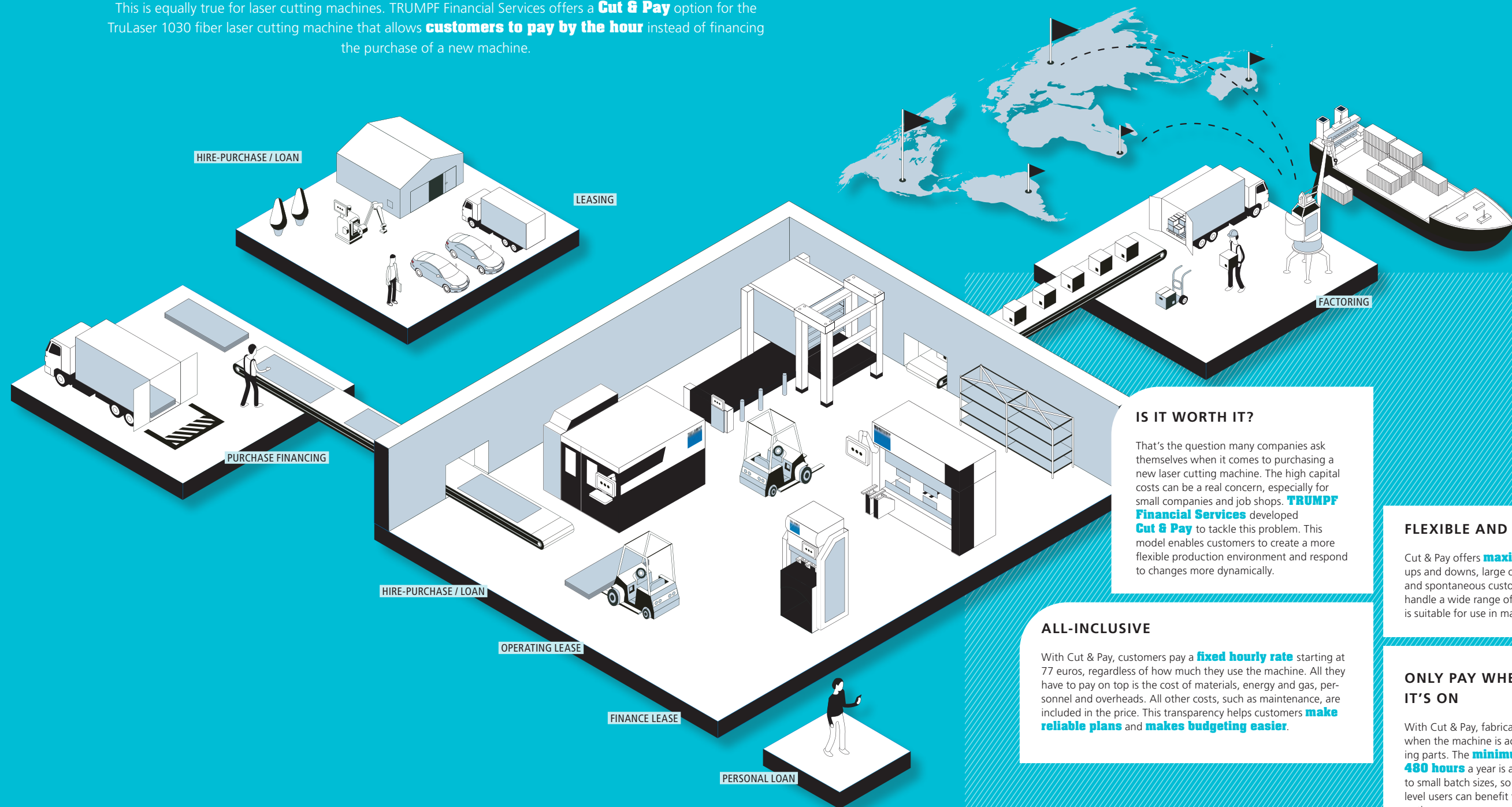
In brief

Bye-bye buying, hello Cut & Pay

Sharing is caring: from cars to toolboxes and strollers, sometimes it's better to borrow something rather than buy it. This is equally true for laser cutting machines. TRUMPF Financial Services offers a **Cut & Pay** option for the TruLaser 1030 fiber laser cutting machine that allows **customers to pay by the hour** instead of financing the purchase of a new machine.

The TRUMPF Bank:

Since 2001, TRUMPF Financial Services has been offering a range of financing models for TRUMPF products. Customers benefit from **personalized financing solutions** that are optimally tailored to their industry requirements. TRUMPF Financial Services understands the market – and that makes it the perfect partner to support sheet metal fabricators with reliable technical expertise.



IS IT WORTH IT?

That's the question many companies ask themselves when it comes to purchasing a new laser cutting machine. The high capital costs can be a real concern, especially for small companies and job shops. **TRUMPF Financial Services** developed **Cut & Pay** to tackle this problem. This model enables customers to create a more flexible production environment and respond to changes more dynamically.

ALL-INCLUSIVE

With Cut & Pay, customers pay a **fixed hourly rate** starting at 77 euros, regardless of how much they use the machine. All they have to pay on top is the cost of materials, energy and gas, personnel and overheads. All other costs, such as maintenance, are included in the price. This transparency helps customers **make reliable plans** and **makes budgeting easier**.

FLEXIBLE AND VERSATILE

Cut & Pay offers **maximum flexibility** to cope with economic ups and downs, large orders, rapid production of additional parts and spontaneous customer requests. The TruLaser 1030 fiber can handle a wide range of metals, shapes and sheet thicknesses and is suitable for use in many areas.

ONLY PAY WHEN IT'S ON

With Cut & Pay, fabricators only pay when the machine is actually producing parts. The **minimum usage of 480 hours** a year is already tailored to small batch sizes, so even entry-level users can benefit from this option.

03

BELGIUM

Growth in Moerkerke

BELGIUM'S BEST BENDING BUSINESS

For over 50 years, bending has dominated the lives of the **Dezwaef family** in the Belgian town of Damme. Two generations of the family work side by side to ensure farmers get the very best **slurry tankers** to spread fertilizer on their fields. And even their eight-year-old son is gearing up for a career in the family business.

PHOTOS: Mies Schubert



Safely contained in its plexiglass housing, Vincent's TruBend 8500 Mini was specially designed and built for him by TRUMPF apprentices. With a confidence born of experience, the eight-year-old boy deftly inserts a blank, closes the hatch and operates the controls. Alongside the miniature machine on the Dezwaef shop floor is another custom-made machine from TRUMPF, in this case a tandem behemoth consisting of two TruBend 8500 bending machines. Together, the two machines are over nine meters long and weigh more than 90 metric tons. This custom combination was recently acquired by Dezwaef, which specializes in agricultural slurry tankers. Vincent would love to lend a hand with his little machine's bigger cousin – but he's still a bit too young for that!

Growth for Vincent

"He loves his TruBend Mini and insists no one should touch it apart from him," says Angélique Dezwaef, his mother and the company's managing director. She and her husband Filip are the second generation of the Dezwaef family at the company's helm. By the time she hands over the business to Vincent, she hopes it will be even bigger and just as successful. Based in the Belgian town of Damme, there is certainly something special about this

manufacturer of slurry tankers and manure spreaders – and its custom machines from TRUMPF are only one example.

