

TRUMPF

Vol. 1/15

Express

Magazine for Sheet Metal Processing
in North America

High technology

Smart manufacturing secures
customers and workers

Cheerful readiness

Manufacturing with care
and an open mind

Young and flexible

Investing wisely and
gearing up in Mexico

**Special
LaserNetworking**

Pumped up

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going lean in manufacturing

SCYBEX

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PAVING THE ROAD TO ECONOMIC DEVELOPMENT

The governor of Connecticut recently proposed a plan to spend \$100 billion over the next 30 years to improve and rebuild Connecticut's roads, bridges and transit system. These improvements are a necessary expenditure, and meant to boost economic development and create jobs across the state. The state is also looking to improve its information super highway. Here, the State Broadband Initiative aims to expand the availability and access of high speed networks across Connecticut.

This is the current situation in Connecticut, and one mirrored by many states across our nation. In Indiana, former Governor Mitch Daniels implemented an aggressive, long-term transportation plan that is having a significant and positive impact on its residents. In regards to the nation's high-speed broadband connection, the United States has improved, but is still outranked by nearly ten countries worldwide in speed and accessibility of service.

Enhancements to the infrastructure should attract and stimulate new business; however we must also remember where these highways lead. Standing proudly along the edge of our interstates are the businesses that fuel our economy and offer opportunities for work. Many of these companies are manufacturing operations.

Manufacturing stimulates economic growth and plays a critical role in any state's financial health. According to the Bureau of Economic Analysis, for every \$1 of goods produced, manufacturing generates \$1.37 for the economy. This is the highest multiplier effect of any economic sector. It also serves as a nucleus driving demand in supplier networks. This includes a plethora of well-paid professional and skilled positions in areas outside of manufacturing. In fact, each manufacturing job creates nearly three additional jobs in other sectors which wholly rely on competitive manufacturing. Its impact cannot be denied.

Just as the country needs to remain world class with its infrastructure, manufacturers must do the same to remain competitive. Investments in capital equipment and new technologies are among the most important. The latest advancements enable a business to run more efficiently and cost-effectively, while a state-of-the-art working atmosphere helps to attract and retain the best workforce. At TRUMPF we hear this daily. Our customers speak about their new machine tools; how they enhance their flexibility, increase production, and reduce their costs. To ensure our customers will continue to have access to leading edge equipment, TRUMPF invested \$331.3 million in research and development (9% of sales) and \$169.9 million in capital investments in FY 2013/14 alone.

To maximize economic growth as a nation, we must make wise investments in capital equipment as well as the transportation and new technology infrastructures which will carry us into the future. These investments will have the largest long-term impact on our nation, and enable the factory lights to shine brightly along the freshly constructed physical and electronic highways that unite the nation.



A handwritten signature in black ink that reads "Peter Hoecklin".

Peter Hoecklin,
President and CEO

Tooling Tip

LASERdur ZN

Bending tools for galvanized sheet metal

When processing galvanized sheet metal, abrasion of material can cause zinc to build up on the lower die. Even a few bends can facilitate galling which leads to bending inaccuracies and unwanted imprints on the workpiece.

This galling can be avoided with TRUMPF's LASERdur ZN coated bending tools. The tool's high quality multilayer coating establishes high surface hardness and a low coefficient of friction which enables the sheet to glide smoothly as it is bent. The tools are gentle on the workpiece surface and maximum bending accuracy is guaranteed when bending galvanized sheets. In addition, the coated tools are corrosion-resistant and require minimal cleaning. LASERdur ZN dies can also be combined with all standard LASERdur dies for maximum flexibility in processing.

> **Additional information:** www.us.trumpf.com



Welcome home!

TRUMPF's new location better serves Canadian manufacturers



TRUMPF Canada's new office is officially open

TRUMPF Canada recently moved to a new location in Mississauga, Ontario. With approximately 35% more space, the new facility enables TRUMPF to show a wider range of fabricating solutions as well as to stock a larger selection of spare parts in Canada. At the Grand Opening in March, TRUMPF unveiled the new demonstration room complete with a TruLaser 2030 fiber, TruLaser 3030 fiber with Rotolas, the new TruPunch 2000, the new TruBend 3100 press brake, a TruBend 7036, a TruMark laser marking system and TRUMPF power tools. With additional technologies on display and increased access for local visitors, we hope our customers will love the new location as much as we do. Stop by the new location and see for yourself!

TRUMPF Canada's new contact information:

3755 Laird Road, Unit 1
Mississauga, ON L5L 0B3

Tel 905-363-3529 Fax 905-363-3551

Toll free 1-800-306-1077 (Canada only)

Individual email addresses and extension numbers have not changed.



RAM Specialty Fabrications named "Manufacturer of the Year"

RAM Specialty Fabrications honored in CT.

Recognized as "Manufacturer of the Year"

RAM Specialty Fabrications of Naugatuck, CT, was recently presented with the Harold Webster Smith "Manufacturer of the Year" Award by the Waterbury Regional Chamber of Congress. The award is given annually in memory of Harold Webster Smith, founder of Webster Financial Corp., who supported and nurtured business development within the Greater Waterbury Region.

RAM Specialty Fabrications was originally founded as RAM Welding, Inc. by Joe Reilly and Thomas Mahn in 1946. Since its humble beginnings as a two-man welding shop, RAM has grown, mostly notably under the direction of Reilly's son-in-law, David Murelli, who took over the business in 1981. With its acute attention to detail and commitment to state-of-the-art technology including TRUMPF lasers, punching machines and press brakes, RAM has become a premiere, steel metal fabrication company in New England.

> **Additional information:** www.ramwelding.com

Did you know?

TRUMPF's webinars aim to inform

TRUMPF Inc. produces its own webinars to inform sheet metal fabricators about the latest processes and technologies available. These free webinars have included topics such as solid state laser cutting, automated bending, and combination punch laser processing. More are currently in production so watch for an emailed invitation from TRUMPF or your local sales representative, and keep your eyes on TRUMPF Inc.'s social media channels for information on how to register!

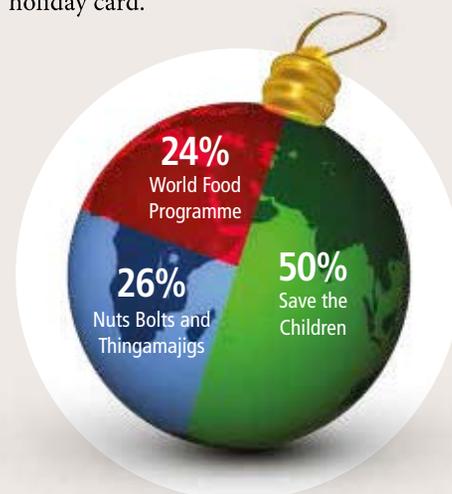


TRUMPF Holiday Card

A gift on your behalf

With TRUMPF's 2014 electronic holiday card, we wanted to make a difference. That's why we invited our customers to choose one of the following three charities so we could make donations on their behalf.

You chose. TRUMPF gave. Here are the results from the TRUMPF holiday card.



Save the Children:

Provides support for health, education, protection, disaster relief and so much more to children in 120 countries worldwide.

Nuts Bolts and Thingamajigs:

Created by the Fabricating Manufacturer's Association (FMA) to inspire the next generation of manufacturers, inventors and entrepreneurs through manufacturing summer camps and scholarships.

World Food Programme:

Provides food to victims of war, civil conflict, and natural disasters in their time of crisis and while they rebuild their lives.

> **Additional information:**
www.nutsandboltsfoundation.org
www.savethechildren.org
www.wfp.org

Watlow Electric Manufacturing welcomes milestone machine

The 1000th TruPunch 1000 finds a home in Missouri

TRUMPF recently installed its thousandth TruPunch 1000 punching machine at Watlow Electric Manufacturing in Hannibal, Missouri. The family-owned company is an industry-leading producer of thermal solutions including electric heaters, temperature sensors, power controllers, temperature controllers and supporting software. It has nine manufacturing facilities and three technology centers worldwide. The state-of-the-art punching machine from TRUMPF will replace an older TRUMPF model in use at the company, thereby improving Watlow's productivity and competitiveness.

"The TruPunch 1000 will produce sheet metal parts for our electric heating elements," says Curt St. Clair, senior engineer at Watlow. "Many of our parts feature simple holes and square or rectangular contours, and in such cases punching has clear advantages. The high productivity of the TruPunch 1000 for these kinds of parts takes the heat off our TruLaser machine. That makes us much more flexible and increases our production capacity."

> **Additional information:** www.watlow.com



From Germany to Watlow Hannibal Missouri, the 1000th TruPunch 1000 has found its permanent home.



> **Additional information:** www.us.trumpf.com/services

TRUMPF Finance

Financial professionals who understand fabrication

TRUMPF Finance was established in 2008 to ensure financing is available to TRUMPF customers. It is staffed not by bankers in suits and ties, but rather professionals who know sheet metal fabrication. They are people who have grown up and worked in a sheet metal fabrication shop, and others who have invested time to learn and comprehend it. They understand the need for flexible and productive equipment and can provide the necessary funding to bring it to your sheet metal shop. This means fast decisions, easy to understand documents, and a customer service team that realizes the ups and downs of business.

TRUMPF Finance approves over 90% of transactions, and offers a wide range of

financing solutions tailored to the unique needs of fabricators. Application only financing (up to \$350,000), seasonal loan payments, operating leases, or the simple \$1-out finance lease for shops who want to manage cash flow – there are even solutions to accommodate TRUMPF customers when times are not so good. There has never been a better time to invest in a new TRUMPF machine and TRUMPF Finance is here to help make it happen.

