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VIVIAN BEER

Inspiring a new generation

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LINCOLN ELECTRIC

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ARC MAGAZINE

Publisher
Craig Coffey
publisher@arcmagazine.pub

Editor
John C. Bruening
editor@arcmagazine.pub

Associate Editor
Ken Krizner

Art Director
Maggie Ryel
design@arcmagazine.pub

Advertising Manager
advertising@arcmagazine.pub

Digital Media Manager
Rob Bruder
apps@arcmagazine.pub

Circulation Manager
circulation@arcmagazine.pub

Production Manager
Erin Abed
reprints@arcmagazine.pub

Photography
Jenny Ogborn
photos@arcmagazine.pub

Designers
Travis Lefelhoc
Karen Ludlow
Emily Rigo
Anthony Schneider

facebook.com/LEArcMedia

@LE_ArcMedia

CONTRIBUTORS

Peter Chakerian **Writer**

Peter Chakerian is an award-winning writer, author and journalist whose work has been featured in dozens of publications across the country. His 25-year career has earned him several awards, including "Best in Ohio" nods for online journalism by the Ohio Society of Professional Journalists. A regular contributor to *The Plain Dealer* and Cleveland.com, Chakerian covers dining, nightlife, popular culture, features and entertainment for Northeast Ohio. He is the author of four books.

Karl Hoes **Instructor**

Karl Hoes has been a welding instructor at The Lincoln Electric Company since 2003. He has taught many aspects of the welding school curriculum, including basic and advanced motorsports classes. He has trained welders and instructors at multiple welding schools and national union training programs across the country. Karl is a Certified Welding Inspector/ Educator (CWI/CWE).

Jimmy DiResta **Fabricator**

Jimmy DiResta is a New York-based artist, designer, master builder and video producer. His work has been showcased on Discovery Channel, HGTV, DIY and FX, as well as YouTube. His goal is to educate and inspire people to embark on their own home projects in an entertaining way. His unique builds are comprised of many different materials and processes. With his artisan skills and a shop full of power tools, he lets the build process speak for itself.

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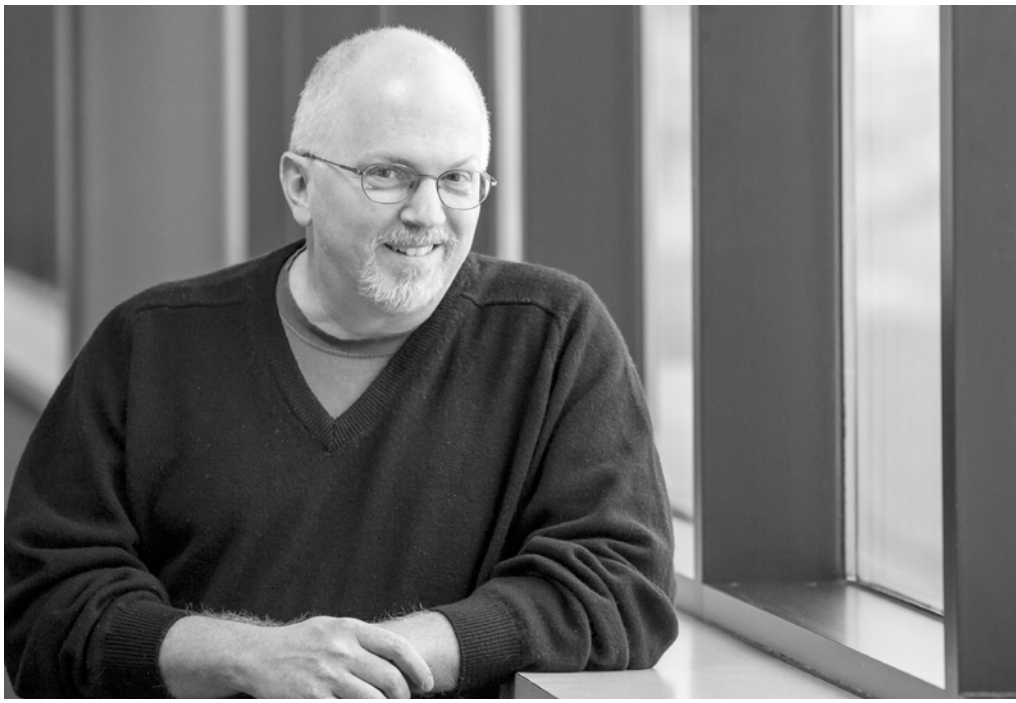
LETTER FROM THE EDITOR

Back in the Saddle



Since we began publishing early last year, we've received a lot of great feedback – praise, constructive criticism, insightful commentary, interesting story ideas and more. We welcome the input, so please keep it coming!

We occasionally get a letter that tells an interesting story. One of these came from Michael "Mick" Stewart in Graettinger, Iowa. Mick and his wife live on 200 acres of farmland, and he manages a portion of the land with the help of two local teenage boys. For the past three years, he's been mentoring the boys in his shop, teaching them welding, drill-press operation, equipment maintenance and repair and more. In addition, he's taught them how to operate tractors, skid-steer loaders, chain saws and other farming equipment.

