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Openness is a word open to interpretation that can be examined from many different perspectives. Even so, openness always has a positive connotation. Openness is what drove many pioneers to venture forth during the Great Westward Expansion, willing to risk life and limb for a chance to farm in the vast openness beyond the Mississippi River.
On November 9, 1989, people experienced openness first hand. At precisely 7:41 p.m., German news agencies reported that the East German border was open. This was a profound moment not only for Germany but for the world.
As an astronaut you have to be open-minded, **curious and ready to take on new challenges**. Having a partner you can trust and confidence in the partnership is essential to proceed with new ventures **despite the unknown**.
New name, new look, new agenda: “TRUe,” our new customer magazine, reflects a manufacturing environment that is increasingly connected, and in which machines, software and services are inextricably linked.

Through its capitalization of the first three letters, the name “TRUe” both pays tribute to its predecessor and refers to our product portfolio. We also like the meaning of the word, which we believe represents both our company and the magazine.

Each issue going forward will have a topic at its focus. In this first issue, we are exploring the common thread of “openness” throughout the magazine. For me, openness signifies our willingness to try something new, something unexplored – I find openness to be imperative in meeting the challenges of today’s fast paced business environment. In many industries, we see the impact digitization and increased connectivity have on processes, changing the way companies are doing business. In manufacturing, we see a clear trend continuing towards smaller batch sizes. The right digital solutions should result in reduced cost and increased speed, even for these small lot sizes.

TRUMPF has invested heavily in Industry 4.0 solutions and to the left you can see one of the results – the TRUMPF Smart Factory which opened in September 2017 in Hoffman Estates, IL. The TRUMPF Smart Factory is designed to digitally connect all sensors and machines vertically and all parties involved in the manufacturing process horizontally, supporting entirely new business models. At the Smart Factory TRUMPF is able to give transparency into the manufacturing processes in real time and remotely track jobs through the automated system. I invite you to open yourself up to new things as you explore this new magazine and join us in creating something new!

PETER HOECKLIN, PRESIDENT & CEO
in Long Island City

Charles Boyce of Boyce Technologies is proud of his Help Point units that keep MTA riders connected and help save lives in New York’s subway stations.

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in Long Beach

Two retired sheet metal workers rise to the challenge and train the future workforce in the Metal Fabrication Technology Program at Long Beach City College.

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...in Chicago

Get connected in the newly opened TRUMPF Smart Factory and experience digitally connected production processes – from initial order for a sheet metal component to its design, manufacture and delivery

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03

...in Ditzingen

3D Printing: A new technology made out of metal powder and a laser makes completely new parts from scratch in almost any geometry and complexity

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04
Every day six million people speed through New York City's subways. Across the river and two stops from Manhattan, the team at Boyce Technologies strives to keep mass transit riders secure and connected by creating innovative safety and communication solutions for today and tomorrow.
Subway trains zip through New York, the city that never sleeps, twenty-four hours a day, year-round. Things happen – directions are forgotten, something drops onto the track, a suspicious package is discovered, someone falls off the platform -- and people call for help. Charles Boyce, President of the company that bears his name, worries about those calls connecting every time. More specifically, his mind races with ways to continually build better systems to keep riders safe and able to communicate. A relentless dedication to advancing reliable safety and communication systems is the backbone of Boyce Technologies, a 50-million-dollar company transforming its Long Island City neighborhood and its customers’ products. Boyce looks out a window of his new 100,000 ft.² state-of-the-art manufacturing facility toward the Empire State building and remembers the call that started it all.

Believing In Excellence

Ten years ago, the New York Metropolitan Transportation Authority (MTA) needed a new passenger emergency communication system that would address modern safety concerns and not depend on payphones, station agents, or locating old -- and frequently inoperable -- intercoms. The MTA called eleven companies and Boyce, who had recently gone out on his own after leaving the design and engineering project management company he co-owned. Boyce won the work, even though at the time he was a one-man operation working from a cottage in upstate New York.