TRUMPF Finance is located at TRUMPF Inc. in Farmington, CT and Jersey City, NJ with four finance representatives in the field serving customers in the US and Canada.

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QUESTION



Chandra Brown, Deputy Assistant Secretary for Manufacturing, U.S. Department of Commerce

> Why is exporting important for manufacturers to consider?

For the first time in more than a decade, manufacturing output and employment are growing. One in four U.S. manufacturing jobs is supported by exports; therefore, it is critical to the United States' economic security that American companies increase their export potential and be more competitive in the global market place.

Since February 2010, the manufacturing sector has created just under 800,000 new jobs—the first sustained growth in more than 20 years. The growth of manufacturing helps the nation's economy but also benefits local economies. Each day, upwards of 17 million Americans go to well-paying jobs in manufacturing and its supply chains.

During the State of the Union address, President Obama said 95 percent of the world's consumers are living outside of the United States. Less than five percent of U.S. businesses export and of those who do, 58 percent export to one market. Every \$1 billion of exports supports 5,590 U.S. jobs (more than 11.3 million jobs). Imagine what it would mean for job growth in our cities if those businesses that export to one country now began exporting to three or four in the next few years.

> **Additional information:** www.trade.gov

Handheld versatility

TRUMPF introduces cordless drill driver

TRUMPF has released its first cordless drill driver, the TruTool DD 1010. Featuring a 10 mm chuck and 17 easily adjusted torque settings, this powerful drill offers two speeds and can drill holes in wood as well as mild steel. The tool is a perfect complement to TRUMPF slitting shears and profile nibblers since a starting hole must often be made before these tools begin their task.

The new TruTool DD 1010 is comfortable to use, easy to control, and features a built-in LED light to illuminate the work area. It switches easily between forward and reverse operations and comes standard with two, 10.8 V Li-Ion batteries with charger – the same battery found on the latest generation TruTool slitting shears and TruTool PN 130 profile nibbler. As a result, the batteries and chargers are compatible and interchangeable. The quick charging Li-Ion battery stays charged even after long periods of non-use, and can be recharged at any time – regardless of the charging state – without any risk of damage to the cells.

> **Additional information:** www.us.trumpf.com



TRUMPF's new TruTool DD 1010 cordless drill driver

A lean lifestyle

Cybox takes its premium exercise equipment to a new level with lean initiatives.

Walking through the doors of the Cybox Research Institute at the company's headquarters in Medway, MA, it is easy to feel inspired. As your eyes dart around the room, you begin to take in the latest and greatest solutions in cardio and strength training equipment. Rows of treadmills, exercise bikes and arc trainers proudly stand at attention, prepared for the demands you are about to place on their performance. The sun reflects off the freshly painted machines and treats you to bright flickers of Platinum Sparkle, Monte Carlo Red, and Nightstorm Black. It is just another afternoon at Cybox International, Inc. where employees are encouraged to take time for their personal health and take advantage of this space and all the company has to offer.

Building a strong core

It takes dedication to build and maintain a strong reputation for premium exercise equipment, but Cybox has done just that. Here, exercise science professionals guarantee each product best optimize the benefits while minimizing the stresses imposed on the body. Bruce Horn, whose responsibilities include manufacturing engineering, production leadership, new product implementation, and lean initiatives, elaborates, "We have a research team on staff, with expertise in biomechanics, physiology, and motor learning to ensure our products are mechanically correct while also a comfortable and ergonomically accurate training experience." At the Cybox Research Institute, visitors see current research of Cybox products, its competitors, and non-machine exercises unfold alongside all the latest equipment on the market. As the research team drives new and unique innovations in the

mechanics of exercise, the design team is hard at work incorporating technologies such as CyboxGo, which brings live HD TV, virtual workout environments, individual performance statistics and integration with third party fitness trackers directly to the user.

Cybox builds its elite treadmills and exercise bikes using a range of TRUMPF technology. The company found TRUMPF when looking to replace an older press brake. "We assembled a team from various departments and individually ranked all the available technologies based on their capabilities," recalls Horn. Narrowing down the choices, they decided to invest in a TrumaBend V130 (TruBend 5130) for the precision it would afford. Since then, the company has purchased two additional press brakes, a TruPunch 3000 punching machine and a TruLaser 2030. In addition, Cybox became an early adopter of the new TruLaser 2030 fiber with an integrated TruDisk resonator. Speaking for the new technology, Rodrigo Delgado, Senior Manufacturing Engineer at Cybox asserts, "You couldn't design a machine that would better fit our applications."

Although the company typically processes steel, it is not uncommon to find aluminum and stainless steel within its product lines.

"You couldn't design a machine that would better fit our applications."



Bruce Horn in the Cybex Research Institute



Rodrigo Delgado (L), Bruce Horn and Anthony Bernasconi (R) consult on the production floor.



Material thickness ranges from 0.080 to 0.375 inch. Using sheet metal instead of metal tubing might seem unusual for a fitness equipment manufacturer, but Horn explains the Cybex approach, “The TRUMPF technology enabled us to redesign products of sheet metal, making them lighter and less expensive to manufacture without compromising strength.” This durability is crucial for many customers, including elite fitness centers, military bases, universities and professional athletic teams, where heavy use and abrasive environments are the norm.

“There is a strong connection between our engineers and the machine tool shop which enable us to develop the best products,” says Delgado. “When making changes, we take advantage of TRUMPF’s offline programming to quickly develop a prototype, ready to pass inspection, without wasting valuable time at the machine.” This is vital considering Cybex keeps its production equipment extremely busy. “We run our original TruLaser 2030 an average of 18.25 hours a day and the

three TRUMPF press brakes average 10,000 bends per day,” says Anthony Bernasconi, Manufacturing Engineer.

Regardless of the features, configurations, voltages, colors or languages needed, Cybex is able to ship a product within two days. They achieve this by maintaining a small stock of fabricated and welded structures in its supermarket. When an order is received, it can be easily customized according to the customer’s specifications. “With twelve different languages and a wide variety of options, we simply kit what is needed for the line each day,” explains Horn. “The product is pulled from the supermarket and heads to powder coating where it takes just seven minutes to change colors.” In this way, Cybex ships 40-65 customized treadmills and 20-35 upright and recumbent exercise bikes every day. Approximately 70% are sold domestically, either through direct sales or specialty fitness dealers, while the rest are sold by international distributors in more than 90 countries worldwide.

Trimming down

To maintain this level of customized production, Cybex has embraced the practice of continuous improvement. “The goal is to move small lot sizes with fast velocity through our production facility. For this, we need a highly visual factory and a Cybex workforce which can actively identify waste,” he explains. A grant from the government enabled Cybex to train its entire staff in the principles of lean manufacturing while strategically placed monitors now enable workers to easily track their efficiencies and progress throughout the day.

There is also a company-wide expectation to contribute to continuous improvement which Cybex supports during department huddles and idea review meetings. During this time, employees present their ideas and brainstorm, rather than just stuffing a suggestion box. “It starts with respect,” says Horn. “Whether its maintenance, welding, fabrication, or any other segment of our business, we improve processes by enabling employees to solve

Cybex offers a range of customizable options, including color.



“When making changes, we take advantage of TRUMPF’s offline programming to quickly develop a prototype.”

problems and leaders to drive progress.” Once ideas are presented, the different departments communicate to implement these changes. If a specialty cart or apparatus might make fabrication easier for assembly, Cybex manufacturing engineers might use their TRUMPF machines to build one.

These efforts have proved successful. As Horn reports, “Last year 53 employees generated 1009 ideas, and 650 of these were implemented.” As Cybex becomes more lean and profitable, the new profit sharing program enables employees to directly benefit from the cost-saving improvements. Cybex also rewards active contributors with small tokens of appreciation ranging from gift cards to additional paid time off. “It’s a win for everyone involved,” says Horn.

In addition, Horn and his colleagues are building a more robust and documented training program, including the establishment of an apprenticeship program for 2015. Horn is excited for the program and stresses, “We want any employee with an interest and the motivation to learn, to take advantage of this new initiative, develop skills, and become a more versatile and valuable member of the Cybex team.” As Horn and many others at Cybex realize, improvements can take place anywhere – from the production floor to personal development. And with this mindset, Cybex will continue to grow stronger. □



Cybex International, Inc.

- Who:** Cybex International, Inc. Medway, MA. Established 1995. www.cybexintl.com
- What:** A leading manufacturer of premium exercise equipment including a full line of cardio training and strength machines.
- How:** TruLaser 2030 fiber, TruLaser 2030, TruPunch 3000, TruBend 7036, TrumaBend V130 (TruBend 5130), TrumaBend V85S (TruBend 5085)

Make your mark

Part marking has become an integral part of the manufacturing process, from managing and streamlining production within the shop, to traceability of a part for its lifetime. Visual indicators can be simple, such as those used for basic part identification, bending instructions, or post processing operations, or more complex, including bar codes, data matrix codes, and ornamental designs. Whether for branding, functional use, or traceability, value is created along with the mark. By knowing what your machine can do, you'll make your mark – economically and just the way you want it.



Punch characters with a high speed dot matrix (L) or EasyType.

TruPunch

The TruPunch offers different solutions for part marking directly on your punching machine to eliminate secondary processing. One option is a **high speed dot matrix**. Punching at approximately one inch/second, nearly any font size, character, or shape is possible, so long as the geometry is achievable with a dot matrix. The mark will remain visible even if the material is painted or coated further down the production line.