Father-in-law on the team

Angélique Dezwaef takes us on a tour of the facilities via video link. "That's my father-in-law over there!" she says, directing the camera at an older gentleman bathed in sparks from his welding equipment. She guides us past huge steel tubes, blanks for the slurry tanks, various bending, cutting and laser machines, stacks of sheet metal, and a series of huge chassis on which the tanks will eventually come to rest. The oldest machine from TRUMPF, a TruBend 2300, is 16 years old – twice as old as Vincent.

Custom-made as a matter of course

Dezwaef needs all the flexibility its machines can offer, because each and every one of the 250 or so slurry tankers it makes each year is a custom job. One tanker might have a twin-axle design, the next a suction arm for fertilizer, and yet another might be equipped with a special spraying system. The company's customers are based in Belgium, the Netherlands, France, England – and even as far away as Canada.



.....
 "It's not easy finding
good workers.
 We've got a great **team,**
 but we really need more
 skilled staff."

Filip Dezwaef, owner



Bending in tandem

With some 250 orders in the pipeline, the family-run company is already fully booked for the remainder of this year. Soon, Dezwaef plans to grow its business by expanding its production facilities and offices and acquiring another, even larger laser machine from TRUMPF. "We're aiming to make all those investments over the next five years – it's all about securing Vincent's future," says Angélique. TRUMPF is proud to work with such a versatile, growth-oriented customer. "The two bending machines are combined and connected in a way that allows them to work in tandem, so they can handle tremendously long bending lengths," says Maximilian Schacht, who is responsible for the Belgian region at TRUMPF.



Testing for TRUMPF

But the bending length is not the only customized feature. Dezwaef is the first customer to deploy a laser angle measuring system on a tandem 8000-series machine, says Karel Vincke from VAC, TRUMPF's Belgian sales partner. "We already know that the laser angle measuring system works well with the TruBend 5000 and 8000 series, but we had never used it in a tandem configuration; the Dezwaef's are our test user!" says Vincke.



In tandem: Together, the two TruBend 8500 machines are over nine meters long. The tandem machine weighs more than 90 metric tons.



PHOTOS: Niels Schubert

“ We’ve been using the **laser angle measuring system** successfully for years. But the Dezwaef's are a test case, because this is the **first time** it’s been used in tandem. ”

Karel Vincke, TRUMPF sales partner

Lack of skilled workers

Managing director Angélique works alongside her husband Filip Dezwaef, who is responsible, among other things, for planning and building the slurry tankers. “When my parents founded the company in 1968, we had a broader range of jobs including piping for livestock sheds, water pipes, silage trucks and similar products. It was only later that we began specializing in slurry tankers,” he says. Today, the company employs 14 people – parents included! “Right now, our biggest challenge is finding good workers. We’ve got a great team, but we really need more skilled staff.” Automation in the form of new machines can help to some degree. “But we still need well-trained workers to operate our TRUMPF machines properly,” says Filip.

Cooking for customers

Angélique Dezwaef happily invites us into her spacious kitchen-living room, which also plays an important role as the company's meeting room. “This is where we negotiate, make deals, and cook up treats for our customers when they come to pick up their slurry tankers,” she says proudly. And Vincent has plenty of space to play with his Lego while the adults talk business.

Conference room: The Dezwaef family kitchen is where all the important negotiations take place – with food to follow!





One-of-a-kind: The company makes some 250 slurry spreaders each year – and every single one is custom-made.

“ We have big plans and hope to make all our **investments** over the next five years – it’s all about securing Vincent’s **future.** ”

Angélique Dezwaef, owner

Commitment pays off

TRUMPF organized a special training session to show Vincent how to use his miniature bending machine, just as it does for its full-sized machines. Maximilian Schaich from TRUMPF is confident that this level of commitment will pay off. “It’s one of the secrets to our success: if our customers keep growing, then so will we!” he says. Judging by the company’s current performance and their plans for the future, things certainly seem to be on the right path.

You only have to glance at Vincent and his miniature machine to know that this company will continue to have a bright future 20 years from now.

PHOTOS: Niels Schubert

03

A closer look:

TruBend Center 7020

Belgian company **Dezwaef** has been a major player in the slurry tanker sector for almost half a century. Every tank is custom-made and one-of-a-kind. The fully automatic **TruBend Center 7020** panel bender is an excellent choice for these kinds of unusual jobs.

In brief

Fully automatic panel bending: TruBend Center 7020

Complex parts with lots of curves present machine operators with real challenges. The **fully automatic TruBend Center 7020 panel bender** offers the perfect solution, even for the toughest geometries. Users benefit, in particular, from the generous box heights, which open up all sorts of new possibilities.

How does panel bending work?

The sheet lies horizontally in the machine and is held in place by blank-holder tools. The upper and lower bending blades are mounted directly on the bending frame. The bend is created by the swivel motion of the bending blade. A key benefit is that only the tool moves during the bending process. The metal part remains horizontal and does not have to be repositioned.

What can the TruBend Center 7020 do?

The new TruBend Center 7020 offers a number of unique selling points that make it superior to other panel benders. Its ingenious design lends it a generous open height that is unrivaled on the market.

The machine offers **three key advantages**:

01

GENEROUS BOX HEIGHTS

One of the unique selling points of the TruBend Center 7020 is the generous box heights users can work with. The maximum box height is defined as the maximum leg length of a bend whose associated adjacent bend can still be folded. The maximum box height is primarily dictated by the open height of the machine. With a **160 percent box height** for high sides, the TruBend Center 7020 is a step above other panel bending machines.

LEFT, RIGHT, UP, DOWN

The rotary part manipulator secures the blank and automatically rotates it into the required position in the machine at speeds of **up to 3,000 millimeters per second** – much faster than doing it by hand! All the operator has to do is load and unload the sheets. The optional, height-adjustable, two-axis part manipulator can move parts side to side and up and down – perfect for narrow profiles! Combining these devices offers unprecedented flexibility.

02

03

GOOD BY DESIGN:

The TruBend Center 7020 is the fastest panel bending machine in the TRUMPF portfolio. It **reduces** cycle times per part by up to **20 percent**. At the same time, it offers high precision, simple handling and high-quality parts.

PANEL BENDING...

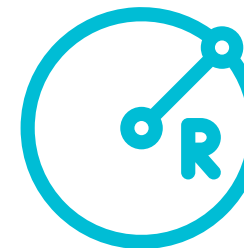
is two to three times faster than die bending for many parts