Thirty years of experience, a reputation for technical excellence, and a deep understanding of the project’s challenges gave Boyce an edge. Boyce knew that the information and emergency communication kiosk housing must be rugged enough to withstand vibrations, power fluctuations, pressure washing, crowds, vandalism, extreme temperature variations, and damp subway station conditions. “I felt strongly that if I could build the product better and with more reliability, I would succeed,” reveals Boyce. Boyce tapped into his passion for manipulating radio waves and perfecting high-reliability electronics to develop a system that employed power conditioning and battery backup and could be continuously monitored remotely to ensure it was functioning properly.
Brilliant Design

The clincher was Boyce’s unique forward-looking vision for the new Help Point Unit product. Fundamentally, the product was a modern intercom system. Riders push buttons to request travel information from a multilingual call center or to report threats or emergencies in the station. Boyce saw greater potential for the kiosk, envisioning it as a safety and security “hotel” that was cleverly configured to leave room for modular improvements to serve riders’ needs in the future.

Today, nearly all 475 MTA subway stations have two or three Help Point Units per platform produced by Boyce Technologies. Help Point Units are manufactured with aircraft grade high-strength aluminum and ruggedized acrylics to make them invulnerable to vandals and the hostile subway environment. A bright blue light makes the units easy to find and conveys a hidden message. Every minute, the unit performs a multitude of qualifying tests to ensure it’s continually in working order. When every test passes, a call is made to the server and the blue beacon light stays on, silently signaling that the unit is ready for anyone who needs it.

“I felt strongly that if I could build the product better and with more reliability, I would succeed”
Improving Lives Daily

Riders responded positively to the Help Point Units and have made thousands of calls with the new system. Increased communication has given the MTA more insight into riders’ concerns, allowing it to better respond and make improvements. Boyce regularly hears reports of how Help Point Units were instrumental in saving lives. In one case, responders quickly located and rescued a man who used the unit while suffering a heart attack.

The product’s effect on peoples’ daily lives inspires the work of Boyce Technologies’ more than 100 employees. “We’re proud of what we do. You can see it in the quality of the products,” explains Boyce. The company continues to implement innovative and reliable products for the MTA, but is rapidly expanding into other projects such as building cell towers for Verizon and designing infrastructure for more continuous high-speed Wi-Fi between Boston and Washington for Amtrak. Boyce adds, “there is never a day we’re not building something new.”

Last year the company grew by 1,000 percent and Boyce expects the trend to continue. His goal is to surpass 75 million dollars in revenue next year. To keep pace with increased production demands, the company quadrupled its capacity and filled its ultramodern facility with advanced manufacturing equipment, including a TRUMPF robotic laser welder, flatsheet laser cutter, press brake and TruLaser work cell. Adding in-house sheet metal capabilities has already yielded benefits. Boyce points out a three-dimensional part that once took weeks to machine and is now laser processed in six minutes. The company designs new products faster and creates full prototypes, without interfering with production, and sometimes before Boyce has even finished meeting with the customer. “Quality, responsiveness and ingenuity make a difference,” says Boyce.

For Boyce, a secret to success is providing capabilities your customers didn’t yet know they needed. Innovative technology is helping the company to think ahead and bring modern improvements to the products it creates. In the next two years, Boyce hopes to add another 100,000 ft² building and more advanced machinery to keep moving his customers’ systems into the future.
In Brief

Machine portfolio at Boyce Technologies

- **TruLaser 2030**
  The TruLaser 2030 fiber machine is featured with the energy-efficient and fully integrated 4kW TruDisk laser. It combines minimal use of space, easy operation, and fast installation with excellent performance.

- **TruBend 3100**
  The TruBend Series 3000 brings together the best TRUMPF quality with simple operation and an attractive price-performance ratio.

- **TruLaser Robot 5020**
  The TruLaser Robot Series 5000 can handle welding, cutting and soldering. The flexible laser robot system guarantees economical production even of small quantities and is ideal for processing complex geometries.

- **TruLaser Cell 7040**
  The TruLaser Cell Series 7000 laser system offers the flexibility to change between cutting, welding, and laser metal deposition of two or three-dimensional components or tubes.