The local school system has few resources to teach these kinds of skills to students, but Mick has made it his personal mission to take a couple kids under his wing and show them the ropes.

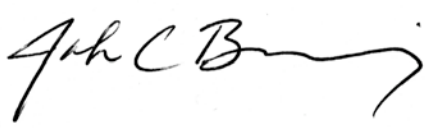
He does all this despite the fact that he's a partial paraplegic. Formerly a power lineman in Alaska in the 1970s, he crashed his four-seater airplane in 1976 and lost the use of his legs from the knees down. After the accident, he went back to school and transitioned to a career in electrical engineering. He retired in 2000 and returned to his hometown of Graettinger, where he currently uses crutches to get around his shop and the farm.

Mick was an avid motorcyclist prior to his accident, and he's anxious to get back in the saddle. He's interested in building a sidecar for his BMW R75/5 that would give the bike some additional stability to compensate for his disability. "I want to get back to riding," he writes. "Any ideas on some plans to help me build a sidecar would be a great help."

Mentoring has always been a crucial part of the welding trade. It's one of the most direct and personal ways to pass along knowledge to the next generation, and it's especially important as the existing pool of welders and fabricators continue to age out of the workforce. We've explored the topic of mentoring in the past, and you'll see it in this issue as well, with stories about educators like Vivian Beer and Emily Pilloton.

Mick Stewart is another one of those stories. Despite his disability, he's committed to doing what he can to teach some important skills to a couple kids in his community. Conversely, there may be folks in the welding community who can step up and give Mick a hand. If you send your ideas or suggestions for his sidecar projects to us at **editor@arcmagazine.pub**, we'll pass them along, or you can contact Mick directly at stewartm@rvtc.net.

ARC Magazine strives to be, among other things, a forum for information exchange as a new generation takes shape in the trades. The communication channel is always open, so don't hesitate to get in touch.



John C. Bruening, Editor-in-Chief
editor@arcmagazine.pub

We reserve the right to edit responses for the sake of grammar, appropriateness and/or available space.

WE WELCOME YOUR FEEDBACK!

Please include your mailing address. If we print your letter, we'll send you a free Lincoln Electric baseball cap or *ARC Magazine* t-shirt!

CORRECTION: The Master Class article in our Summer 2016 issue, "The Advantage of Silicon Bronze Filler Metal," contained an error. When preparing to braze with silicon bronze, the welding equipment should be set to DC- polarity and not DC+ as mentioned in the article. We regret the error.

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ASK THE EXPERTS

Welding experts at Lincoln Electric answer your questions about equipment setup, processes, techniques, safety and more.

Looking for guidance with technical issues? Contact us at
questions@arcmagazine.pub

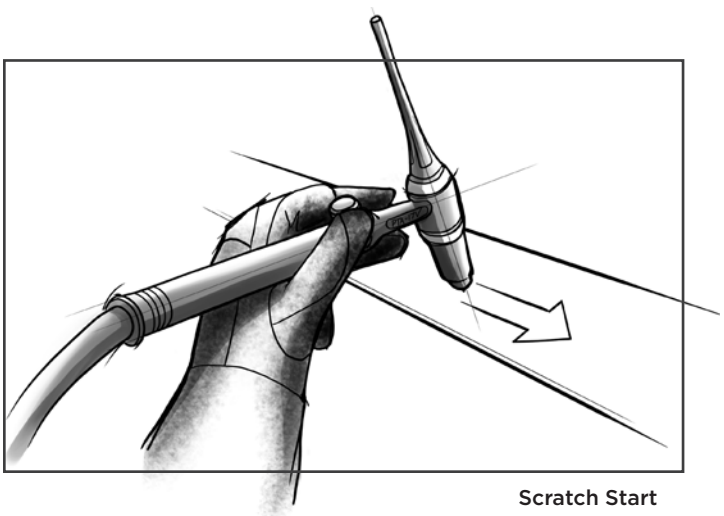
I'm trying to select the right TIG machine. Can you help me understand the difference between Scratch, Touch and High-Frequency arc starting?

- Jack Hunter, Union City, NJ

As your question suggests, there are three basic ways to initiate a TIG (gas tungsten arc welding) arc: scratch, touch and high frequency.

Scratch starting is usually used on material containing iron, like steel and stainless steel. To initiate the arc, use a sweeping motion to make contact with the metal (similar to lighting a match). It's also important to note that the electrode is electrically hot at all times when scratch starting.

There are some drawbacks to scratch starting, though. The first is contamination at the beginning and end of the weld. There can be a tendency for the tungsten to stick to the base material (especially when the proper starting technique is not used), which can lead to tungsten inclusions. At the end of the weld, the arc is broken by pulling the torch back and rolling it to interrupt the welding circuit. When this is done, the gas coverage on the molten puddle is lost and oxidation occurs. Finally, there is no control over the amperage when scratch starting. If the machine is set to 120 amps, for example, it will run at 120 amps throughout the weld.



Scratch Start

IF YOU HAVE QUESTIONS ABOUT WELDING, HERE'S YOUR CHANCE TO GET CLARITY.

Submit your question to questions@arcmagazine.pub, and be sure to include your full mailing address. If we use your question, you'll get a FREE Lincoln Electric baseball cap or ARC Magazine t-shirt. Feel free to submit more than one question, but please be specific; the more details you provide, the more likely we are to use your question.