A second solution, **scribing**, uses a tool with a special diamond-tip to scratch the surface of the material. Although the depth of the mark is limited, this is a highly flexible solution for engraving, and produces a very aesthetic result. This is a great solution when the mark will be visible to the end user.

Solid stamp marking is best for a basic and repetitious mark. A logo, or up to eight characters are locked into place on a tool. A single strike quickly and efficiently produces the desired effect. Although there is



Solid stamp marking

no versatility in its design, it is possible to control the depth of the mark when embossing or stamping.

With **MultiTool characters**, the fabricator has greater flexibility to mark any combination of numbers or characters located in one of the three tooling setups. While the size and font of the mark must be predetermined, the result is attractive, flexible, and very quick to produce. Used with the MultiTool, the **EasyType** tool features five special shapes, designed to be perfectly and automatically arranged to create any alpha or numeric character. Marks are achieved at a rate of two characters/second. Although the result is less aesthetic than with the MultiTool alone, this solution is less costly, requires less space on the linear tool rail, and can produce a wider range of marks.



The TruMark 5010 Mobile Marker



TruMark

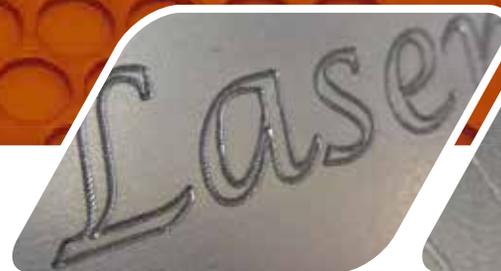
A **TruMark marking laser** is ideal for fabricators looking for the highest quality results. These highly flexible lasers are designed specifically for marking and achieve high quality and precise results in a fast and economical way. They easily produce any desired mark including complex pictures or graphics, data matrix codes, and logos.

Material processing with a TruMark laser is gentle— an essential factor for many manufacturers supplying the medical, aerospace, food service, or similar

industries. The laser is easily programmed to precisely engrave, ablate, or anneal metals. Plastics, ceramics, glass, silicon and inorganic materials can also be marked with excellent results and surface preparation is also possible.

TruMark lasers can be integrated into production lines, or used in a standalone workstation, such as the TruMark Station 1000, 5000, or 7000. For maximum flexibility, TRUMPF's innovative TruMark 5010 Mobile Marker even enables fabricators to bring the laser marking unit to the workplace when marking large or heavy components.

There are many ways to make a mark with TRUMPF equipment.

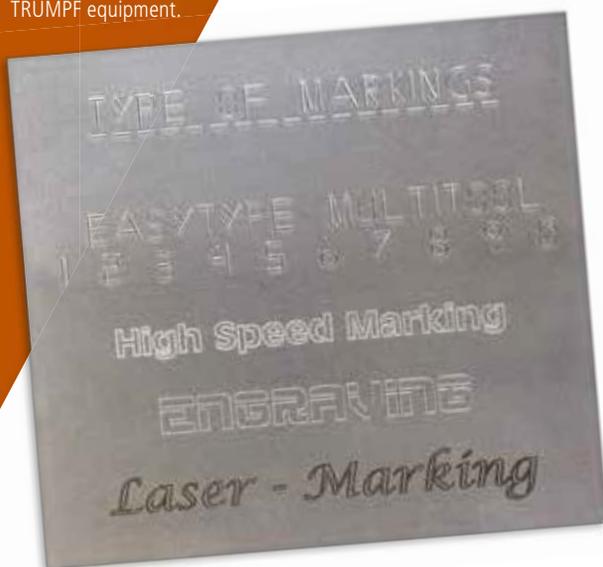


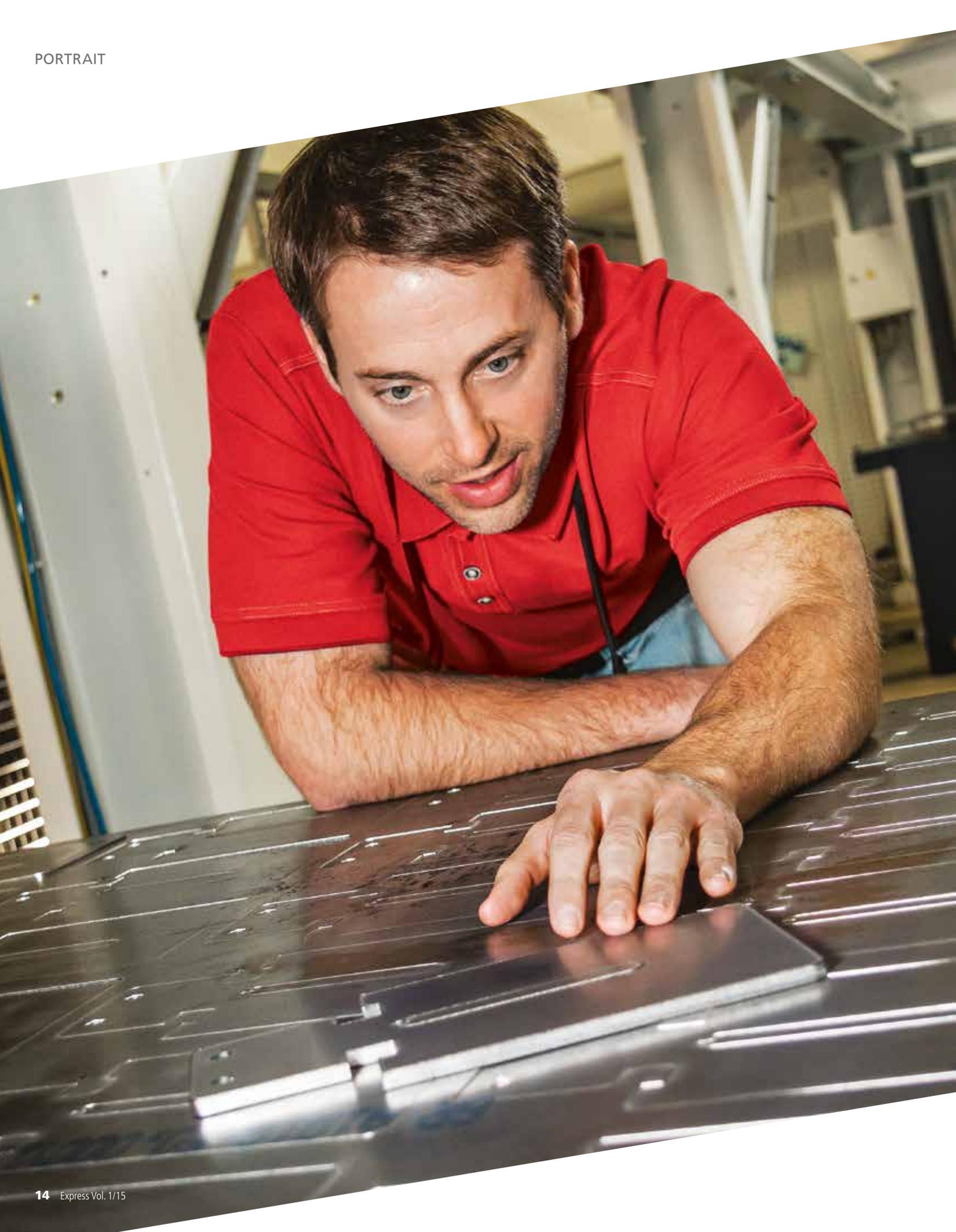
Laser etching with oxygen (L) and nitrogen

TruLaser

Laser etching with a TruLaser 2D laser cutting machine is a flexible way to produce functional visual indicators on a wide range of materials. Similar to marks produced on a TRUMPF punching machine, marking on a laser cutting machine eliminates the need for a secondary marking step downstream.

Using a laser cutting system, the operator has control over the depth of the etch and can simply score the material or penetrate the material more deeply, depending on the desired result. Aspects of the mark can also be adjusted by manipulating the laser parameters. By changing the assist gas to shop air or oxygen, for example, it is easy to produce greater contrast when etching stainless steel. The laser beam also provides the flexibility to program a series of hatch marks to fill in larger or more decorative marks, or to achieve better contrast in reflective materials. With basic knowledge of the laser cutting machine and an understanding of the principles of speed and laser power, it is easy to create a mark that is highly aesthetic and ideally fits a wide range of marking needs. □





Employing high tech minds

Westland Manufacturing has a cutting edge appeal that draws customers and employees.

After years of working in a machine shop, Terry “Chip” Erfman grew tired of working for someone else. With a few partners, he secured a three-year contract to produce furniture for distance learning that supports video and teleconferencing systems in local schools. On New Year’s Day 1996, he incorporated Westland Manufacturing, Inc. in Sioux Falls, SD. They acquired the necessary equipment for punching, bending and welding the components and went to work.

Since then, Westland has become a true family company. Chip’s son and vice president Matt Erfman explains, “Our immediate family members all have roles within the company, including my three siblings, Dan, Ashley, and Megan.” As the children invest in the company, Chip also remains active - except for on Thursday afternoons, or “Grandpa Day”, which is reserved for time with the grandchildren.

Running lean

The last few years have been fruitful for Westland. In 2014, sales were up 31% from the previous year. “We tried to manage growth without too many capital investments, but that is difficult with such significant growth,” explains Erfman. The company built two additions, totaling 20,000 square feet. The smaller segment is for shipping

and storage while the larger addition grew the manufacturing and welding operations. Westland also bought new fabricating equipment, including a second TruBend 5170 press brake and a TruLaser 5030 fiber with LiftMaster Linear. The LiftMaster Linear was predestined to also support a second TruLaser 5030 fiber laser cutting machine, delivered spring 2015.