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- TruLaser 2030
- TruBend 3100
- TruLaser Robot 5020
- TruLaser Cell 7040

To extend your application spectrum, TRUMPF offers other suitable product enhancements for every machine.
Seemingly at every turn there is talk of the growing skills gap and many manufacturers are struggling to hire qualified, trained employees for their modern sheet metal production facilities. Long Beach City College has recognized this and is working hard to educate the manufacturing workforce of tomorrow.
In Long Beach, California two retired sheet metal workers have risen to the challenge and are educating the future manufacturing workforce. Damon Skinner and Tim Shoemaker have almost 60 years of shop fabrication experience combined, and every semester they share their wealth of knowledge with the students enrolled in the Long Beach City College Metal Fabrication Technology program.

The college has 19,000 full-time students and an additional 10,000 part-time students coming from various backgrounds. Approximately 20% of the student body is foreign-born, and 30% are the first in their families to pursue their education beyond high school. Thanks to flexible class options, including daytime and nighttime courses, students can earn a certificate of achievement or their Associates degree in two years. Students at Long Beach City College have a desire to elevate themselves beyond dead-end, minimum-wage jobs, and the Metal Fabrication Technology program opens up career opportunities with higher salaries and more growth potential for them.

Making metal cool again

You may not think so, but Long Beach is the perfect backdrop for a program such as this with its refineries, ports, local U.S. Air Force base, and numerous construction companies in the area. The college acts as a feeder program, providing eager workers with the education and skills they need to be successful. “There’s always a need for welders and fabricators,” Shoemaker said. “Hiring managers are looking for well-rounded students, especially those with design experience, so it’s important that we include this aspect in our curriculum.” Skinner puts it best when he says, “We’re making metal cool again.”

The Metal Fabrication Technology program has been in existence at Long Beach City College for 65 years. It is part of the Manufacturing Technologies Department within the School of Trades and Industrial Technologies. In the past, the Manufacturing Technologies Department contained four programs, but the recession forced the college to cull the manufacturing department from four programs down to one. As new manufacturing jobs are being created and candidates with the necessary skills are harder to find, the Department has seen a resurgence and programs are once again splitting off because they are simply too big.

Cutting edge technology

The Metal Fabrication Technology program is unique in that it offers students the opportunity to learn on manufacturing equipment with cutting edge technology, combining classic skills with new skills that are required in the industry today. In addition to robotic welders, plasma cutters, and a forge furnace, to name just a few, Long Beach City College also owns a TruPunch 1000 punching machine, a TruBend 7036 press brake, and a TruBend 3066 press brake.
“The more skills you have, the more valuable you are,” Shoemaker said. That is the reason the program strives to introduce students to an array of tools, equipment, software and manufacturing technologies. Ideally, every student will leave Long Beach City College with the ability to create a model of a part and use basic programming skills to manufacture that part.
Setting students up for a career

The program’s success begins with attracting the right students. When Long Beach City College conducts tours for high school students, Shoemaker and Skinner like to expose them to the TRUMPF TruBend 3066 and, instead of offering a giveaway, show them a part and invite the students to learn how to make it themselves. Not only are the prospective students impressed with the shop, but the parents are as well. During the tour parents have an opportunity to see the future of manufacturing often this helps to dispel any negative connotations. The equipment might also help to sway an apprehensive student. “Once students see a machine with a computer attached, they feel empowered. If they can play a video game, with the right training, they can run a CNC machine,” Skinner said.

Skinner and Shoemaker are proud of the doors their program can open for students. The certificate or degree the students earn can lead to a lucrative career. Many of these students are first generation college students, and this is a viable option for them that will increase their lifelong earnings and job prospects. “We’re not setting them up for a job,” Shoemaker said. “We’re setting them up for a career.”

A key component to running such a successful program is offering classes that engage the students and hold their interest throughout the semester. One of the most popular projects is the so-called fire pit project where students construct a fire pit using many different manufacturing processes. This particular class has a 95% retention rate. The instructors find that when the students have something to show for their work, they are more engaged in learning. The classes start out with small projects to build the students’ confidence and then work up to a larger capstone project where they are responsible for the entire project from start to finish. Students design a part, make a model, fabricate it and assemble it, all using the impressive array of equipment that Long Beach City College provides for them.