gives designers more scope to include more curves and unusual geometries



can apply various radii to a part with just one tool



produces perfect angles with a deviation of just ±0.5 degrees



Zum Kunden

Metaalconstructie Dezwaef N.V

Location: Scheewege 19,
8340 Moerkerke, Belgium

Managing directors: Filip and
Angélique Dezwaef

Phone: +32 (0) 50 – 50 04 43

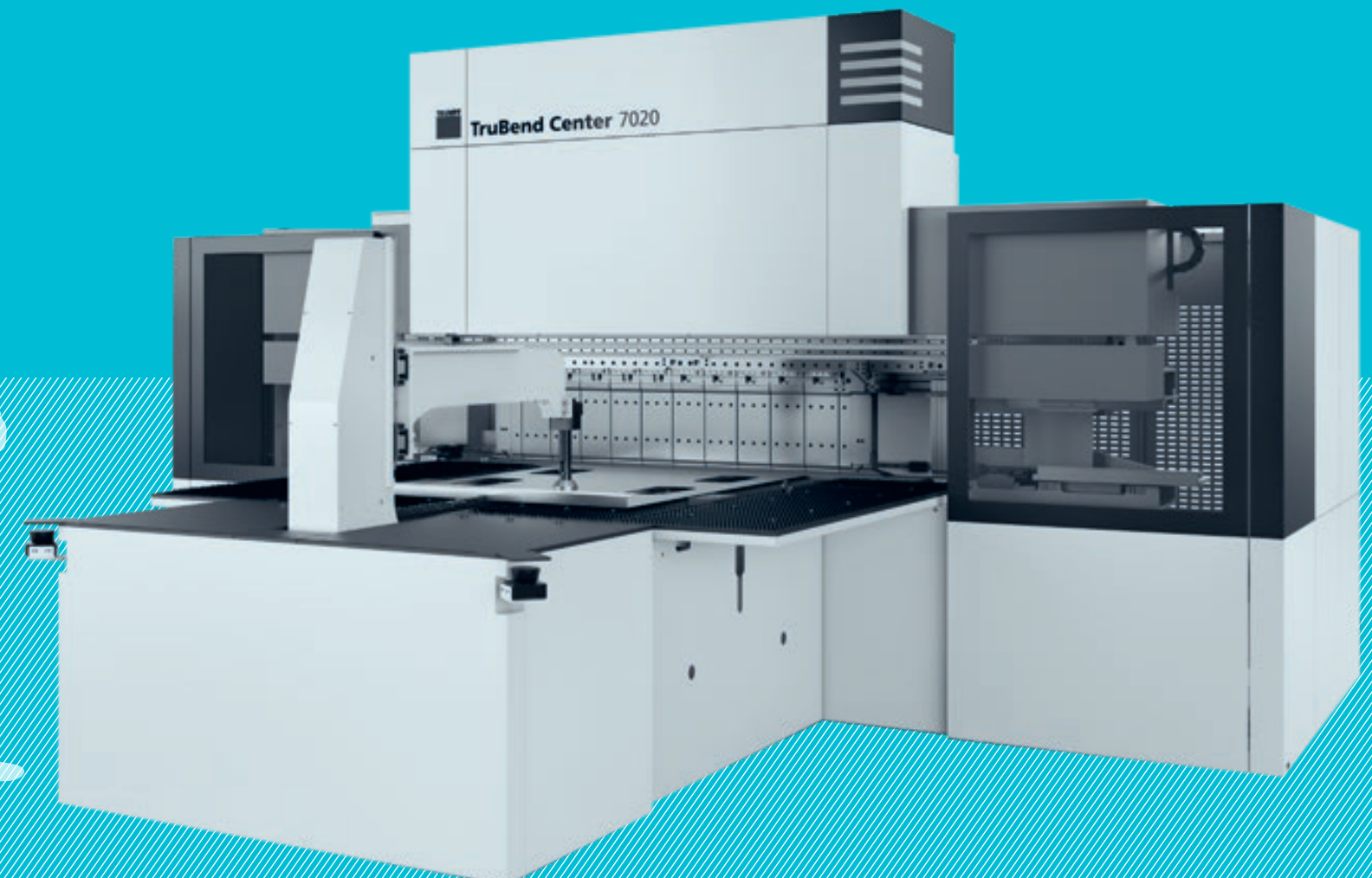
Fax: +32 (0) 50 – 50 11 73

Email: info@dezwaef.be

www.dezwaef.be

Machinery

- TruBend 5230
- TruLaser 3040
- TruBend 8500 Tandem System



04

GERMANY

Growth in Ditzingen

CELL THERAPY AT ITS BEST

Electric cars are more harmful to the environment than many people think – but recycling their batteries can make all the difference. U.S. start-up **Battery Resourcers** is able to recover almost all the materials contained in battery cells. As well as regaining valuable raw materials, their technology also **makes electric car batteries cheaper.**



Michael O’Kronley, CEO of Battery Resourcers

It may be bright turquoise, but the roller belt conveyor with a plastic cover seems unlikely to impress a casual observer. It stands on the dusty cement floor, backed by a collection of hoses, cylinders and shiny insulated pipes reaching toward the ceiling. Yet Dieter Kraft – managing director of TRUMPF Venture GmbH, and normally a calm and levelheaded kind of person – can’t hold back his enthusiasm for this seemingly unremarkable system. It belongs to U.S. company Battery Resourcers, based in Worcester, Massachusetts, which has developed technology that can recover 97 percent of the metals used in battery cells. Compared to the process of producing a new battery, this solution slashes costs by a third, reduces emissions by 20 percent and cuts energy consumption by 13 percent. But that’s only the start: the company is continuing to optimize its recycling process and has already demonstrated its ability to reduce CO₂ emissions by a staggering 87 percent. “Amazing! How cool is that?!” says Dieter Kraft with a broad smile.

Battery problems

The potential is huge, because despite all the talk of an e-mobility future, batteries represent a growing problem – and not just due to their range limitations. By 2020, there were more than ten million electric cars on the world’s roads, a trend that shows no sign of slowing. This means an equally dramatic rise in the number of batteries that, at least under German law, must be taken back by manufacturers and recycled. To complicate matters, experts have long warned of shortages of raw materials such as lithium. Nickel, manganese and cobalt are equally expensive to extract and often have a questionable environmental footprint.

Sustainable use of scarce resources

This is where the Battery Resourcers team comes in. Dr. Yan Wang, an electrochemist and the company’s chief scientist, is the principal inventor of the new recycling technology. His method transforms spent batteries into new cathode active materials. It eliminates the need to mechanically crush battery cells and separate them into their individual chemical components – and it keeps far more of these scarce resources available in the circular economy.

Commitment to e-mobility

So far, so good – but what does this have to do with TRUMPF? More and more each day, says Dieter Kraft. “We want to reinforce our commitment to e-mobility by building on the momentum we already deliver through our high-tech laser systems,” he says. TRUMPF machines and systems cut the sheet-metal components used in battery housings, while TRUMPF lasers are used to weld battery cells, electronic contacts and electric motors. Dieter Kraft is confident that TRUMPF can help Battery Resourcers to make their production process even more sustainable.

A tradition of investment

Far from being a taboo subject at TRUMPF, venture capital and acquisitions are a key part of the company’s innovative strength, says Kraft. Former TRUMPF CEO Berthold Leibinger always said that calculated risk was one of the secrets of his success. In 1992, for example, efforts were underway to acquire the then loss-making company Haas Laser in the Black Forest. The negotiations went back and forth until Leibinger finally stepped in. His calculations paid off, and the manufacturer of solid-state lasers became a key cornerstone of the company.



FOTOS: TRUMPF

Learning from others

“At TRUMPF Venture, we maintain a good mix of our own innovations and investments in the venture capital scene,” Kraft says. The key is to get the right balance, he adds: “TRUMPF innovations are a source of pride and motivation for us all, and that’s how it should be. But, at the same time, we should be open to the valuable skills and capabilities of innovative individuals outside the company.” Kraft emphasizes that this is not about trying to steer the company in a particular direction. “That would be deplorable. Our interest lies in what we can learn from start-ups like Battery Resourcers.”