Designing the new space for better workflow is a major focus of Westland’s lean and continuous improvement manager, who was hired in 2014. After studying Westland’s material flow with South Dakota Manufacturing and Technology Solutions, a government funded organization, the company decided to eliminate batch building industrial generator housings for a customer. “We had large stacks of parts everywhere which created poor workflow and bottlenecks in production.” Now Westland builds one or two at a time so parts flow all the way through production. To manage more frequent press brake tooling changes, the team designed special racks to store tools at the same height and orientation as needed at the machine: now the operator simply slides tools into place. In addition, Erfman states, “Our new TruBend 5170 has a mobile control and LED optical set up and positioning aid which greatly

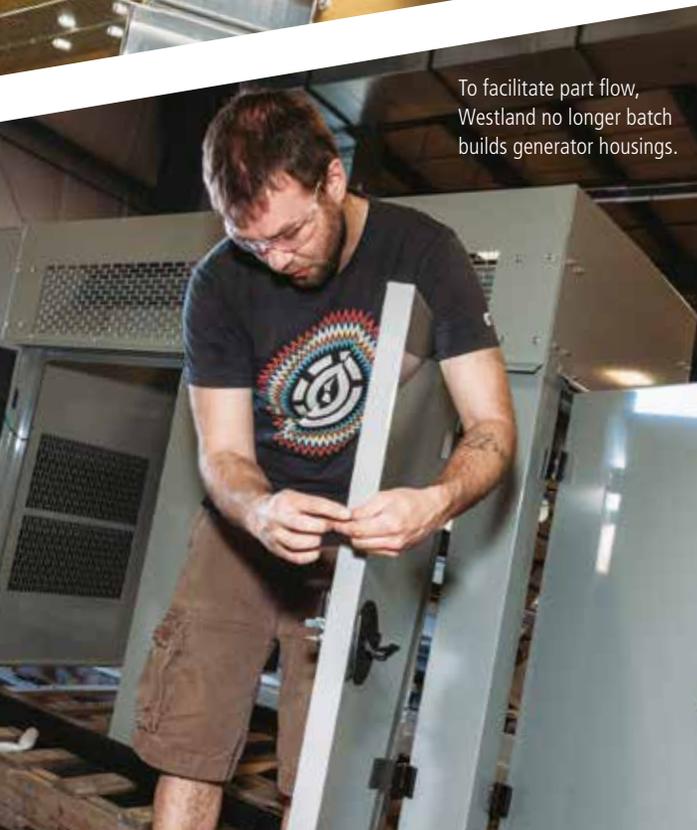
reduced setup time.” The lack of surplus parts is so noticeable that visitors often ask if fabrication is slow. “We say, ‘No, we just figured out a better way to do it!’”

Solutions for all

Westland’s customers are diverse and require a range of capabilities to best support their applications. “When bending small brackets, such as those used for electronic signage, we use the TruBend 7036 for its speed. The TruBend 5170 is used for display frames and large industrial generators,” explains Erfman. The TruMatic combination machine is ideal for jobs such as the large generator part which features 600 rectangular holes, 0.5 inch x 2 inch in size, to enable airflow. “The holes are economically produced by punching, but the customer wants a laser cut outside edge. The TruMatic is the perfect compromise.”

Prior to purchasing its TruLaser 5030 fiber, Westland laser cut its parts with a TruLaser 3050. “We often cut 20 gauge cold-rolled steel up to an inch thick and thought only a CO₂ laser could handle the thickness. When we heard about BrightLine fiber, we were on the next plane to Connecticut to see it.” They liked what they saw. Erfman asserts, “We’ve been operating BrightLine fiber for a few months, and we really like what it can do.”

“We want the best and the brightest employees.”



To facilitate part flow, Westland no longer batch builds generator housings.

Attracting new talent

South Dakota has a very low unemployment rate and Westland attracts the best employees by investing in new technologies. “When we bought our first TRUMPF laser eight years ago, automation was important because of the limited labor pool,” says Erfman. Automation meant Westland could hire workers with more technical skills, like computer programming. “When your company provides the newest technologies to work with, it is easier to attract skilled workers.”

The company also looks to make work easier for its employees. Westland purchased its second TruBend 5170 press brake with material support arms to aid operators when bending large generator panels. The operators appreciate it, and with less fatigue, parts flow faster through production. The entire facility is also air conditioned – an uncommon comfort for manufacturing facilities in the area. Although not very economical, especially in the welding department, it creates a better work environment. “We want the best and the brightest employees. A comfortable work environment and state-of-the-art equipment is the way to attract and keep them,” asserts Erfman.

Erfman believes these extras make a difference. “We have a high rate of referral without any incentive for it, and I think that says a lot about what our employees think of us.” It is no surprise the company is also fairly diverse in the age and gender. Young workers are often exposed to the company through their local universities and technical schools, which Westland helps to develop training programs. “All of our welders were trained at South East Technical Institute, located across the street from our facility. We’re currently working with the Institute to show the local demand for careers in fabrication as well.”

Passing on the value

In South Dakota, Erfman reveals the job shop market is not overly saturated but still competitive. “Our skilled employees help us provide additional value to our customers.” For a particular customer, Westland worked with the company to determine what was driving the costs on a particular product line. Design changes lead to a cost-savings of nearly 11% last year, or roughly \$103,000. The customer saved money while Westland increased its margins. In addition, the customer approached its other suppliers and realized they couldn’t provide the same support. “We’ve been lucky to have established strong relationships with good, growing companies that help us remain strong as well.” These relationships have generated significant growth for Westland, and better prepare the company for the days ahead. □

Westland Manufacturing, Inc.

Who: Westland Manufacturing. Sioux Falls, South Dakota. Established 1996. www.westlandmfg.com

What: A full service provider of metal fabricated assemblies that meet customer needs from design to finishing.

How: 2 x TruLaser 5030 fiber with LiftMaster Linear, TruMatic 7000 with SheetMaster, TruPunch 5000 with SheetMaster, TruBend 7036, 2 x TruBend 5085, 2 x TruBend 5170

Special

LaserNetworking

What is a laser network?

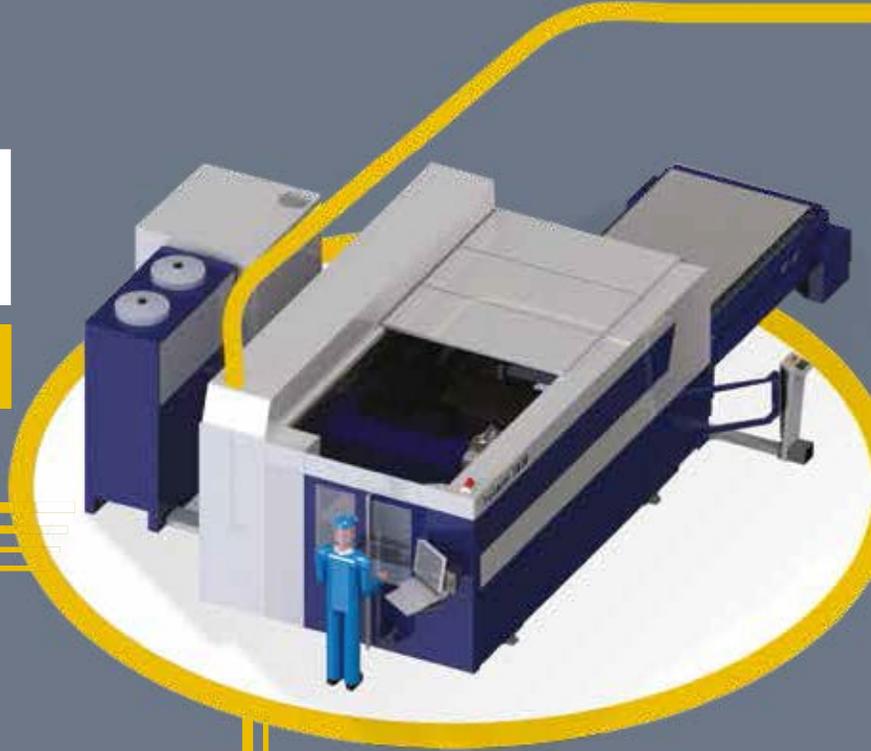
A laser network is achieved when one beam source is used for multiple operations.

With small lot sizes and faster processing times, many fabricators find their TruLaser fiber machines standing idle while it waits for more work. If you have a TruDisk laser resonator, it is possible to take advantage of this downtime and use the inactive laser for other operations such as laser welding. This is achieved with a LaserNetwork. Let's take a closer look at this innovative solution and the ways it can increase productivity and laser uptime in your shop.