The school administration sees the value in the educational experience that Skinner and Shoemaker are providing. The funding for the new TRUMPF equipment came from three grants, and the administration was very supportive. The Dean David Gonzales was excited about the expansion of the equipment, and the college’s board approved the purchase.

When asked how the partnership was working out, Shoemaker said, “TRUMPF stuck by their word. They understood that we’re a nonprofit organization, and we are very happy with the service we’ve received.” TRUMPF is also pleased to work with Long Beach City College to train the TruBend and TruPunch operators of tomorrow.
In Brief

Machine Portfolio at Long Beach City College

TruPunch 1000
The compact TruPunch 1000 excels with its high level of processing flexibility and can produce even small lot sizes economically.

TruBend 7036
The TruBend Series 7000 with its high speeds and acceleration values ensure first-rate overall productivity. It provides the optimal conditions for large press forces at a high working speed.

TruBend 3066
The TruBend Series 3000 brings together the best TRUMPF quality with simple operation and an attractive price-performance ratio. Even in low utilization you can profit from precise results as well as the highest safety standards.

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The Chicago connection

CONNECTED PRODUCTION

Over 45 miles of cabling, 280,000 pounds of steel and millions of bits and bytes – in just 13 months a Smart Factory materialized out of nowhere near Chicago. Fully connected, the factory is digitally controlled.
All key information available with a single click – anytime, anywhere. In an age of smartphones, the notion of “anything, anywhere, any time” no longer seems all that special, but in the world of sheet metal processing, being able to monitor and control capacity, production orders and the status of manufacturing equipment at any time definitely is a big deal. TRUMPF’s Industry 4.0 solutions, aptly named TruConnect enables manufacturers to do just that.

TRUMPF opened its doors in the windy city in September 2017. By establishing its state-of-the-art technology center, TRUMPF has taken a major step into the future of sheet metal processing. Visitors to the center can expect to experience the company’s first Smart Factory, complete with fully connected production processes.

TRUMPF is pursuing a clear strategy for its Smart Factory: to be even closer to its customers and to advise them on how best to implement connected manufacturing solutions. The site’s location already checks off the first point – roughly 40 percent of all sheet metal fabrication in North America is located in Illinois and surrounding states. Here in the heart of the US sheet metal industry, TRUMPF is capitalizing on its strength as developer and demonstrating just what digitization can do: affect a marked reduction in the number of indirect processes.
Cool, cooler, Chicago – custom architecture:
More than 140 tons of steel were used in the construction of the 50,000 square foot facility. It was a TRUMPF customer from Atlanta that manufactured the truss roof construction. In addition to sheet metal and steel, other materials catch the eye. Sections of the exterior façade as well as many interior walls are made of wood. The technology center was designed by Berlin-based architectural firm Barkow Leibinger.

Organized:
The storage system provides over 200 spaces.

TruLaser 5030 fiber:
This laser cutting machine is fully automated and features 8 kW of laser power.

Flexible:
Stand-alone machines complement the interconnected production line.
80 percent of production time today is spent pre- and post-processing orders. Now that batch sizes are becoming smaller, the proportion of time spent on these process steps must also be reduced to achieve efficient production. The manual handling of orders, the tedious task of compiling accompanying documentation, committing a lot of time to tracking down parts – none of this applies to TRUMPF in Chicago. Instead, customers will encounter connected equipment that allows for automated order processing. What makes the Smart Factory really stand out is not just the automation components – the hardware – but the software. This is what enables orders to be processed in a matter of minutes, including an automatic ordering process, programming, nesting and allocation to the job list for the relevant machine. Production data for all machines is fed into the control center. Here, as well as from any connected mobile device, it is possible to see the status of production and orders at a glance and make adjustments at any time. In Chicago, production never sleeps. Visitors to the Smart Factory can do more than observe. Thanks to the connected AXOOM Webshop, they can also place an order for their own parts. TRUMPF brings to life all sheet metal fabrication processes – from inquiry to production to invoicing – and can thus understand its customers’ requirements even better.
THE RIGHT POWDER FOR ANY OCCASION
**3D printing is booming** – and it’s no longer just about making plastic action figures. Industry is also reaping serious benefits from the new technology, which is also commonly known as **additive manufacturing**. This alternative moniker often refers to a rather different process, however, which is based around two main ingredients: a laser, and a **fine metal powder** that has the peculiar effect of seeming to be neither liquid nor solid!