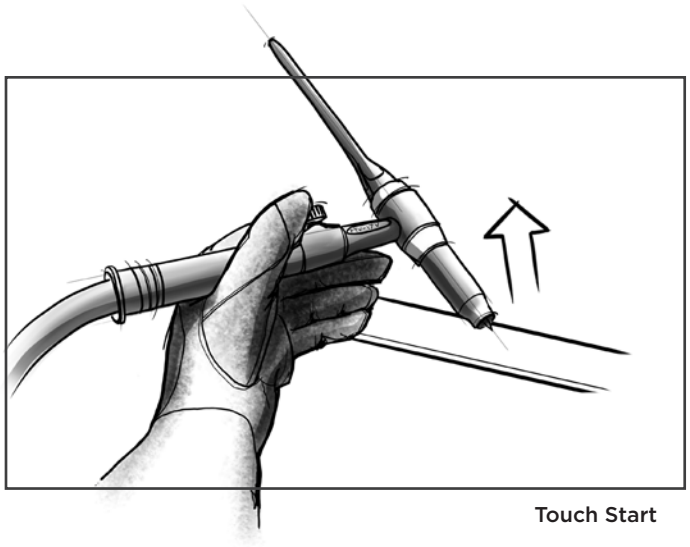
Touch starting (also known as lift starting) is not the same as scratch starting, but the terms are often mistakenly used interchangeably. Like scratch start, the tungsten is in contact with the metal — but that is where the similarities end. When touch starting, the tungsten is placed on the base material prior to activating the amptrol. Until the amptrol is activated the tungsten is not electrically hot and will not strike an arc.

When the pedal is pressed, lift the torch up to initiate the arc. Touch starting uses a lower open circuit voltage (OCV), meaning the equipment uses a very low voltage output until it realizes it has made continual contact with the work piece. Once lifted, the equipment will shift to a higher voltage output as the tungsten leaves the surface of the work piece. This preserves the tungsten points and creates little contamination. Because of the amptrol, users can control the amperage with touch starts.

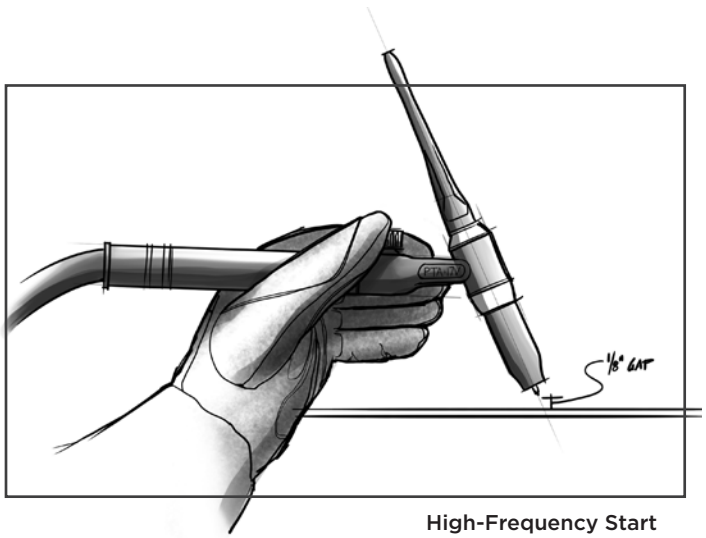
High-frequency starting is a touchless method of arc starting. The tungsten should be held about 1/8th inch off the material. If equipped, make sure the power source is set to HF TIG or the toggle switch is set to high frequency. If a foot pedal is used, make sure to switch to remote so you can control the current. As you step on the foot amptrol or press the hand amptrol, the arc will jump the gap and initiate. There is little risk of contamination (tungsten inclusions) at the beginning of the weld, and there is no contact between the tungsten and base material. The gas flow (preflow) begins before the arc initiates and continues to flow once the amptrol is released and the arc is terminated. Post-flow will then continue, allowing the gas flow to protect the weld puddle.

This form of arc starting is very good for beginners, as it has the least amount of risk when it comes to tungsten contamination. Machines capable of high frequency are good for projects that require high-quality welds.

- Charles A. Lariche, Lincoln Electric Weld School Instructor



Touch Start



High-Frequency Start

Illustrations by Jeremy Lacy

VIVIAN BEER BLAZE A TRAIL OF SUCCES

By Peter Chakerian | Photography by Jenny Ogborn

The winner of *Ellen's Design Challenge* pursues her passion with her metal-making designs—and seeks to inspire a new generation.

ART & DESIGN have long been a calling to Vivian Beer. Yet it was her strong affinity for interdisciplinary education and experience in metalwork – specifically in casting and fabrication – that put her on the road to becoming a household name.

The Manchester, New Hampshire, resident and namesake CEO of Vivian Beer Studio Works is described as fearless, and the description is apt. She was the grand prize winner in the second season of HGTV's series, *Ellen's Design Challenge*, scoring the program's $100,000 prize, largely through her intrepidly creative approach to fabrication and metalworking skills.