The TruDisk resonator's unique design features multiple outputs which easily enable LaserNetworks

Special

LaserNetworking



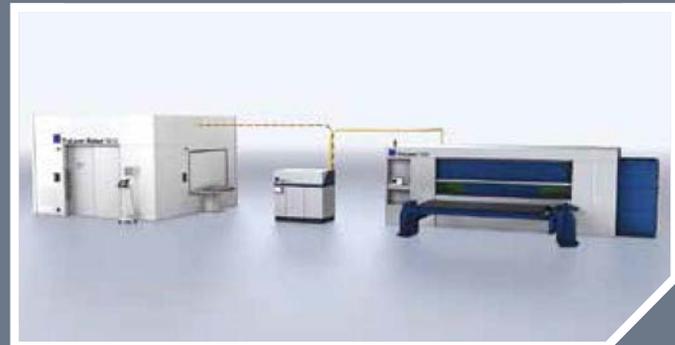
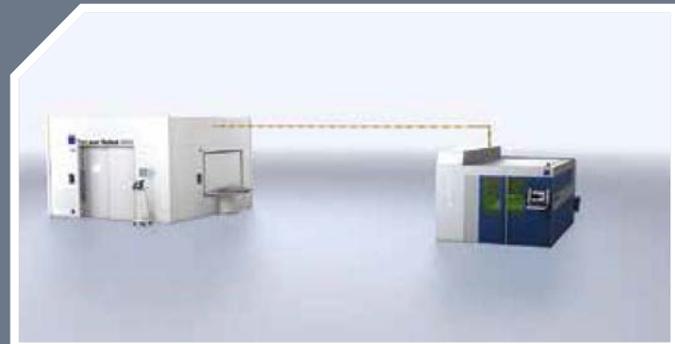
Here, the TruLaser 3030 fiber shares its TruDisk laser with the TruLaser Robot 5020, exhibiting the unique flexibility of the TruDisk laser resonator design.

Laser cutting with a solid-state laser

Laser cutting is a staple processing solution in sheet metal fabrication. Every manufacturer has different needs relative to the performance and capabilities of its machinery, and the choice between a CO₂ laser or solid-state laser resonator has become one of the most highly debated options. As solid-state laser technology evolves, it grows more competitive and appealing. This is especially true of the TruDisk resonator, which is found on all TRUMPF's TruLaser fiber machines.

With more than 5000 TruDisk lasers worldwide, the technology is well-proven, yet many manufacturers do not fully realize its flexibility. The resonator's unique design features additional laser outputs so manufacturers can easily share the beam between multiple systems as part of a LaserNetwork. This means the TruDisk laser which powers your TruLaser fiber machine can be used for laser welding when the laser is not actively cutting. Switching processes is automatic and nearly instantaneous.

All TruLaser fiber machines, from the TruLaser 1030 fiber to the TruLaser 7040 fiber, are capable of LaserNetworking. It is even possible to prepare the laser to accept a second output later on. This is a capability only TRUMPF can offer. As the only 2D laser machine manufacturer to build all of its own laser resonators, optics and components, TRUMPF is also the only supplier able to develop a 2D laser machine to work perfectly in tandem with its laser, automation solutions, software and support for maximum efficiency and productivity.



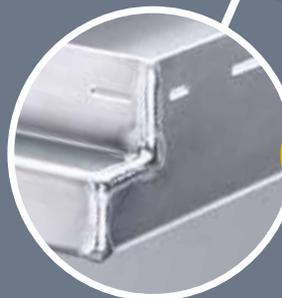
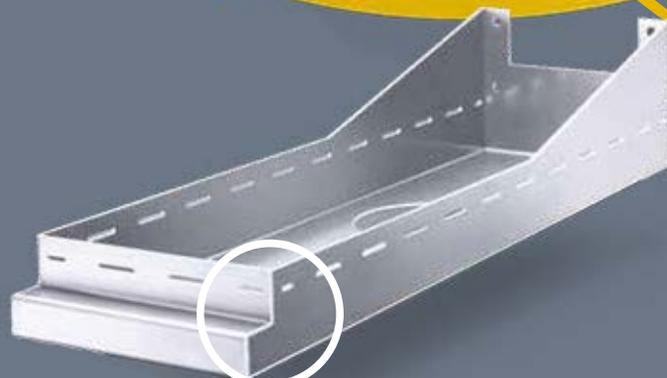
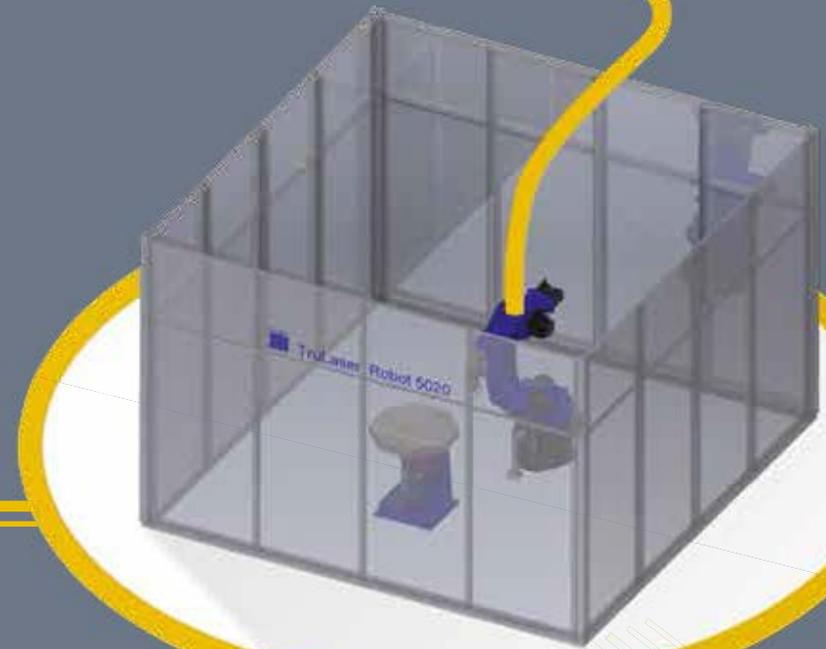
A LaserNetwork is possible with a variety of machines.

Laser welding

Laser welding outperforms conventional welding processes since the laser is able to process at high speeds and precision with far greater processing stability. With laser welding there is minimal heat input and therefore only the smallest degree of heat distortion in the material, and since it is a fusion process, there is typically no need for filler material. With less distortion, a lack of filler material and more consistency, a smoother weld seam is produced. This requires far less refinishing work, and since laser welding is a non-contact process, the tools will not wear in processing.

From simple sheet metal parts to tubes and bent profiles, the TruLaser Robot 5020 easily welds components of different sizes and shapes. Whether looking to achieve conduction welding or deep penetration welding, long seams or corner connections, several components can be joined in a single processing step depending on the size of the part. An automatic rotational turntable provides the ability to set up the next part while the laser is active.

If you have considered adding a laser welding cell but have a difficult time justifying the initial investment, a LaserNetwork could be the solution. Using the TruDisk laser for welding when the 2D laser cutting machine is inactive eliminates the need for a second laser. This allows a fabricator to build its customer base and its demand for laser welding and add a dedicated laser when the purchase is justified.



conventional welding

VS



laser welding



Wondering what it takes to create a LaserNetwork at your shop?

Since TruDisk lasers are designed for multiple outputs, sharing the laser source is relatively easy. The laser must simply be prepared to accept a second output at the time of manufacture. When the time is right to network, the second fiber output is quickly and easily installed. Plan ahead and this minimal modification can lead to maximum gains in productivity down the road. Contact us at info@us.trumpf.com for more information!

Werner Neumann,
CEO at CBV
Blecbearbeitung



CBV found 80 to 90 percent of its joined parts are suitable for laserwelding with the TruLaser Robot 5020.

CASE STUDY

Under the direction of Werner Neumann, CEO, CBV Blechbearbeitung invested in a LaserNetwork incorporating a TruLaser 5030 fiber and a TruLaser Robot 5020. The TruLaser 5030 fiber, equipped with a 3-kilowatt TruDisk laser, was purchased in 2011. The laser offers two outputs, which was a factor in the decision. “We could use the beam source with an additional machine, and this was when we first thought about making our debut in laser welding,” explains Neumann. In 2014, after working with TRUMPF to analyze CBV’s range of assembled parts, he found 80 to 90 percent would be suitable for laser-based welding using a robot. This prompted the purchase of a TruLaser Robot 5020 which was connected to the second beam output of the TruLaser 5030 fiber. The network has achieved greater energy efficiency, reduced costs, and enabled an affordable start in laser welding, even when machining small batches. Here’s how:

Learning laser welding

Neumann had a healthy respect for the challenges of laser welding, especially in fixturing and part redesign, but visits to two users dispelled these concerns. “Seeing firsthand how a robot actually works, we realized our fears were unfounded,” he explains. Since June of 2014, CBV has adapted more than 20 orders to the TruLaser Robot, approximately seven of which do not require fixtures. CBV’s innovative workers learned to teach the robot where and when to weld manually, saving a great amount of set-up time and cost. Once the welding robot has been “trained”, no specially trained operator is needed. A measurement cycle, under the TeachLine option, ensures dimensional precision. Networked with the TruLaser 5030 fiber, utilization of the beam source rose from 50 to over 85 percent and it takes just milliseconds to switch between processes. He asserts, “The only thing I regret is that we didn’t start earlier.” □

Results

- A batch of 100 parts, made of 0.8 mm aluminum was difficult to weld and required about twelve hours of touch-up work following manual welding. The TruLaser Robot reduced this to just 90 minutes.
- Laser welding an edge 30 mm wide to a stainless steel crowned housing panel 2 mm thick, reduced touch-up time by 90 percent.
- A U-shaped aluminum profile with close fit areas, holes and notches once milled from solid material is now cut with the laser and deep-weld at the base. “Thanks to the low degree of thermal input, there is no distortion. We brush over the seams and save 95 percent of our previous costs,” Neumann reports.
- CBV welders, TRUMPF experts and the Linde Industrial Gas company worked together to define the correct parameters and mix of gases to weld electro-galvanized steel containers with almost zero retouching.