Advice and guidance

This also applies in reverse: “We see it as positive and important to have reliable investors,” says Michael O’Kronley, CEO of Battery Resourcers. In addition to TRUMPF, other industry giants that have invested in the start-up include Jaguar and Land Rover, as well as research institutes such as the private university Worcester Polytechnic Institute. “Our investors give us useful advice and guidance. They each have their own way of helping us grow,” says O’Kronley.

Not just about money

In its second funding round in April, Battery Resourcers raised 20 million U.S. dollars. This will be used to set up a production plant with the capacity to process some 10,000 metric tons of batteries a year. The company currently has 35 employees and hopes to increase this figure to 60 by the end of the year. But money and skilled workers are only part of the equation. “Obviously, we need



Dieter Kraft, Managing Director TRUMPF Venture GmbH

“ We want to reinforce our commitment to **e-mobility** by building on the momentum we already deliver through our **high-tech production systems.** ”

Dieter Kraft, Managing Director TRUMPF Venture GmbH

a certain amount of funding to expand our production capacity. But our investors also have useful connections in sectors such as the automotive industry, and that’s hugely important to us, too,” says O’Kronley. Battery Resourcers is also planning to gain an initial footing in Europe in 2022, once again drawing on the valuable support of its European investors.

Spreading the risk

TRUMPF Venture injected two million euros into the second funding round. “We deliberately opted for a minority stake. We’re not trying to take on a managerial role, because we think that should stay with the existing management team – and we don’t want to put all our eggs in one basket,” says Dieter Kraft. His counterpart Michael O’Kronley appreciates the stability and caution that comes from TRUMPF being a family-owned company. “We have similar values, and having TRUMPF on board puts a firm focus on sustainability,” he says. As, of course, does the whole concept of battery recycling – a concept that Battery Resourcers hopes will revolutionize the future of e-mobility.



Fascinating facts and exciting innovations



Award for digital transformation

This year's **German Demography Prize** in the "Opportunities of digitalization" category went to sheet-metal fabricator Mauser + Co GmbH for the "LidA - Learning in the Digitalized World of Work" project. The Ditzingen-based company is a close partner of the high-tech company TRUMPF, which was also shortlisted as one of the top three prize nominees with the "F4DIA - Fit for the Digitalized World of Work" project. Mauser + Co. was also previously involved in the **F4DIA joint project**, which raises customers' awareness of digital transformation and offers targeted training.



New managing director at TRUMPF Machine Tools

Marcella Montelatici took over as Managing Director Sales and Services in the TRUMPF Machine Tools division on April 1, 2021. She also manages the TRUMPF Group's European subsidiaries. Montelatici succeeds Reinhold Groß, who had held the position since 2014. The high-tech company will be drawing on her skills to further expand its range of solutions for digitally connected sheet-metal fabrication. As **Managing Director for Sales and Services**, Montelatici is responsible for the sale of machines, services, software, digitalization solutions and consulting on all aspects of connected manufacturing. She believes customer satisfaction is paramount: "TRUMPF views the success of its customers as a top priority. We assist and support them on their growth path and help

them find the solution they need – whether that's a fully automated system, a digital upgrade for their production environment, or traditional stand-alone machines," she says. Marcella Montelatici has been working at TRUMPF for 30 years. She was appointed as Managing Director of TRUMPF Italy in 2012.



Close partnership with Lantek

In another sign of its support for manufacturer-independent, open software standards, TRUMPF has entered into a close partnership with the software company Lantek. This marks another step on the Ditzingen-based company's journey toward open and **nonproprietary system software** for sheet-metal fabrication machines. "Our focus is on the process our customers actually use, so we're working with Lantek to map out the entire sheet-metal process chain, including machines from all the different manufacturers. This is the next big step toward efficient and connected sheet-metal fabrication for us and our customers factory solutions," says Thomas Schneider, Managing Director Research & Development at TRUMPF Machine Tools.

PHOTOS: TRUMPF



Seek and you will find

As part of its efforts to expand its business in **industrial location tracking technology**, TRUMPF has upped its stake in Dresden-based software company ZIGPOS GmbH from 25.1 percent to 50.1 percent. **ZIGPOS** develops a range of products including software components for indoor position tracking systems. The technology can be used to determine the position of sheet-metal parts in real time. This maximizes transparency, boosts productivity and makes production easier to plan. ZIGPOS has around 20 employees, and its customers include technology groups and companies from the semiconductor industry. The two companies hope this increased stake will enable them to **leverage synergies** and collaborate even more closely on development projects.



Zweistelliger Millionenbetrag für Q.ANT

TRUMPF is boosting its support for its wholly owned subsidiary Q.ANT with a new eight-figure investment. The new funding will allow the start-up to venture into the **development of quantum computer chips**. Q.ANT has developed a photonic chip process that is able to create highly specialized optical channels on conventional silicon chips. In future, this process will enable mainframe computers to be equipped with processors that use cutting-edge quantum technology. "Q.ANT developers have succeeded in linking the electronic world to the realm of quantum optics. This new investment is the logical next step on our journey toward developing and fabricating quantum computer chips," says Peter Leibinger, Chief Technology Officer of TRUMPF. The goal is to develop a fully

functional quantum chip in five years or less that will enhance today's computers and make them more powerful. Headquartered in Stuttgart-Vaihingen, the start-up works with chipmakers, IT equipment suppliers and international industrial corporations. Q.ANT currently has around 20 employees but **expects this figure to increase to 120 by the end of 2022**.



German-Italian partnership

Keen to collaborate more closely in the future, TRUMPF and STARMATIK have entered into a **strategic partnership for bending machine automation**. STARMATIK will supply specific modular solutions for TRUMPF smart factory solutions that reflect the general trend toward automation. Customers will benefit from the expertise of both companies and from a significant **boost in the speed of production processes** as compared to standard solutions. Founded in 1996 in Spresiano, Italy, STARMATIK employs around 100 people. The company specializes in process automation for sheet-metal fabrication. The main focus is on the use of robotics to automate bending machines, but the technology can also be used for 2D laser, punching and punch-laser machines.

Behind the scenes: Smart Factory Consulting

The Smart Factory Consulting service reveals optimization potential in production and offers customers step-by-step support on their journey toward connected sheet-metal fabrication. The team of TRUMPF consultants accompanies fabricators from the initial planning stage through to implementation and evaluation of the optimized production processes. Robert Herold joined the team three years ago and understands the problems many companies face.

Mr. Herold, why do companies need the services of a smart factory consultant?

We work with our sheet-metal fabricator customers to develop custom solutions that will keep their processes fit for the future. TRUMPF smart factory consultants think strategically and act pragmatically. Our goal is to make our customers even more successful. Whether your company has five or 500 employees, we're the partner you need to take your production to the next level.

What are the benefits of a Smart Factory Consulting session?

Our customers are already successful, but we believe we can help them become even more successful thanks to our objective approach and expertise drawn from over 130 projects. It's often easier for an outsider to spot potential that those inside a company can no longer see. For example, the Smart Factory Consulting service can help entrepreneurs to optimize their processes by reducing lead times or increasing output;



Team player: Robert Herold has been a smart factory consultant at TRUMPF for three years and is proud to be part of such a capable team. He and his colleagues work closely with customers to pave the way into the future of sheet-metal fabrication.

alternatively, they can join forces with us to redesign their whole production environment. Each of these scalable solutions is unique – just like our customers.