Long before her victory, she was already well known – and well received – in the art world. Her metal handiwork is included in the collections of the Renwick Gallery (Smithsonian American Art Museum, Washington, DC); The Museum of Fine Arts (Boston); The Brooklyn Museum of Art (Brooklyn, New York); The Metals Museum (Memphis, Tennessee); The Currier Museum of Art (Manchester, New Hampshire); and the Museum of Arts and Design (New York City), as well as public art in Portland, Maine; Cambridge, Massachusetts; and Arlington, Virginia.

Beer is riding a wave of success, but with success comes responsibility. She is a mentor and role model to new generations of women metal art enthusiasts, giving time and counsel to those who seek her out. This type of guidance was simply unavailable when she was up and coming two decades ago.

She is a leader in her field and has already inspired the next generation through her innovative use of industrial materials. She and her work are proof that metalwork and fabrication have nothing to do with gender and everything to do with talent.

METALWORK IS HER CALLING

To talk with Beer is to understand that metalwork is her singular, driving passion. It's as obvious as water is wet. "I love metalwork," she says. "I think I've always been attracted to it and attracted to making things at a very early age. I chalk that up to a rural upbringing, which really lent itself to that."

She attended the Maine College of Art in Portland, where there was a lot of very traditional arts training — painting, photography, printmaking, etc. But she found her calling in casting and fabrication. "I was in love with metal the minute I touched it," she stresses. "I think that sort of arrival at a favorite medium happens a lot with artists and people involved in the making community."

Beer loves the resistance that comes from fabricating hollow forms mainly with a hydraulic press and a series of forming dies that she engineers herself. "In my mind, metal is clay with the right tools, but with an even better personality," she points out. "Metalwork is unforgiving. Don't get me wrong, as an artist I truly love ceramics, too. But clearly [clay] doesn't fight back enough to jibe with my personality. Metal provides me with the reciprocity and battle I look for."

Her design aesthetic spans many subjects and inspirations, ranging from car culture and mid-century transportation to women's fashion and aviation. "So many human needs are addressed with the 'planes, trains and automobiles' of transportation, as they say," she notes. "Sure, it's about efficient, 'point A-to-B travel,' but also this lofty need for speed and momentum in life, being 'up to speed' and moving forward – the underpinnings of American society.

"To link the luxury to seek and search for those things, taking these very traditional masculine elements as we see them and adding the fashion feminine to it in a mashup — that's where I see my pieces come together," she believes. "In my mind, a lot of it boils down to communication, too. Without copper, we couldn't even talk to each other. Using metal to communicate ideas feels organic and natural to me. It always has."

Beer is successfully bridging the divide between the art world and everyday life. Her work is becoming a functional part of the tapestry of the culture at large. She creates objects that have both craft and art rigor, but they also have the industrial form and function that allows them to live and breathe in everyone's kitchen or living space.

Since her *Design Challenge* win, Beer's work has been in particularly high demand. Outside of the "high-end products" she is currently creating, Beer is exploring avenues opened through the *Design Challenge* audience to make affordable, functional goods — ranging from bowls and pendant light fixtures to all manner of living and dining furniture.

HER WORK IS HER ESCAPE

What constitutes a typical day in the creative life of Vivian Beer? That depends on the day, and the days lately have blended together. "I'm so incredibly busy; good thing I'm a coffee fan," she jokes.

Top: Vivian welds a bronze desert bench. Bottom left: Amanda Kressler grinds a pattern piece. Bottom right: The team builds a low-rider chair (top); taking time out on a completed public art commission (middle); concrete, steel and stainless steel raindrop stool and low-rider chair, waiting to ship out (bottom).

Stepping Up to the *Design Challenge*

Vivian Beer was the Season Two winner of *Ellen's Design Challenge*, HGTV's furniture design competition created by daytime talk show host Ellen DeGeneres to showcase undiscovered furniture designers.

Beer, who was one of 10 designers when the season began, received a cash prize of $100,000 for winning the competition.

"It's been such an incredible journey, but I always strive to make better and better work," she said after being chosen as the winner on the show's season finale.

One judge commented that Beer's design was "beautifully sturdy, whimsical and very original."

Ellen's Design Challenge features designers who undertake the challenge of sketching, designing and building extraordinary pieces of furniture that are placed in the greenrooms on DeGeneres' talk show, *Ellen*.

"This show is a launching pad for new designers," DeGeneres says. "Vivian's unique take on making furniture was really what stood out and made her this season's winner."

First small steps: Vivian creates scaled-down models of her projects before diving into full fabrication.

"I'm not even sure we'd be talking if I didn't properly caffeinate first."

She's practically working around the clock on different projects, putting in four full days in the studio and filling out the rest of her time with other design work and business-related tasks. "I love all of it, and try to do what I can to stay balanced," she insists.

Between product design work, commissioned pieces, collegiate/technical school talks, residencies and visits — including a glassworks residency in Seattle — along with her impending virtual YouTube channel of sorts, Beer says she is finding it "normal to be planning a year or two out," with some work stretching into 2018.

BREAKING DOWN BARRIERS

The art world has "a rather small group of enthusiasts" who are into metalwork. Beer sees her newfound celebrity as an "important responsibility to those people" and others who are considering pursuit of metalwork as a means of study or vocation. She also sees it as a means to reach people who may not be at all familiar with the metalwork culture. Most importantly, that includes women.