Who: CBV Blechbearbeitung GmbH, Laasdorf, Germany.
www.cbv-blech.de

What: CBV supplies customers with complete, ready-to-use sheet metal components, small and large production runs, special-use components, component assemblies, and welded designs.

Trading conventional welding (L) for laser welding (R) enabled CBV to reduce refinishing work.



Strong connections

There are many ways to join sheet metal. TRUMPF punching tools help keep things together.

To stand out, sometimes you have to do something special. Expectations in sheet metal processing continue to rise and trigger demands for new options in joining techniques. TRUMPF offers many tools for this purpose. With their help, a wide variety of solutions can be produced directly by TRUMPF punching and combination machines. From

sheet metal screw fittings on the front surface to click connections and hinged joints, TRUMPF offers the right tool for every application and every type of sheet metal.

> Additional information: tooling@us.trumpf.com



Sheet metal threads:

When multiple sheets need to be fastened with the help of sheet metal screws, special reshaping of the material is often necessary. The Thread Punch Tool is especially useful in reshaping thin sheet metal. A hole is punched in the first step and the threads are tapped in a second step.

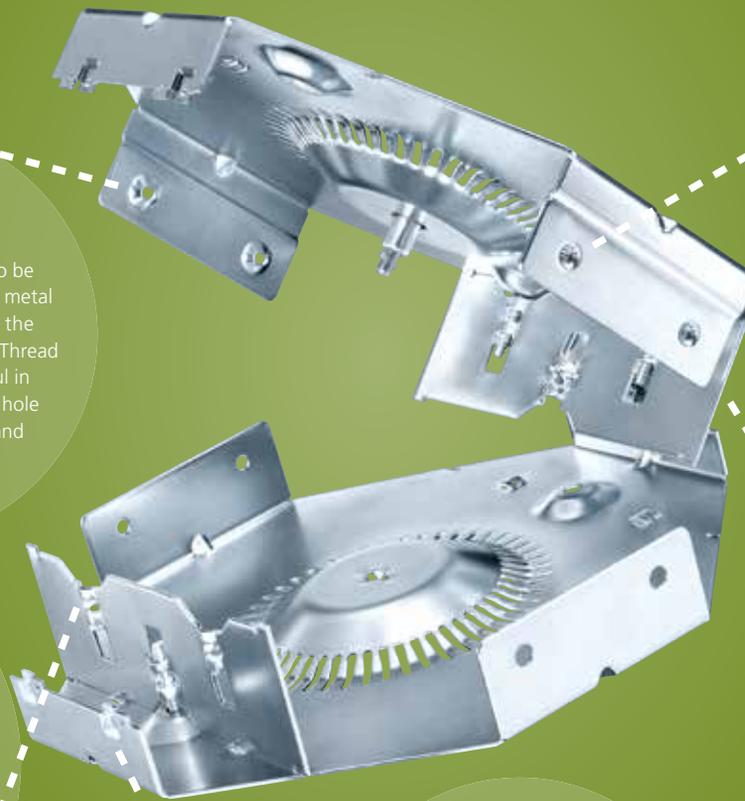


Threads:

Creating threads in a punched hole or extrusion is referred to as tapping. This reshaping can be done right on the machine when a Tapping Tool is used. No chips are created, since the material is displaced and not cut during the procedure. An additional advantage is that the displacement process itself lends great strength to the threads.

Threads at the front face:

This connection is located at the outside face of the sheet metal and is often used for electrical motor housings and metal beam construction. Such joints can take either sheet metal screws or metric threads.



Click connection:

Click connections join sheet metal panels easily and without any additional tools or aids. Brackets with tiny center stiffening beads are produced in the metal. The mating panel is then slid into the gap at the bracket, resulting in a "click and go" connection.



Hinge:

Hinges are common way to achieve moveable parts. They can be either shaped completely using two forming tools or, as shown in this example, made up as separate halves. In a hinge leaf such as this, the shaping phase requires only a single stroke with one single tool after the area has been cut free. Narrow hinge bows also guarantee design flexibility.



Bystrom Managing Director
Francisco Flores

Designing the right path

Mexican fabricator Bystrom builds a flexible and comprehensive strategy as it journeys toward success.

Climbing the iconic Saddle Mountain – or Cerro de la Silla as it is called in its Mexican home of Guadalupe – is no easy task. But determined hikers who work their way up the peaks are rewarded with breathtaking views of Monterrey’s bustling landscape.

Manufacturing in Monterrey has risen steadily over the last few years. With an eye toward addressing this growth, Bystrom Manufacturing SA de CV was founded to serve the metal fabrication needs of customers in the lighting, telecommunications, medical and agricultural industries.

A strong start

After months spent carefully reviewing equipment suppliers, Bystrom Managing Director Francisco Flores chose TRUMPF for its state-of-the-art technology in laser, punching and bending. “It was an easy decision when you consider the machines’ capabilities,” explains Flores. “We appreciate TRUMPF’s dedication to advancing the three main fabrication technologies, as well the support of their local technical staff in Monterrey.”

Bystrom purchased a TruPunch 2020 punching machine and a TruBend 5085 press brake in June of 2012. Just one month later, the company placed a second order for an additional TruBend 5085 and a TruPunch 3000. As business began to take off, the company took full advantage of the machines’ flexibility, productivity and fast setup. Today, Bystrom processes a wide variety of materials from aluminum and stainless to hot rolled steel and pre-painted sheet metal, with most of its work in light gauge material.

Although many of Bystrom’s customers have fabrication departments, they’ve found that

Bystrom has been able to deliver the parts faster and without any quality issues. For example, Bystrom was able to set up and produce one particular project nearly thirty percent faster than the customer could fabricate it in-house. Flores smiles, “It’s satisfying to know that we have the right equipment to produce customer parts quicker and at a better quality.”

Growing productive

While Flores is particularly pleased by the TruPunch 3000’s ability to efficiently produce more parts faster than other punching machines, its low maintenance costs made an equally big impression. “Maintenance without worry is really important as a factory is growing,” he says.

Watching Bystrom’s 15,000 square feet of fabrication space fill with activity, Flores now values another feature of the TruPunch 3000 and TruPunch 2020: their compact footprint. The company is currently at sixty-five percent

of capacity and has added a second shift with nine additional technicians and four employees in administration to its seventeen-person staff. Bystrom far exceeded its sales goal for 2013-2014 and achieved a forty percent growth in sales. This year, the company projects another sales increase of between twenty and twenty-five percent.

“Gearing up” laser

Customers began asking Bystrom to quote laser cutting projects. Flores informed them that Bystrom didn’t have laser cutting machinery yet, but offered to quote the projects and invest in laser equipment. “A laser was always in our plans,” he explains. Some key clients promised work, and so Bystrom added a TruLaser 1030 to its lineup in April of 2014 – a year ahead of schedule.

With an entry-level price point, quality cutting features, and easy installation and operation, the TruLaser 1030 was an ideal choice for Bystrom. Flores considered the TruLaser 1030 fiber as an

Bystrom services customers in high-volume and low-volume work alike.





By continuing to exceed sales goals, Bystrom has been able to add new workers and quickly grow its business.



alternative, but decided to start with CO₂ laser equipment. “It was our first laser investment,” stresses Flores, who doesn’t rule out a future solid-state laser purchase.

“The machine is part of a gearing up process to build experience. As we develop our expertise, we will be well-positioned to approach automotive companies in the future,” says Flores, who worked for twelve years in automotive manufacturing.

Inclusive, accurate and flexible approach

For Bystrom, lasting customer relationships are built during the quotation process. “We offer competitive pricing for complete solutions,” Flores emphasizes.

“We handle our customer’s high-volume work as well as the low-volume jobs that no other company will touch.” For example, Flores describes a recent project containing twenty-five part numbers: ten high-volume part numbers representing eighty-five percent of the project sales and fifteen low-volume part numbers.

Bystrom’s comprehensive strategy is paying off now that its customers are consolidating their projects by having just three or four suppliers.

Using TruTops software to produce prototypes on the laser enables Bystrom to quickly provide quotations and samples for customer review. Flores also praises the role of TruTops in supplying an accurate price for parts. “You don’t want any surprises in production costs to jeopardize

profits or customer relationships,” he says. “TruTops makes us ninety-five percent sure of the true cost of producing the part.”

TRUMPF technology also assists Bystrom in enhancing partnerships with clients. When a customer revealed the challenges it faced in meeting increased demand for lighting assemblies, a Bystrom engineer proposed design and fabrication changes that would eliminate one or two part numbers and reduce the client’s overall assembly time by fifteen percent. The ability to quickly laser cut prototype parts made the project a reality, and Bystrom ultimately produced the parts using punching technology.

As he contemplates the choices and future goals he has mapped out for the company, Flores is confident. “We’re glad we invested in TRUMPF from the start,” Flores declares. “We don’t consider TRUMPF simply a supplier, but rather as a strong partner for the long run. If you want to move toward being the best, choose TRUMPF technologies and you can be certain you’re on the right path.” □

“We don’t consider TRUMPF simply a supplier, but rather as a strong partner for the long run.”

Bystrom Manufacturing SA de CV

- Who:** Bystrom Manufacturing SA de CV, Guadalupe, Mexico. Established 2012.
- What:** A young job shop with a growing portfolio of sheet metal fabrication services.
- How:** TruLaser 1030, 2 x TruBend 5085, TruPunch 2020, TruPunch 3000



Jeff Berkes (L) and Nick Dvorak approach work with a cheerful readiness

Manufacturing outcomes

Taking a brisk and cheerful approach to change, Alacriant, Inc. redefined itself as a company and a supplier.