A qualified chemist, Joachim Behm spent 23 years working for a powder manufacturer in charge of laboratory facilities and quality management. Just under a year ago, he decided to move to TRUMPF, where he is now responsible for metal powder, overseeing each and every step up to and including powder processing in TruPrint machines. He forms part of what is known as the materials team, a group of experts who focus on locating and acquiring the right kinds of powder. Their works involves numerous lab tests to determine each powder’s grain size, grain-size distribution, and flowability. Behm and his colleagues also run test build jobs to analyze the various metal powders, because it’s imperative that they fulfill their required function even in shapes that were almost unimaginable before now. In fact, the way in which 3D printing allows us to manufacture objects of almost any geometry and complexity is one of its biggest strengths – ultimately we are limited more by our imaginations than the technology itself.

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**Making everything out of nothing**

Additive manufacturing (AM) means making a completely new part from scratch, using a laser to build up metal powder layer by layer to form the required shape. The data comes straight from 3D CAD software, and the model can be whatever shape you choose. “This process of gradually adding new layers to the top of the powder bed is also referred to as laser metal fusion, or LMF,” says Behm. “It’s a useful alternative to more conventional methods, providing solutions for multiple industries including tool and die making, automotive, dental and medical devices, and even the aerospace sector.” More than ten years have passed since TRUMPF developed its first machine based on this technology. “It’s fair to say that we were pioneers in this field.” It soon became clear that TRUMPF was ahead of its time, however. Demand was still too low, leading the company to temporarily halt development in 2005. In 2014, the decision was taken to revive LMF technology in the form of an innovative department in its own right, which has been growing steadily ever since. “After so many years working at one company, I was very excited by the idea of helping to shape a new project from scratch in a different kind of working environment,” says the powder specialist.
“Laser metal fusion has made it easy for us to do things that we previously thought were impossible.”

As well as working on a new machine, and numerous other development topics, the AM department also focuses on powder sales and marketing. Selecting from a wide variety of powder containers stacked on storage shelves and in cupboards, the members of the materials team test the contents of each container using the facilities in TRUMPF’s in-house powder laboratory. To ensure they analyze each powder’s full range of properties, the team even prints test parts, cuts them up and examines them under the microscope, checking aspects such as porosity and mass. Once all the tests have been run, machine experts define suitable parameters for each powder. These give an indication of how to coax the optimum behavior from each powder by adjusting machine settings such as laser output and process speed.

The importance of flow

TRUMPF launched its first standard powders on September 1, selling them to customers in a wide range of industries. Combined with the right parameters and a suitable TruPrint machine, these powders can be used to create the parts of the future. Behm sees this technology as a huge step forward: “Laser metal fusion has made it easy for us to do things that we previously thought were impossible. Whole new ways of thinking are emerging – and that’s exactly the kind of openness we need.”
In principle, Behm says, the possibilities offered by the alloys you can produce from the 50-plus naturally occurring metals on the periodic table are virtually endless. The most important materials for 3D printing are titanium and titanium-aluminum alloys. That’s because they offer a combination of high strength and low weight, which is highly advantageous for the aerospace industry. In the realm of medical devices, dental bridges are often made from cobalt-chrome alloys, while power plants and turbines make use of nickel alloys, since these resist corrosion up to a temperature of 600 degrees. Other commonly used metals include stainless steel, tool steel, and sometimes even gold. Behm also reveals that he has a personal favorite in the powder kingdom: Inconell 718. “Because it flows so well!”

**3D printing is transferring into production**

In the past, 3D printing of metal parts was primarily used in rapid prototyping because it took only a few days to translate an idea into a finished part. But now the focus is firmly on full-scale production. The method is particularly suitable for short-run batches because additive manufacturing needs no specific tools. Instead, the same machine can print anything at all using different programs. That makes this technology particularly lucrative. What’s more, AM allows users to construct highly complex parts with whatever internal channels or hollow spaces they choose. No extra costs are involved because the material is applied only where it is actually needed. “The more hollow spaces you have, the cheaper it gets, because you use less powder,” says Behm.