But why not simply hire a traditional management consultant?

The TRUMPF Smart Factory Consulting service has a major competitive edge: we speak our customers' language. As industry experts, we understand the particular challenges of sheet-metal fabrication, but we also have one eye firmly fixed on the bigger picture. We look beyond the confines of the areas that TRUMPF serves, because we want to make sure that the measures we develop with each customer have a positive impact on the entire production process.

The TRUMPF Smart Factory Consulting team is pretty small. How can you be sure that you will make a real difference?

We currently have 14 active smart factory consultants worldwide, but demand is high and the team is steadily growing. But our effectiveness doesn't really depend on the number of consultants: we may be a small team, but we have the whole TRUMPF organization behind us! We always have the option of calling on partners to provide expertise for specific projects, such as TRUMPF IT experts, for example, or the construction department for factory planning projects. That makes us a tremendously effective team.

So how does a consultation actually work?

When a company contacts us, the most important thing is to have an initial, in-depth discussion. We need to understand what their

The team of consultants conducts a **joint sports session** after almost every day of a project. And sometimes the customers decide to join in!

vision is, what's working well, and where the challenges lie. It's about getting to know each other and building up a complete picture of the current situation. The next step is to define precise objectives together with the customer and draw up an individual offer. Then we work with the customer to put all the arrangements in place to ensure the project runs smoothly. We analyze the current situation on site and make recommendations on what action needs to be taken. The final step is to work together on implementing the specific measures we agreed on.

How can you tell if a consultation has been successful?

The key is to have jointly defined, measurable targets such as increases in productivity or cost savings. We also feel it's important to stay in regular contact with the customer after a consultation and implementation process, not least to check that their objectives have actually been met.

How much time should a customer set aside for a Smart Factory Consulting session?

It only takes a few days to identify potential improvements. Getting optimized processes up and running for the long term generally takes a few weeks or months, and integrated factory planning projects can sometimes extend over one or two years.

What's the best feedback you've had?

A managing director once said to me: "You're not just a team of external consultants or some kind of project add-on. You're actually part of us." His comment showed how close collaboration and commitment pays off, and it demonstrated how much more we can achieve together than individually. That felt pretty good!

40

The **Smart Factory Consulting team** carries out over 40 projects a year.

At home anywhere – Robert Herold has spent some **80 nights** in hotels over the past year.



The team speaks a total of **five languages:** English, German, Chinese, Turkish and Spanish.

Check it out!

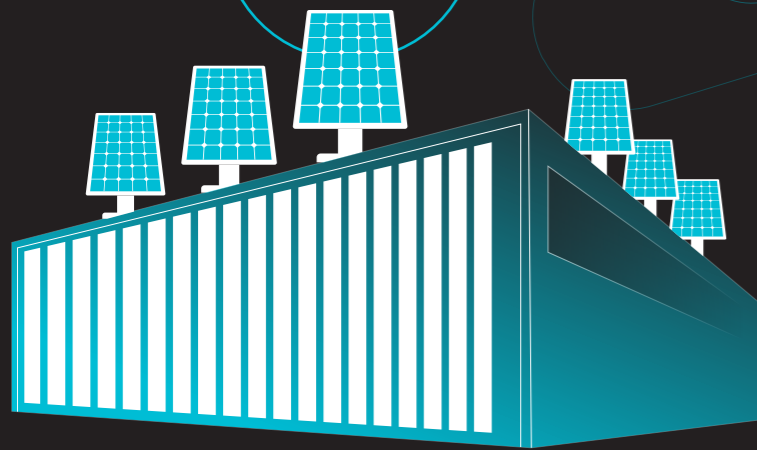
LESS IS MORE: SUSTAINABILITY AT TRUMPF

Sustainability is one of the key concerns of modern society – and sheet-metal fabricators increasingly understand the importance of using resources responsibly. For TRUMPF, **climate change mitigation and environmental protection** are an essential part of its business. The company has already achieved the hallmark of carbon-neutral certification. Over the next few years, TRUMPF will apply its **sustainability strategy** to machines, power generation, vehicle fleets and much more.

80 M

TRUMPF will invest almost 80 million euros by 2030 to combat climate change.

2027



By 2027, all suitable roof spaces at TRUMPF locations worldwide will be equipped with **photovoltaic modules**.

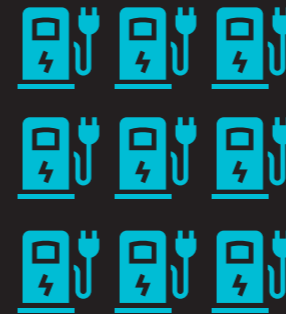
100%

TRUMPF obtains **100 percent of its electricity from renewable sources** by purchasing high-quality certificates and ensuring the green power comes from recently built, unsubsidized plants.

By 2030, TRUMPF will reduce its **electricity consumption** by a total of 25.5 gigawatt hours. That's roughly equivalent to the electricity consumed by 100,000 people in one year.

- 25.5 GWh

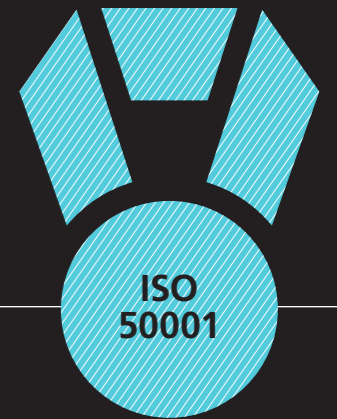
No more vroom, vroom: The TRUMPF fleet is gradually being electrified. This is expected to reduce CO₂ emissions **by 25 percent** by 2030 (compared to 2018/19 figures).



≈ 1000 KW

In 2019, TRUMPF opened one of Germany's biggest electric charging stations in Ditzingen. Employees have access to **86 charge points** in the company's own parking garage. In total, the supply equipment has a capacity of almost 1,000 kilowatts – enough to make 70,000 cups of coffee.

TRUMPF processes, systems and buildings are state-of-the-art. An **ISO 50001-certified energy management system** has been in place at all its European production sites for several years. The company aims to steadily improve its energy efficiency and reduce emissions further.

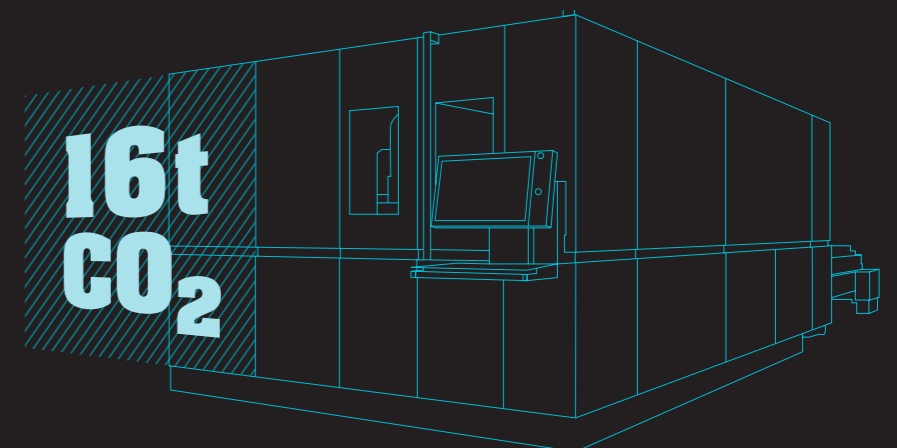


Second-hand solutions:

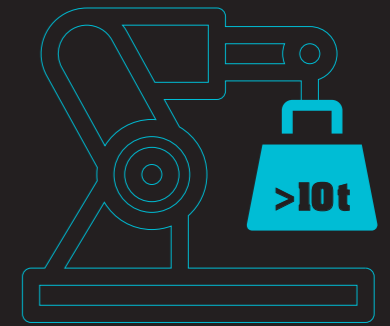
If a company no longer needs their old TRUMPF machine, there's no need to scrap it. Instead, they can sell it to the **TRUMPF Resale Center**. The team at the Center will refurbish the machine and put it back on the market. Surveys suggest that the new owners can expect these refurbished machines to operate reliably for **at least another ten years**.