The word alacrity (a-lac-ri-ty) is defined as “brisk and cheerful readiness”. For Jeff Berkes, President and CEO of Alacriant, Inc. it means taking an open-minded and zealous approach in a service-oriented organization. This is the new state of mind for Alacriant, a company which manufactures stamped and fabricated metal assemblies from facilities in Ohio and Florida. After operating for nearly sixteen years as Artisan Industries, a trademark issue forced the company to change its name. Berkes took the news in stride. “It wasn’t in our strategic plan, but it was the card we were dealt,” he explains. “It provided me, as an owner, the opportunity to look at things differently, to have fun and do it right.” As the leadership team worked through the renaming, they

decided alacrity precisely defined their new approach. “It was already a part of our DNA,” says Berkes. And with that, Alacriant, Inc. was born.

An architect at Alacriant

Berkes’ role as architect of a new company culture is ironic, considering he once aspired to be an architect in the traditional sense. Although he always enjoyed working with his hands, he resisted a career in tool and die making and metal stamping. He recalls with a smile, “I grew up in father’s business and, as son of the owner, I naturally was given the most miserable work. I swore I would never work in manufacturing.” He eventually changed his path and joined his father at an assembly

“The first piece of equipment we installed was a TRUMPF press brake.”

start up company. After building a strong foundation, he branched out with three partners to form Artisan Industries.

Artisan Industries purchased Artisan Tool and Die in 2004, which brought CNC metal fabrication together with production stamping capabilities. In just two years, the company was forced to expand. “We simply ran out of space,” states Berkes. The stamping facility remained in Cuyahoga Heights, Ohio, while the fabrication business relocated to support a large commercial landscaping customer in Streetsboro, OH. This location now also primarily serves the defense industry, as well as aero-lift and platform customers.

At the request of a large client, the company expanded to its third location in Sanford, FL. in 2007 to manufacture power transmission component enclosures. The parts required standoffs and embossing. “It wasn’t cost-effectively to manufacture with hard stamping tools so instead of working ourselves out of the market, we invested in our first punching machine,” explains Berkes. All agreed the TruPunch 5000 was the tool they wanted on the shop floor. “The rigidity of the single punching head and flexibility of all tool rotation were the deciding factors, but there was also a bit of pride in the German technology,” he admits. Nick Dvorak relocated to Florida to serve as Division Manager and Alacriant’s original press brake, a TrumaBend V130, went along with him. That’s when Alacriant’s partnership with TRUMPF really began. “When we moved fabrication to Streetsboro, the first piece of equipment we installed was a TRUMPF press brake. In Florida, it was the TruPunch 5000,” recalls Berkes. We replaced our original TruPunch 2020 in Ohio with a new TruPunch 5000 in Florida. “That machine has been running twenty hours a day, five to six days a week, for nearly seven years.”

Since then, Alacriant’s Streetsboro location has added three new TruBend press brakes, ranging from 40 – 250 tons of press force. “TRUMPF is the market leader when it comes to the intuitiveness of the work center,” says Berkes, who made the switch to TRUMPF press brakes in 2006. The ease of changing from one job to the next has enabled “single digit setup time” and changed their approach to bending. “In the past, press brake operators had to be the artisans of the shop, but the new technology has enabled us to change how we train, hire and maintain our staff,” he explains.



Jeff Berkes, president and CEO of Alacriant, Inc.

A TruPunch 5000 with SheetMaster was added to help Alacriant bridge the gap between metal stamping and laser technology in Ohio. “Punching is often the best choice, and now we offer a solution.” He continues, “You could never afford the lower volume production with a turret machine because of the time it takes to load the cartridges, but the TruPunch provides a high degree of flexibility.” It also enables Berkes to go back to the marketplace and penetrate new business. “We are most dynamic with customers who have a staple diet in punched products. When I consider how we can support a very aggressive customer with low volume, high mix parts with material changes, countersinking, embossing, tapping, louvers and other forming options, I know we have yet to fully realize the opportunities for growth.” He adds, “It is a market we look to tap into over the next 24-60 months.”

The Alacriant mentality

Already with approximately 200,000 square feet of space between its three locations, Alacriant is looking to expand. “Within the next year, our eyes are on Florida and diversifying our customer mix there.” To support future growth, Berkes has developed a consistent cadence with Alacriant’s leadership team. “What we haven’t had in 16+ years of business is integrated communication at all levels,” he reveals. Now mornings begin with a strategic phone call

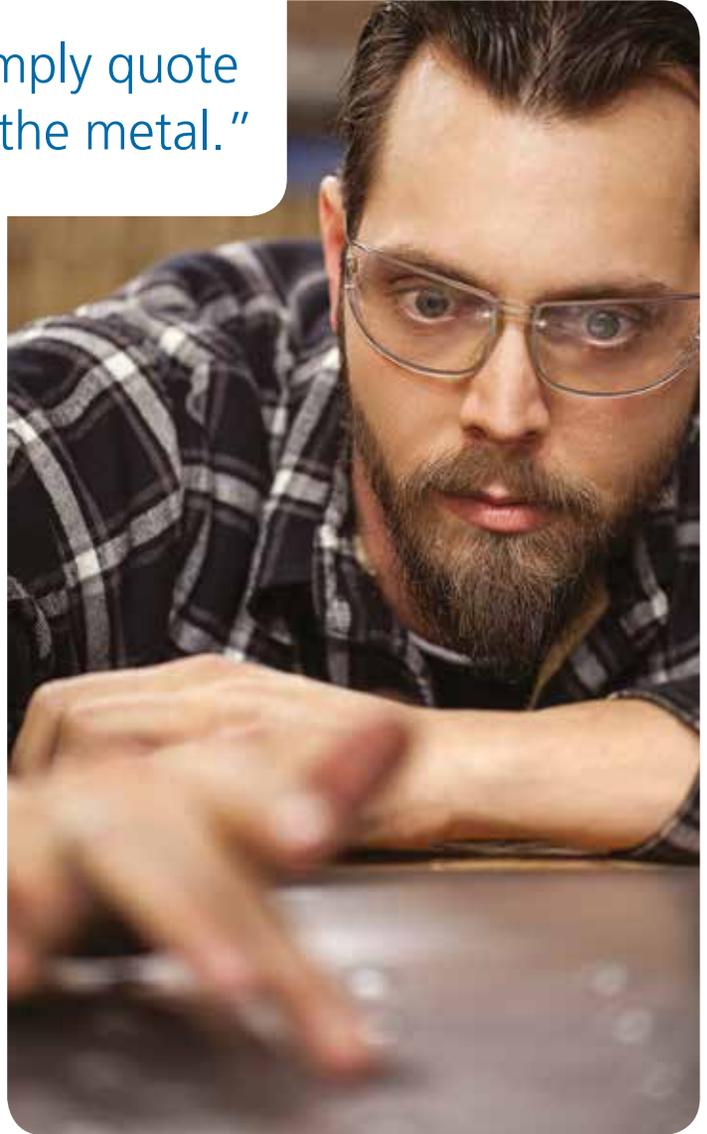
“We no longer simply quote jobs and pound the metal.”

between all three locations. It one focus: mitigate any customer issues for the next five to ten days. This then defines tactical areas of responsibility for production, scheduling, and shipments for the day and week ahead.

Alacriant has also changed its approach to business. “We no longer simply quote jobs and pound the metal. We take a slower approach. We ask customers what outcomes are critical to their success and what has been missing,” Berkes explains. Feedback is received in a fashion clients haven’t experienced before – with a smile and the Alacriant mentality. Business growth is also achieved slowly and purposefully. “Being selective with our future partners enables us to grow effectively and to make sure the fit is worthy of both the customer’s and our investment.”

Beyond the business

Berkes asserts the work has been rewarding. “We look to improve at every order, every opportunity, and every day,” he explains. This progress applies to people, as well as fabrication. When Alacriant first secured defense contracts, it was simply a revenue opportunity but now, Berkes asserts, “We realize it isn’t about cutting armor, or forming product. It’s the relationship we have with our soldiers. Every part we produce may save someone’s life.” In this spirit, Alacriant has partnered with the Northeast Foundation for Patriotism (NEOPAT), to support active military members, veterans and their families through events such as “Stuff the Humvee” toy drive and “Wreaths Across America”. “When we started, our company wasn’t mature enough to understand the need to support our community, but it’s something we’ve learned.” Those at Alacriant have truly embraced the company’s new core values and the meaning of the word alacrity. □



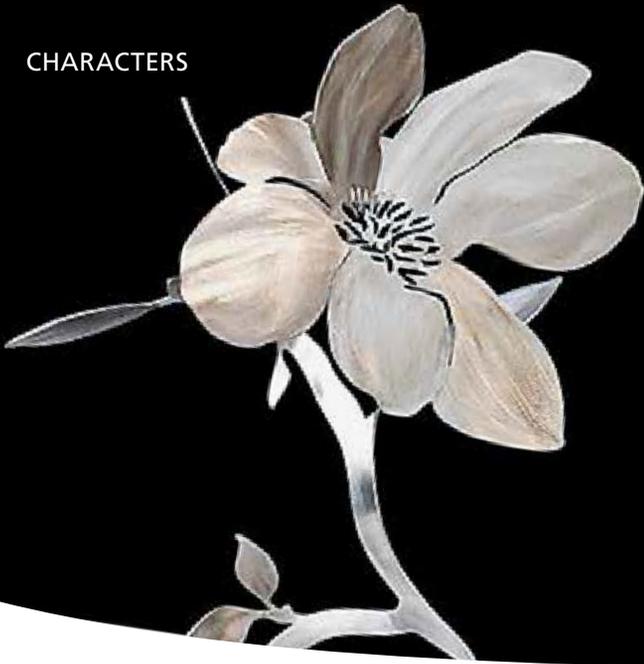
Alacriant, Inc.