The material team’s goal for the months and years ahead is to launch many more metal powders that are perfectly adapted to LMF processes on TRUMPF machines. There is certainly no shortage of passion and enthusiasm, and working with powder is clearly more than just a job to Behm: “It really is an amazing feeling to see the machine create something totally new from powders that we have studied and scrutinized in such detail!”
TRUMPF was able to boost its sales in fiscal year 2016/2017 by nearly 11 percent, from 2.8 to 3.1 billion euros. Orders received rose as well, increasing 21 percent to 3.4 billion euros. The highest-earning markets were Germany and the U.S., with China coming in at number three. South Korea, home to many customers in the electronics industry, had especially positive news: sales there rose 58 percent to 211 million euros, making the country number four.

In the past fiscal year, TRUMPF invested in upgrading and expanding its locations in Germany and around the world; examples include the new logistics center at headquarters in Ditzingen, Germany and the Industry 4.0 demonstration factory in Chicago, U.S. At the same time, the company continued to develop its digital business platform AXOOM.

TRUMPF has opened a technology and laser center in Silicon Valley. “Our new application laboratory for laser processing, micro applications and coating technology places us firmly at the heart of the U.S. technology industry and brings us close to our customers and partners especially in the consumer electronics and e-mobility sectors,” says Peter Leibinger, Vice-Chairman of the Managing Board of the TRUMPF Group and head of the Laser Technology/Electronics division. TRUMPF can now examine each customer’s individual requirements on site and identify the optimum process and the right laser for each application.

Model mechanic Annabelle Pichl plays first violin in the truest sense of the phrase – her final project to finish her industrial mechanics training at TRUMPF is probably the first violin to be made out of sheet metal. The body of the violin is made entirely of stainless steel, while the neck was milled by apprentice Nick Rampp. The chinrest is plastic and was 3D-printed in the training workshop. All in all, superb teamwork sounds good – and shows off the versatility of sheet metal.

TRUMPF goes Silicon Valley

Interesting. Worthwhile. Surprising.
Breakfast of the future

Samuel Kurz, Philipp Ruta and Fabian Bacher want to revolutionize breakfast toast. The team from the Vocational School Center Leonberg is taking part in the German youth science competition “Jugend Forscht” and has devised a toaster with an integrated laser that can be individually programmed using an app. The weather forecast or a short message on your toast? No problem! During a one-week internship at TRUMPF, the three students constructed a protective housing made from sheet metal components, which they then cut and bent on site. The young inventors have already advanced to the next round of the competition with their magic toast.

TruLaser 1030 times 1000

Let’s celebrate! In spring of this year, the plant in Farmington, Connecticut (USA) manufactured the thousandth TruLaser 1030. Developed in the United States, this machine arrived on the market in 2009. The TruLaser 1030 fiber, which features a solid-state laser, has been available since 2011. Initially, the machine’s interior had only a permanently installed table for supplying material. TRUMPF then responded to customer demand by adding means of processing materials – including a fully automatic pallet changer for loading and unloading. Although a majority of TruLaser 1030 units are sold in North America, the thousandth machine has found a home in South Africa.

Cutting-edge 3D printing

TRUMPF has advanced additive manufacturing once again in the form of two new 3D printers, the TruPrint 3000 and the TruPrint 5000. Using lasers to manufacture whole parts, these medium-format machines are designed for the mass production of complex metal parts. The TruPrint 3000 and the TruPrint 5000 boast industry-standard peripherals and a sophisticated solution of interchangeable cylinders: the construction cylinder and the supply cylinder can be swapped out quickly. The TruPrint 5000 is the first 3D printer made by TRUMPF equipped with three 500-watt lasers that turbocharge efficiency. This machine will become available at the end of 2017.