"The gender question has been around for many years, and it's true that there weren't a lot of women working in the field when I started," Beer recalls. That was 16 years ago, when she was getting started in architectural blacksmithing fabrication — doing fences, railings, architectural lighting and so on. Back then, there weren't many workshops, hammer-ins or blacksmiths that were well-attended by women. It really was predominantly a man's world. "I didn't have one female mentor in my formative years – not one," Beer remembers.

But that's changing, and Beer is doing her part to make sure it's more than just a trend.

She teaches workshops at various locations nationwide, as well as at craft schools – Penland School of Crafts in North Carolina and Anderson Ranch in Colorado – with regularity.

"I do a number of different [programs] around the country," says Beer, adding that the schools span different programs

— large-scale metals, sculpture and blacksmith-oriented. “I plug in as someone always running a fabrication class, because I tend to get really diverse demographics. Women, of course, but also some older men, designers, sculptors, furniture makers — lots of cross-creative fields are attracted to hollow-forming and welding because there are a lot of applications.”

Because Beer makes furniture, she tends to get a lot of younger folks interested in furniture design but has had students upwards of age 70, including a retired car enthusiast and racer who loves the automotive side of the craft. The cross-section also spans professional to hobbyist, with the gender split in her workshops standing at an even 50-50.

INSPIRING THE NEXT GENERATION

Today, Beer serves as a mentor for a new generation of women entering the trades. She maintains regular connections with many of her female students and interns that she’s worked with for more than 10 years.

Former students and current studio interns Olivia Juarez and Amanda Kressler planned to be with her through the summer. Former students Hannah Vaughan and Sophie Glenn have kept regular professional relationships going for several years.

“It’s a blessing and good luck to have met Vivian when I did,” says Glenn, adding that she sees Beer as someone who taught her everything she knows. “I acquired so much working knowledge from her.”

Vaughan agrees, indicating that her metalwork classes with Beer helped her transcend “being stale and stuck in the wood furniture medium,” and opening her eyes to sheet metal forming through what she says ultimately became “10-hour paid immersion experiences.”

What began as a teacher-student relationship evolved into best friends over a “come-work-for-me conversation,” with welding as a mutual passion, Vaughan notes.

Beer says there’s a broad assortment of inquiry and communication that happens in those relationships, “ranging from ‘What kind of slip roller should I buy?’ to much more complex questions about the designer-maker movement, where craft and art meet design.”

Many of the relationships she has maintained with former students have transcended mentorship/apprenticeship to friendships that double as recurring internships.

“That’s the true beauty of the craft schools,” Beer insists. “It is somewhat outside of the formalized educational system. It can really be anyone sitting across from you. And it often is, and even better when, so many years later, that connection is still strong, vibrant and foundational.” **ARC**

Vivian and her team:
Amanda Kressler (standing, left),
Olivia Juarez (seated, left),
Hannah Vaughan (seated, right).

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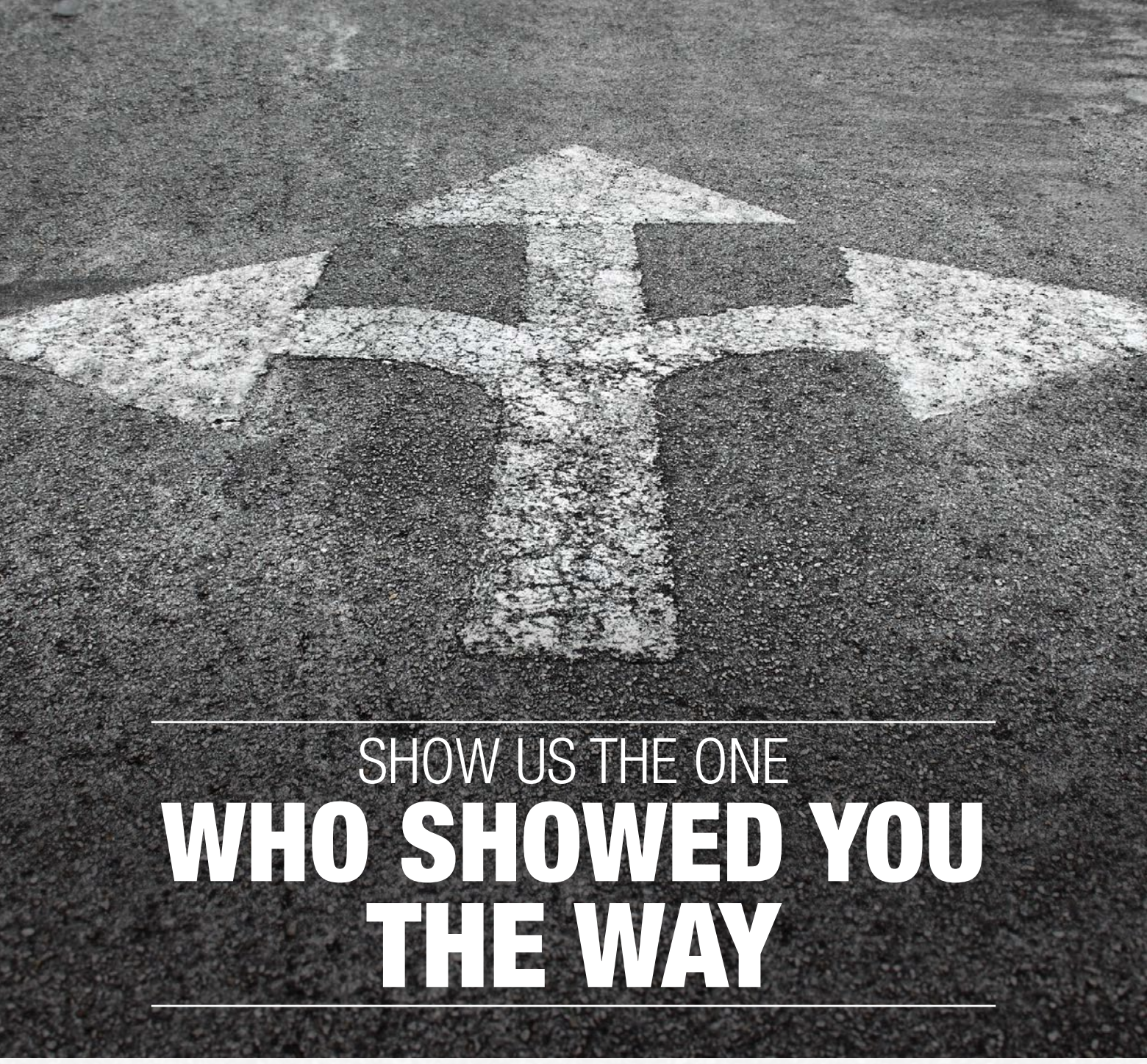