Who: Alacriant, Inc. Cuyahoga Heights, OH, Streetsboro, OH, and Sanford, FL. Established 1997. www.alacriant.com

What: A manufacturer of stamped and fabricated metal assemblies serving both the commercial and defense industries with an outcome-driven focus.

How: TruBend 5085, TruBend 5130, TruBend 5230, TruBend 7036, TruPunch 5000, TruPunch 5000 with SheetMaster.

CHARACTERS



Sculptor Babette Bloch gives permanent meaning to passing moments

Shifting perspectives

Babette Bloch reflects upon nature and history in her sheet metal sculpture.

There is only a short amount of time in her native New England that Babette Bloch has the chance to see the magnolia trees at their peak of beauty. “From afar, they are this beautiful burst of pinkish trees,” she explains, “but they’re only in bloom for about a week before the petals start to fall.” In this fleeting moment she examined them up close, and realized just how intriguing they were. She was immediately inspired to use their unique forms in her art. “Every flower’s shape reminds me of a dancer!” she remarks with great enthusiasm.

The classically trained sculptor has been working with stainless steel sheet metal as a medium since 1993. Her inspiration and intentions as an artist are exemplified in her Magnolia series, where she creates an illusion of space and depth by texturing the flat metal. Her ability to give a dense material such as steel a sense of lightness is extraordinary.

Babette first experimented with sheet metal forms when commissioned to create a pair of gymnasts for a client’s home. “I wanted the figures to appear to float in space,” Babette explains. She first tried to use laser cut $\frac{1}{4}$ inch aluminum, which didn’t produce the intended effect. Eventually she found success with high grade stainless steel, and has been using it to make her sculptures ever since.

Babette’s studio space, located in southwestern Connecticut, is where her ideas really come to life. “My design studio is my creative idea center, where I draw and create paper models,” she says. “As a craft, I see the art form of paper-cutting as being very similar to working with laser-cut sheet metal.” The handmade drawings she creates are scanned and made into DXF files and then sent to a local job shop, where they create a CAD/CAM file for Babette to proof. Laser machines are used to cut the essence of her sculptures out of sheet metal. She brings the parts back to her garage studio where she grinds, sands, shapes and prepares the pieces, and then returns with them to the shop for fabrication and welding.

The sculptures provided to her galleries are mainly inspired by nature and all its bounty, while many of her commissioned pieces are historically themed. Of her commissioned pieces, one favorite is a sculpture she created for a centennial park in Saugatuck, Michigan. A family asked her to create 9-foot high stainless steel likenesses of their pioneer grandparents. “The way that their shapes are cut, they

appear as ghosts in the landscape. Through the negative space of the cutouts one can see the field behind them,” Babette describes. “They stand alone to tell their own story.”

Babette wants her work to resonate with the environment in which they are displayed, and is chiefly interested in this aesthetic experience. “What compels me is the way the stainless steel reflects light depending on the angle of the sun, time of day, or season,” Babette reveals. “Whether the landscape is white or green, whether it’s morning or sunset, the way the shadows are cast; the experience for the viewer is always changing, and that is important to me.”

While concerned with making her sculptures aesthetically pleasing, Babette always leaves room for last minute changes to her vision. “It’s not about making things precise, it’s about making art,” she says. For this reason she relishes the freedom and variation that using sheet metal as a medium provides. “I’m always learning, pushing myself and the material.”

Babette realizes that it’s easy to become wrapped up in her work as an artist, so she tries to remain active in the local artistic community. She and her husband, bronze sculptor Marc Mellon, are involved in many different organizations that lend aid and support to artists of all kinds. “We always try to give back to the community where we can,” she says. She and her husband are also alike in the messages they try to convey through their art. “We both try to create work that is life-affirming,” she explains. “As an artist, you can choose to make art that reflects anything, bad or good, about society. We strive to make art that uplifts both our spirit and those who see it.” □



Two-wheeled wonders

Modern bicycles are a far cry from the so-called “boneshakers” from which they evolved.

In the age of lightweight, smooth riding bicycles, it's hard to imagine ever cruising down the street on a heavy, rigid wooden two-wheeled vehicle with no pedals. But when the first bicycle was invented, it was far from sleek and efficient. In fact, it was downright clunky.

The first appearance of the two-wheeled vehicle is debated, but the closest invention resembling modern day bikes was created in 1817 by German inventor Karl von Drais. It was officially called the velocipede (“fast foot”), and was invented as a substitute to riding on horseback. This machine had no pedals and was entirely foot-propelled. Over time, these vehicles earned the nickname “boneshakers,” due to the rough ride its riders endured. The wooden frame, iron rims, and leather covered tires were not capable of absorbing much shock, so the rider felt every uncomfortable bump along their path. Regardless, velocipedes became a popular fad in the United States, despite their being outlawed in many other countries due to safety concerns.

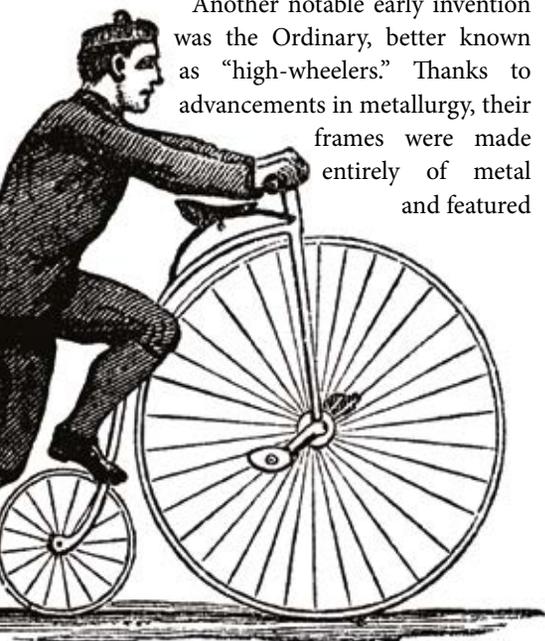
Another notable early invention was the Ordinary, better known as “high-wheelers.” Thanks to advancements in metallurgy, their frames were made entirely of metal and featured

wire wheel spokes, which helped to remedy vibration. High-wheelers provided a slightly smoother ride and were considerably lighter weight than their predecessors. Unfortunately, these bikes were still outrageously unsafe – if a rider was to encounter an unexpected obstacle in their path, they would almost certainly tip headfirst over the front wheel and risk serious injury.

Significant improvements were made in the design of the bicycle during the late 1800s, made possible by even further innovations in metallurgy. One of the most important of these was the invention of the chain drive, a fine chain and sprocket small and light enough for a person to power. In earlier models of the bicycle, the pedals were attached directly to the wheel, which was inefficient and often dangerous. The chain drive allowed the rider to sit between two wheels rather than atop of the front wheel, which greatly improved balance, speed, and the cyclist's security. With the addition of steel tube frames, gears, and the pneumatic tire, the “safety bicycle” was born.

The bicycle soon became ubiquitous, offering efficient and inexpensive transportation, especially in urban areas. Their development also contributed to the progress of vehicle inventions. Many future automobile makers started their careers manufacturing bicycles, as well as the famous aviation pioneers Wilbur and Orville Wright.

Fast forward a century, and modern bicycle frames are now amazingly high tech. The thin-walled tube frames can be made of steel, aluminum, titanium, and even carbon-fiber, for strength, lightness, and ease of handling. Having gained a lot of ground from the high-wheelers of the past, bicycles remain a beloved means of movement for children and adults alike. □



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Help Secure the Future of Manufacturing

Support the STEM Education Coalition

STEM education provides students with a firm foundation in science, technology, engineering, and math. Manufacturers need workers with STEM talents to lead the way in engineering, while keeping pace with modern technology in order to remain globally competitive.

Wide ranged efforts to promote deeper learning in the STEM subjects will also help ensure that all students are ready for college or for the workforce when they graduate from high school and that they are prepared to take their place as productive, full participants in society. Additionally, nearly half of new jobs in the STEM workforce don't require a traditional four-year college degree, and so are served by community colleges, trade schools and a variety of other educational pathways. These are jobs like auto mechanics, craftspeople in advanced manufacturing, and other forms of modern technicians.

We must work with educators and policy makers to prepare students with the necessary foundation of knowledge. Partner with the STEM Education Coalition to help improve teaching and learning in science, technology, engineering and mathematics (STEM).

"STEM workers drive our nation's innovation and competitiveness by generating new ideas, new companies and new industries."

-STEM: Good Jobs Now and for the Future, U.S. Department of Commerce



www.stemedcoalition.org



TRUMPF

Priceless precision

Wandering a museum, exploring the wonders of past kings, artisans, scientists, adventurers, and debutants, one comes to appreciate what has come before and how the world has evolved. Steel Fixture Manufacturing Company in Topeka, KS, protects this history by crafting airtight steel storage

containers for museums, courthouses, libraries and more. With its TRUMPF punching and bending machines, the company ensures the containers are manufactured with the utmost precision and care, preserving priceless artifacts for future generations. www.steelfixture.com