Dizzying heights

Those with a fear of heights should avoid visiting the peak of Mount Karren near Dornbirn, Austria, where the floor of the viewing platform is made of glass. Perched twelve meters above the ground, the platform affords visitors marvelous views of Lake Constance and the Vorarlberg Alps. Markus Kalb is the owner and managing director of Kalb GmbH, which constructed the viewing platform. Kalb’s welding pros had to create ultra-sturdy welding seams that span meters. It was essential that the seam edges be absolutely flawless. That is why for years, Kalb’s Austrian company has been using a TRUMPF power tool: the TruTool TKF 1500. It ensures pure metal seam edges that are uniform and oxide-free.
For the 7.45 billion people who currently live on the planet, the internet is becoming more and more important. The world’s population will be booming over the coming years, and so will internet use: in June 2016, more than half the world’s people were online. The distribution of users is not without its surprises; though the proportion of internet users in North America is very high, standing at 89 percent, this amounts to only 9 percent of total users. Asia has proportionally fewer users, yet these account for almost half of global users.

Big data, small buildings

\[ 90\% \]

of the data existing today worldwide was created in the last 2 years.

Every day, we generate more than 3 billion gigabytes of data. That sounds pretty impressive. If you were to save this mountain of data onto Blu-Ray discs and stack them one on top of the other, you would get a tower 12,585 feet tall. To put this into perspective, this is almost five times as tall as the Burj Khalifa in Dubai, currently the tallest building in the world.

*Based on XL Blu-Rays with a storage capacity of 128 GB.
Technology transformed into art. In each issue of TRUe, we will be showcasing selected parts in a whole new light. This time, a high-pressure ZnSe lens gets a makeover. Photographer Christian Stoll has taken the TRUMPF replacement part out of its familiar environment and given it a whole new context.
Curiosity and creativity

“Open yourself up too much,” says my neighbor, “and you’ll end up embarking on the craziest schemes.” That’s one of the unshakable tenets he lives by, and he repeats it at every one of our backyard barbecues. He believes that a constant stream of new ideas and influences can make people a bit flighty. His favorite example is our neighbor from across the street. We see him tinkering in his garage whenever he has a free moment, and he never tires of coming up with new things. Recently he installed a solar panel on his roof, and now he has an electric three-wheeler parked in front of his garage. It looks like a soapbox car for adults but was probably a lot more expensive.

I envy his childlike curiosity. Being open to things is the key to learning, while the attitude that “what we don’t know already isn’t worth knowing” is a worrying precursor to mental calcification. Curiosity, however, also tends to make people fall flat on their face, because not everything new and exciting is necessarily good!

For example, our neighbor from across the way was recently left high and dry by his electric speed machine when they closed a local road, and the vehicle’s battery couldn’t cope with the unexpectedly long detour. He arrived home on foot, soaked in sweat and thoroughly resigned to the gloating of his neighbors. But however much we tease him, he insists that he hasn’t failed. He simply tried something out that didn’t work.

That’s his version of a quote from Benjamin Franklin, the remarkable innovator who we remember not only for the Declaration of Independence, but also for inventions including the lightning rod, bifocals, and the flexible urinary catheter. Yet he is also known for the Franklin stove, a novel and supposedly more efficient fireplace that, instead of producing the extra heat he hoped for, actually racked up significant financial losses.

Failure goes hand in hand with openness, and it seems to hit particularly hard just when we are most confident. In his book Stumbling on Happiness, Harvard psychologist Daniel Gilbert explains the principal reason why life never goes the way we expect it to: “We tend to imagine the future as being like the present with an unexpected twist. That’s why the future as we imagine it invariably looks like a slightly distorted version of today.”

As a rule, the future does not conform to our expectations. We simply don’t know what lies in store for us. When making decisions that impact our future, it’s similar to firing at fast-moving targets with a gun that is stuck in one position. And yet we are constantly astonished by how rarely we hit the mark.

These insights give rise to two very different conclusions. Either you entrench yourself in the stubborn idea that “everything used to be so much better,” or you keep an open mind to embrace all the new, exciting, off-the-wall, and fascinating things that we will encounter tomorrow but that we can’t even imagine right now.

Sometimes that takes a healthy dose of courage. But it’s almost always rewarded with new discoveries.