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Before embarking on the actual sculpture, Cramer tested his design in miniature scale.

Photography by Jenny Ogborn

Behind the Sculpture: Penn State's stainless monument to healing and hope

Artist and sculptor Jonathan Cramer, Penn State University class of 1994.

AS is the custom at Penn State University, alumni of the Class of 2013 made plans to provide a gift to the school, something to be enjoyed by future generations of students, faculty and visitors. What nobody knew at the time was that this gift would provide a path to healing from the wounds of the university's recent past by recalling a time when its football program acted with honor and integrity.

In the autumn of 2011, the Penn State football program was rocked by a scandal so egregious that its aftereffects were felt not only by the team and students of the university, but throughout the NCAA, the country and around the world. The crimes for which assistant football coach Jerry Sandusky was convicted had the collateral effect of forever tarnishing the reputation of storied and celebrated football coach Joe Paterno and the program that was his life's work.

In 2014, the alumni opened a design competition for a sculpture that would be prominently featured on campus. Among the entrants was noted metal sculptor and Penn State alumnus Jonathan Cramer (1994), who found the inspiration for his design in a largely unknown story that dated back to the segregated time of 1940s America.

"WE ARE! PENN STATE!" is a cheer heard during football games and other competitions that on its face seems so obvious that it needs no explanation. Cramer wanted to find the origins of the cheer. He discovered that in the 1970s, a group of cheerleaders got together and created the chant: "WE ARE! PENN STATE!" While an interesting tidbit of information, it was decidedly uninspiring. Cramer delved further into the history. What he uncovered was a deeper, more profound origin.

In the 1940s, football was far from immune to the fallout from racial segregation in the United States. In 1946, Penn State was invited to play at the

University of Miami, with the caveat that they leave their African-American players behind. Like most other southern schools at the time, Miami refused to compete against integrated teams.

The 1946 Penn State team had two African-American players on its roster, Dennie Hoggard and Wally Triplett. While the decision to play such a high profile game under Miami's condition could have been an easy one for the predominantly white team, captain Steve Suhey put his teammates to a vote. The result, as reported to the coach, was unanimous: "We are Penn State. We play all or none."

With that, the now-famous "WE ARE! PENN STATE!" cheer was born. Two years later, Penn State accepted an invitation to play in the Cotton Bowl and took its entire team, including Triplett and Hoggard, to Dallas, Texas. They became the first African-Americans to play in the Cotton Bowl. Triplett scored a touchdown as Penn State played Southern Methodist University to a 13-13 tie.

Both men would continue to make history. In 1949, the Detroit Lions made Triplett the first African-American selected in the NFL draft. Hoggard was the first African-American member of Lion's Paw, an honorary society that recognizes service to the university and extracurricular activities.

Armed with — and inspired by — the actual history of "WE ARE," Cramer created a unique, asymmetrical design that was at the same time abstract and literal, winning the commission. Now, the goal of transforming raw material into a 12-foot-high monument to healing and hope had to be realized.