16t CO₂



Buying a pre-owned machine saves money. It also reduces CO₂ emissions by eliminating the energy-intensive production of raw steel for the machine frame. Machines like the TruLaser 3030 weigh about 12 metric tons. Even just **reusing** the machine frame can save around 16 metric tons of CO₂.



Heavy duty: Depending on the method used, approximately 1.4 metric tons of CO₂ are emitted for each ton of steel produced. A sheet-metal fabrication machine typically weighs over 10 metric tons. To improve their environmental footprint, companies should therefore endeavor to use these machines until the end of their service life.



05

FUTURE

The future of exoskeletons

IDEAS TO CHANGE THE WORLD

PHOTOS: Q-ANT GmbH

Exoskeletons have long been used to replace missing limbs, to help partial paraplegics stand up from their wheelchair, and to ease the burden of **heavy physical labor**. Dr. Sönke Rössing from German exoskeleton manufacturer **Ottobock** says these valuable devices may one day work just as intuitively as the rest of our body.

“**Quantum sensors** have the potential to create a brain-machine interface.”

Dr. Sönke Rössing,
Head of Ottobock Industrials

Mr. Rössing, many people still think of the “Terminator” movie with Arnold Schwarzenegger when they see an exoskeleton. Does that surprise you?

I suppose people do still find them quite unusual! Yet the past decade has actually seen a boom in demand for our exoskeletons in industrial and logistics settings. We’re also the global market leader in the medical arena with products such as our computer-controlled C-Brace leg orthosis, which allows people with partial paraplegia to get out of their wheelchair and walk.

How do businesses expect to benefit

There are three major drivers. The first is the shortage of skilled workers who are willing to do physically demanding jobs. The second comes down to the demographics of an increasingly older, frailer workforce. And the third is the failure of automation to deliver on its promises; even today, for example, 90 percent of vehicle assembly is still done by hand. The demand is there in logistics, aircraft construction, shipyards and many other industries – and the applications are almost unlimited.

Lighter work for all: Dr. Sönke Rössing is head of the Ottobock Bionic Exoskeletons business unit. He and his team want nothing less than to revolutionize the world of work with exoskeletons.



Even outside industry?

Absolutely. Remember what I said about changing demographics: one of the biggest sectors that can benefit from exoskeletons is nursing, where sick people need to be lifted, turned and moved around. But there are also many other exciting applications that are already up and running; for example, manual workers who have to paint or weld things above their heads, or elderly people who are keen to climb an Alpine peak or run the New York Marathon. Healthy living is a real option nowadays, especially as our lives get longer and longer, but it’s often our musculoskeletal system that is least willing to play ball! Most people start to feel that from their mid-40s

Sad but true! But are people completely happy with these new technologies?

We're doing our best to make sure they are. One of the most sensitive topics is data. People have real misgivings, especially in Germany, and we spend huge amounts of time clarifying those issues for works councils and data protection officers. But it's essential for us to measure how exoskeletons perform in companies in order to demonstrate their benefits.

These technologies keep evolving – where might they end up?

Next year we're launching the QSens research project, which is funded by the German Federal Ministry of Education and Research. It includes a number of key players, including TRUMPF as the sensor manufacturer, and I think it will be a big step forward. The QSens cluster will focus on the future development of high-performance quantum sensors. It will cover applications ranging from medicine to autonomous driving, and we're hoping to see some very specific progress in our field.



Making work easier: The Paexo Shoulder exoskeleton transfers the weight of the user's raised arms to the hips, providing relief for the muscles and joints in the shoulder area.

What might that progress entail?

Well, some of our visions are still in the realm of Star Trek! But the basic idea is for people to use quantum sensors to control exoskeletons without having to adapt their normal thought processes – in other words, the sensor system would automatically take over automated movements such as raising your hand or bending your finger. We could achieve that by using a quantum sensor instead of electric current to sense the accompanying magnetic fields. This could conceivably create a true brain-machine interface where the machine responds to your thoughts.

Doesn't that sound a bit creepy?

Not if, like us, you have a clear roadmap of the series of steps that will lead us there. The more exoskeletons are used, the more they will come to be accepted. And we understand the importance of involving people in the development of this future scenario, because gaining their acceptance of this kind of product is crucial. The sensor doesn't influence people, it just picks up their signals, so we reckon that the benefits of this kind of technology will outweigh people's skepticism. These are some of the questions we hope to tackle in the project.

Ottobock and TRUMPF: a great partnership to research the merging of man and machine

QSens is funded by the German Federal Ministry of Education and Research through its Clusters4Future initiative. It is based in the Stuttgart region. Over the next ten years, the participating universities and their 17 industry partners will research and develop innovative quantum sensors offering unparalleled levels of sensitivity.

Ottobock will contribute its expertise in exoskeletons to the project. The med-tech company is headquartered in the city of Duderstadt in Lower Saxony, Germany. It has been developing orthopedic aids for over 100 years and is now ranked as a global leader in technology for wearable human bionics, including microprocessor-controlled knee joints and computer-controlled leg orthoses.

Another member of the QSens future cluster is Q.ANT GmbH, a company founded in 2018 that forms part of the TRUMPF Group. The start-up currently employs 20 people who aim to make quantum technologies industry and market ready. Q.ANT will take charge of developing, producing and distributing the new technology. Q.ANT has already successfully launched a new optical particle sensor as an initial result of the development work.



Smart backpack: This exoskeleton weighs less than two kilograms and can be worn comfortably for hours.

“ We could conceivably create a true **brain-machine interface** where the machine responds to your thoughts. ”

Dr. Sönke Rössing, Head of Ottobock Industrials

**10
Bil.**

10 billion euros in **lost production** per year

Source: German Federal Institute for Occupational Safety and Health



Key facts Musculoskeletal disorders (MSDs) in figures

23%

of all **sickness absences** are caused by MSDs

26.000

people **retire** each year due to a loss of earning capacity



Innovations, technologies and future trends



AI helps customers order spare parts faster

At its virtual INTECH 2021 in-house trade show, TRUMPF presented a solution that harnesses artificial intelligence to identify snapshots of spare parts and place orders automatically. All users need is a **cellphone photo** and the **Easy Order app**. In future, this will allow machine operators to identify and order service parts and wear parts in a matter of seconds. The process of pulling out a cellphone and taking a picture couldn't be easier, and the system already covers 10,000 different parts. "Wear and tear on the shop floor eventually makes it impossible to read material numbers on spare parts – and some wear parts are difficult to mark in the first place," says Arun Anandasivam, who is responsible for the MyTRUMPF customer platform. The AI solution should make problems like these a thing of the past.