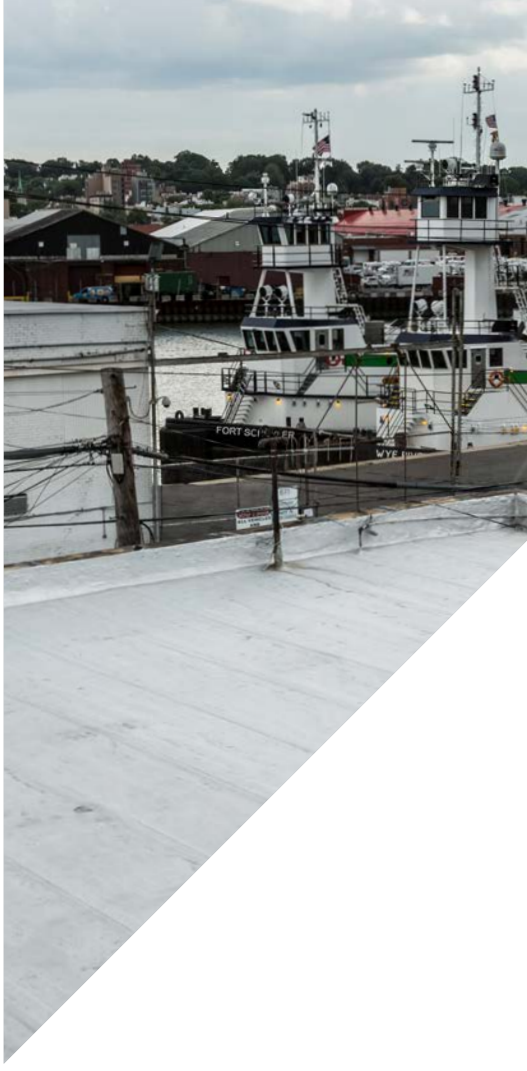
Cramer was no stranger to a commission of this scope. His prior works — including sculptures in New York City's Central Park, Jersey City, New Jersey, and Providence, Rhode Island — are prominent and moving features. The Penn State commission had its own distinct challenges, both in terms of scale and material. According to Cramer, "Steel is unforgiving. It's a slow process. It's a dangerous process," to coax an artist's vision from the raw material. Cramer's niche has always been the creation of geometric, abstract shapes which, when seen from different angles, appear differently, depending on the viewer's point of view.

This element of abstraction was as evident in the asymmetry of the WE ARE sculpture as its underlying intent — a counterbalance to the intense adoration that could be foisted upon sports heroes and programs. According to the artist, "It's a phrase! You can't worship a phrase." But Cramer says the sculpture makes people think about themselves in the context of humanity.

The challenges of the build were far less abstract.

Because of the not-always-happy weather in Happy Valley, where the campus is located, stainless steel was the obvious choice of construction material. Two-inch-thick slabs were sourced from a specialty mill in central Pennsylvania, not far from the university campus (Cramer insisted on American-made stainless steel).

Though Cramer describes stainless steel as "beautiful" and "incredible to work with," it expands and contracts at different temperatures because it is comprised of different metals. "If you want to create intense precision with stainless steel while welding, you have to take into consideration heat sink and wicking away the heat, especially if your sculpture relies on perfect angles," he says.



"WE ARE PENN S
WE PLAY ALL OR NO

Jonathan Cramer and Penn State legend Wally Triplett at the WE ARE sculpture dedication in October 2015. Triplett and teammate Dennie Hoggard are the inspiration behind the cheer, "WE ARE! PENN STATE!"

STATE.
ONE."

Cramer's WE ARE sculpture has become a focal point on the Penn State campus – a gathering place for students and alumni alike.

Photograph by Lisa Byall

Three individual components of the structure were cut in the artist's studio in Brooklyn, New York, where a team of welders, including the artist, undertook the arduous process of joining the pieces, including hours of welding 12-foot-long beads deep into the 2-inch-thick stainless steel.

Once welded, more than six months of hand polishing made the once dull stainless come to life, finally approaching the artist's vision.

Nothing about this process was easy or could be taken for granted. The size and scale of the individual pieces required special rigging, even anchoring them to the floor of Cramer's studio so they could be safely welded.

The sculpture was unveiled in 2015 with distinguished alumni, including Triplett, in attendance. (Hoggard died in 1985.)

Since its installation, the sculpture has become a touchstone to visitors to the campus and attracts tens of thousands of observers every year. It's not uncommon for dozens of students to climb onto the sculpture at one time, especially after a Penn State football victory. It has also become a popular spot for graduating students to be photographed after commencement and a place where some alums have even exchanged wedding vows. "It has taken on an incredible role on campus," Cramer points out.

The impact of the WE ARE sculpture can best be summed up by one of the men who became the inspiration of the phrase — Triplett. "Just a few words … there's always that … where just a couple of words and you say to somebody, with pride, "WE ARE! PENN STATE!" ARC

Watch exclusive footage at arcmagazine.pub or in the *ARC Magazine*™ tablet edition (download it for free).

The "WE ARE" story was first told as an ESPN Films' 30 for 30 Shorts documentary film series, which debuted at the Tribecca Film Festival in New York City in April 2016. It can be seen at espn.go.com/30for30/shorts.

BEGINNER TIPS & TRICKS

Make It Easier to Weld Your Workpiece.

GIVE IT A REST

– JONATHAN LEWIS, WOOSTER, OHIO

Sometimes, when there is quite a bit of MIG (GMAW) welding, the possibility exists that your glove can get caught at a particular spot, interfering with your pass. To keep this from happening, fabricate a U-shaped metal hand rest on wheels sitting on a track. By resting your hand on this device, you'll be able to move back and forth easily and weld without hindrance.