Laser welding for all

TRUMPF will be presenting its new **TruLaser Weld 1000** at Blechexpo – all part of its efforts to help companies get started with automated laser welding. In many production facilities, workers still weld components by hand – a time-consuming process that leads to higher costs. Current systems for **automated laser welding** tend to be large, expensive and complex to operate, with very few of the kind of low-cost solutions that companies need to start out in this business. "The TruLaser Weld 1000 from TRUMPF fills a gap in the welding market. It finally allows **smaller companies** to benefit from the advantages of automated laser welding, so they can boost the productivity of their production processes and gain a greater competitive edge," says TRUMPF product manager Martin Geiger. The new system is particularly suitable for job shops that weld products such as electrical cabinets, sheet-metal boxes and covers.



New TRUMPF 3D printer paves way for mass production

The new **TruPrint 3000** makes it even easier to process weldable materials, including steels, nickel-based alloys, titanium and aluminum. Users can choose to equip the machine with a second laser that doubles its productivity. What's more, the new design ensures a perfectly even flow of inert gas through the machine. This significantly improves the quality of printed parts. "We've improved key aspects of the TruPrint 3000 to tailor it even better to the quality requirements, certifications and production processes of various industries," says Thomas Fehn, managing director of TRUMPF Laser Technology, who is responsible for sales of additive manufacturing products. The new 3D printer offers a range of features designed to make operators' lives easier, including melt pool monitoring and the removal of excess powder within the machine.



Helping people to help themselves: the Technical Guide

When a machine malfunctions, time is of the essence. A new service from TRUMPF gets machines up and running again even faster – by helping users to help themselves. The **Technical Guide** is a step-by-step set of instructions that lets customers troubleshoot common faults themselves – quickly and safely. All the operator has to do is to enter the error code from the machine. The Guide will then provide specific, easy-to-follow instructions to rectify the problem, including clear descriptions and pictures.

The Technical Guide can be found in the **TRUMPF Service app** or requested by email from the technical customer support team.

PHOTOS: TRUMPF



2D laser-cutting machine for beginners

TRUMPF has presented the new generation of its **TruLaser 1000**. This is the first version of this machine to incorporate the **HighSpeed Eco** function, which uses a nozzle to force the cutting gas directly onto the metal. This increases the machine's feed rate by some 70 percent while simultaneously reducing gas consumption by around 60 percent. The new series also features **CoolLine** technology for the first time. This feature automatically sprays water onto the workpiece; as the water vaporizes, it provides optimum cooling during the cutting process. Another new feature is **Smart Collision Prevention**, which uses a sophisticated algorithm to perform calculations – for example to determine the best sequence in which to cut parts in order to reduce the likelihood of tilting. This reduces downtime and makes production more efficient.



Easy purchasing with the TRUMPF e-shop

A machine is always part of a process – and many of these processes can be digitalized through the MyTRUMPF customer portal. One of the highlights of the portal is the **TRUMPF e-shop**, which has recently been completely redesigned. Offering a range of useful machine filters and intelligent features, the e-shop makes it easier for users to find, select and order original parts. Each customer will find that the portal is individually tailored to their specific machinery. As well as saving time, this also eliminates errors by ensuring that each machine is matched with the correct, original parts. Users can search in three different ways: by category, by entering text, or by referring to an exploded view of the machine.



Laser blanking system: high-volume sheet-metal cutting

TRUMPF recently presented a new sheet-metal cutting system. The new system uses laser blanking to process up to 25 metric tons of sheet-metal coil stock without any human intervention. This is particularly interesting for high-volume manufacturers such as automotive suppliers and automakers, electrical cabinet manufacturers, elevator producers and HVAC manufacturers. "Volume manufacturers typically use presses for processing sheet-metal blanks. But that means they need to adjust or even replace the tool whenever they make the slightest modification to their components, which ultimately costs time and money. Many industrial sectors are seeing significant reductions in the scale of individual production runs, which makes these modifications even more costly and time-intensive. The laser allows users to carry out these modifications without requiring a new tool, making it, **easier, faster, cheaper and**

more flexible," says project manager Oliver Müllerschön, who is responsible for the new system at TRUMPF. TRUMPF developed the new system in cooperation with the SIEMENS technology group and mechanical engineering company ARKU. Compared to conventional blanking presses, the new system heralds a significant reduction in construction and logistics costs. It makes production **more profitable** by eliminating tooling costs, optimizing the use of material, reducing assembly costs and boosting flexibility in the production environment.

All beginnings are easy

TRUMPF has completely overhauled its TruLaser Series 1000 with a particular focus on entry-level users and job shops. The new machines are easier to use and offer even better performance at an affordable price.



Dynamic machines, shorter set-up times: the new TruLaser Series 1000 offers a positioning speed of 140 meters a minute – significantly faster than that of its predecessor. The secret lies in a redesigned machine body plus the perfect combination of a rigid machine frame, a lightweight motion unit and powerful drives. The machine cuts all materials and sheet thicknesses with the same cutting head, and it can even change nozzles automatically with the optional nozzle changer. Sensors monitor the laser optics' protective glass and automatically notify the operator when it needs replacing. All these features help to cut costs by reducing set-up times.

The TruLaser Series 1000 also handles many cutting-related tasks autonomously, which speeds up the process while driving down part costs. Even the actual cutting is faster: the PierceLine feature reduces piercing time by up to 80 percent while protecting both the machine and the material. The HighSpeed and HighSpeed Eco cutting processes boost productivity further, achieving gains of up to 20 percent, depending on the material thickness. Yet the machines remain as energy efficient as ever thanks to the use of lasers with low power consumption. The TruLaser Series 1000 machines also offer a range of other energy-saving features for the laser and power unit.



Laser cutting for all: As well as an intuitive operating system, TruLaser Series 1000 machines offer a range of automation options that allow them to cater to customers' evolving needs.

An intuitive operating system makes life easier for operators. The new 18.5-inch multi-touch control panel displays the most frequently used menu items in the top-level menu. If the operator stops the machine, the control system allows the job to be resumed from the same point.

The productivity of the TruLaser Series 1000 machines can be boosted even further thanks to a wealth of automation options. A semi-automatic pallet changer comes as standard. This lets users prepare blanks while the machine is operating and removes cut parts while the machine is still cutting. The TruLaser Series 1000 can also be equipped with optional automated LiftMaster components.

With or without the optional extras, the new TruLaser Series 1000 from TRUMPF is a highly productive package that offers a competitive mix of sophisticated technology and affordability.

PHOTOS: TRUMPF

The right angle: EdgeLine Bevel

TRUMPF product developers have come up with a genuine world-first in the form of EdgeLine Bevel. This feature makes it easy to apply bevels and countersinks using a laser cutting machine. Product manager Patrick Schüle explains what lies behind the name and how it can benefit sheet-metal fabricators.



EdgeLine Bevel allows operators to apply bevels and countersinks directly on a laser cutting machine. The edges of metal sheets are often beveled to prepare workpieces for welding. Countersinks are required to keep screw heads flush with the metal so that they do not protrude. "EdgeLine Bevel cuts costs by combining multiple steps in one. It helps sheet-metal fabricators to reduce the number of downstream processes by completing the job on the laser cutting machine," says Patrick Schüle. This can be useful when it comes to reducing the number of manual production steps or dealing with shortages of skilled workers.

Fewer steps, automatic weld edge preparation

"Manual post-processing using conventional methods incurs additional costs for transport and personnel," says Patrick Schüle. "EdgeLine Bevel offers a way to sidestep those extra costs." As well as eliminating the need to prepare weld edges using grinders and angle grinders, this new function can also replace the workstations that were previously required to create countersinks manually. In addition, EdgeLine Bevel

retains the ability to tackle a full range of contours, allowing users to machine not only parts with straight edges, but also those with more unusual geometries. It also enables sheet-metal fabricators to bevel edges that are tough to access by conventional means. "All TRUMPF customers can benefit from EdgeLine Bevel," says Schüle. "But it's particularly useful for sheet-metal fabricators who have joining process steps in their assemblies and need to connect one part to another, because that's where you can really save time and money." The feature is available for Series 3000 and 5000 all-purpose machines. EdgeLine Bevel can be used to apply bevels up to 45 degrees and various sizes of countersink – and the programming is as simple and fast as ever!



Visibly proud: Patrick Schüle is the TRUMPF product manager responsible for EdgeLine Bevel, an exciting world-first that will be presented at Blechexpo 2021.

EdgeLine Bevel is a genuine world-first. No other machine makers offer a comparable product. This new function is already available to purchase for laser cutting machines.



SMART SAVINGS: TRUMPF PART OPTIMIZATION

More quality at less cost: TRUMPF part-design workshops teach users how to get the best out of their machines and parts in order to make their production more economical and efficient.

Each issue, TRUe takes a look at a different part to illustrate how this process works.

This issue: Taking milling out of the equation

Many simple parts are still produced using subtractive machining techniques for one simple reason: that's how it's always been done! As a result, many milled parts are much more accurate than they need to be – and this means customers are incurring unnecessary costs. Expensive milled parts could often be replaced by a bent metal sheet, for example.

“Whenever you're dealing with a simple milled part, you need to ask how accurate it really needs to be,” says Michael Sauer, a training instructor from the TRUMPF parts optimization team. “Most of the time, we can substitute expensive milled parts with a sheet-metal solution, because the bent part provides all the accuracy you need.”

Michael Sauer
Training instructor at TRUMPF
parts optimization



Two in one:
The user only needs one part now thanks to the bending solution – with no milling or welding required.

The remarkable potential of bending is neatly illustrated by the cable carrier shown below, which guides and protects cables and hoses on moving machinery. Without cable carriers, the constant movement of the machine would create so much wear that the cables would quickly be destroyed. Michael Sauer explains how they optimized the part: “We replaced the two milled brackets with one bent sheet-metal part. Because of the way its designed, we didn't even have to weld it. The part is exactly the same as before, but it can now be produced faster with less material and less waste. This solution reduced the customer's costs by 85 percent.”

85%
cost saving



PHOTOS: TRUMPF

#14

pARTgallery



This picture shows a **cleaning component of the TruTool TSC 100 slat cleaner** in a completely new light. The TruTool removes slag, which accumulates during the cutting process, from the slats of a flatbed laser machine. The two rows of teeth on the cleaning implement clamp onto the slat and slide upwards to scrape off the slag. Photographer **Bernd Telle** has taken this tool out of its familiar environment and given it a whole new context.

GROWTH

Endless growth to the frontier of space?

Just back from his trip to the edge of space – and he’s already causing a commotion! British billionaire and Virgin Group founder Sir Richard Branson loves going to extremes, and he has a reputation for turning entire industries upside down. So it’s no wonder that this great disrupter set his sights on being the first person to cross the legendary Kármán line in his own space plane. His craft VSS Unity soared to the edge of space at three times the speed of sound. For three minutes, he was weightless, before VSS Unity tilted back toward Earth and was once again subject to aerodynamic forces. Eleven minutes later, the space plane glided back down to a runway landing in the New Mexico desert. Branson was still visibly excited by the adrenaline-pumping experience as he exited the craft with his fellow astronauts, two women and three men. His triumph was complete, as was the great media spectacle that heralded the dawn of a new commercial space age. “Find the right people and bring out the best in them,” is Branson’s motto for successfully running and growing a business, and he lost no time in praising the efforts of his crew. He even hoisted Astronaut 004, Sirisha Bandla, onto his shoulders to celebrate.

But do we really need growth that takes us beyond the boundaries of Earth’s atmosphere? Will we never be satisfied? No doubt some people were asking that question as the space plane took off and the sky turned from brilliant blue to a sooty black. Everyone knows that Branson’s giant conglomerate is a growing force in numerous sectors, from cell phones, travel and transport to financial services, leisure, entertainment, health and wellness. His entrepreneurial skills are astounding, and the newly minted astronaut has never lost his knack for conquering new worlds – often risking his neck in the process. His crossing of the Pacific Ocean in a hot air balloon set a new world record, and he can also lay claim to being the oldest person to kitesurf across the English Channel.

Ultimately, this all ties in nicely with Branson’s brand promise, which is to apply a virginal curiosity to innovation in industries that are ripe for disruption. Always keen to steal the limelight, and never afraid to make a fool of himself, his services to entrepreneurship have even gained him a knighthood. One of his tips for growing a business, which he has often benefited from himself, is to find a mentor. He has never forgotten the advice he received from the airline tycoon Freddie Laker: “Use yourself. Make a fool of yourself. Otherwise, you won’t survive.” Branson found flying boring, so one day in the 1980s he bought a second-hand Boeing 747 and set up Virgin Atlantic Airways. His airline was the first in Europe to install entertainment systems in the seats.

Forum discussions overflowed with heated discussions on Branson’s space flight, including accusations that he was using space as a playground for super-rich Star Trek obsessives and treating the Earth as a kind of Disneyland backdrop for his next selfie.

Others argued that we depend on creative oddballs such as him to drive real progress. Fifty years ago, few people would have imagined that the first lunar landing would pave the way for GPS and digital photo sensors. While Branson certainly wants to send tourists into space, he also wants to combat climate change on Earth and improve education. He argues that the rich should use their wealth to create jobs and fight the injustices of this world. So that’s something! No doubt Branson is already hunting for the next big idea for his business empire. And the more absurd it is, the better its chances of succeeding. See you in the stars!

Daniela Müller



TRUe #14

IMPRINT

Published by

TRUMPF GmbH + Co. KG

Johann-Maus-Strasse 2
71254 Ditzingen, Germany

TRUMPF.COM

Responsible for content

Marcella Montelatici

TRUMPF editor-in-chief

Dr. Manuel Thomä

TRUMPF editors

Jasmin Agha, Luzia Moll, Ramona Hönl

Concept and design

BrandsOnSpeed GmbH

Managing editor

Lidija Flick

Editorial team

Alexia Angelopoulou, Daniela Müller,
Stéphane Itasse, Lukas Walter, Elisa Weber

Art director

Thomas Schrempp

Project manager

Iro Marapidou

Production manager

Frank Zube

Production

888 Productions GmbH
Henadzi Labanau, Jürgen Michel

Printed by

W. Kohlhammer
Druckerei GmbH + Co. KG



TRUMPF GmbH + Co. KG
Johann-Maus-Strasse 2
71254 Ditzingen, Germany

TRUMPF.COM