MAKE SURE YOU STOCK UP

– SUBMITTED BY DANNY ANDERSON, BREA, CALIFORNIA

When MIG welding, it's a good practice to keep a couple of welding tips on hand. Burn back and a plugged tip could mean the difference between working and not working.

Illustrations by Jeremy Lacy

HAVE A TIP OR A TRICK YOU'D LIKE TO SHARE WITH BEGINNERS? LET US KNOW!

Send us your tip or trick and we just might feature it in an upcoming issue!

Feel free to submit more than one tip, but please be as specific and detailed as possible. The more details you provide, the more likely we are to use your tip. Note: We reserve the right to edit responses for the sake of grammar, appropriateness and/or available space.

And ... if we do use your submission, we'll send you a FREE Lincoln Electric Welding Gear Ready-Pak®.

SCRAP IS NOT JUNK

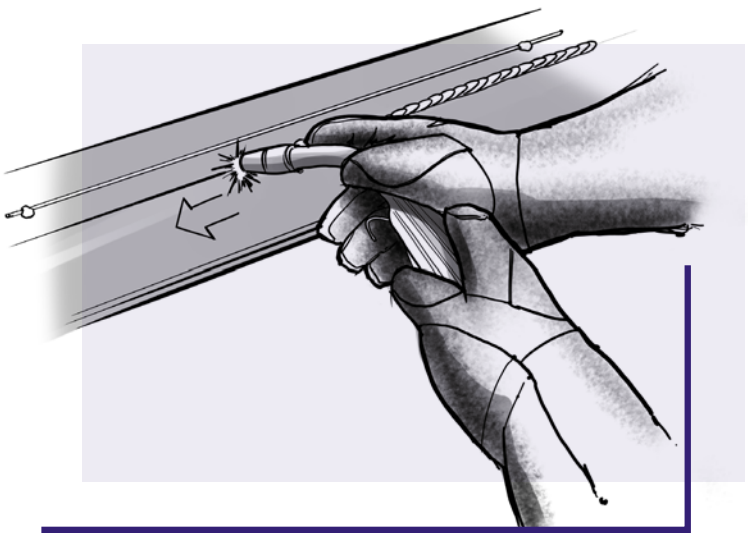
– SUBMITTED BY RICHARD BLACK, DALLAS, TEXAS

Save your scrap metal. Put any material you cut into a bin, because a suitable piece of scrap metal could be used as a patch in a future project.

A DELICATE TOUCH IS NEEDED

– SUBMITTED BY MICHAEL JOYCE, ORVILLE, OHIO

For the MIG beginner, don't hold the torch too tightly. You want to be able to make small position adjustments as needed, and it's much easier to do so if your torch hand and wrist are not locked into position because you're gripping the torch handle too tightly.



LONG DISTANCE RUNNER

– SUBMITTED BY CALEB ODELL, GALENA, OHIO

When practice welding with MIG, I find it useful to extend the wire to the length of my coupon, then cut and tack it to my workpiece. This will help you practice running a straight bead over long distances.

EDUCATOR SPOTLIGHT

EMILY PILLOTON

NEVER BORED, NEVER DONE

By John C. Bruening

Learning welding and other building and design skills is always a good idea. Learning them at a young age in a supportive, gender-inclusive environment – and putting them to use for the betterment of your community – is even better.

Emily Pilloton teaches all this and more. She's the founder and executive director of Project H, a nonprofit organization in the San Francisco Bay area that teaches design and building skills to grade school and high school students, and to educators as well.

Founded in 2008, Project H consists of three programs:

- Studio H, an in-school class for students in grades 6 through 12 at the Realm Charter School in Berkeley, California. Students apply their core subject learning to design and build socially transformative projects.
- Girls Garage, a program for girls ages 9 to 13 that integrates concepts of design, engineering and social justice to equip girls with the tools and confidence to build whatever they can imagine and give back to the community.
- Unprofessional Development, a teacher education initiative that brings project-based learning into classrooms through workshops and hands-on learning experiences for educators.

In addition to running the organization, Pilloton also teaches MIG and TIG welding in the Girls Garage program. Part of her motivation is to provide opportunities for young girls that didn't exist when she was in school.

A Northern California native, she describes herself as "a huge nerd about every subject" from a young age. In college and graduate school, she pursued architecture "as a field that allowed me to continue to be a nerd, but with the promise of building something real and significant."

But the promise was never quite fulfilled. Too often, the focus was on small-scale matters like plumbing fixtures and other minutiae, and not on the bigger picture. Thus Project H was borne out of a "frustration about what architecture could be for me and for kids who are like I was," she says.

To date, the program has completed 29 community design and architecture projects. Of these, 22 were built entirely by youth participants. These include a school library, farm stands, tiny homes for the homeless and furniture for a women's homeless shelter.

Erica Chu has been with Girls Garage since the sixth grade. Now almost 15 and starting her first year of high school, she works closely with Pilloton as a junior counselor.

"Emily is all about encouraging girls to do things that are typically guy-related," says Chu. "I don't necessarily use building and design skills in other parts of my life, but the thought that I can do these things makes me more confident about my ability to do other things that people don't think are for women."

Pilloton's mantra, "You're never bored and you're never done," pretty much sums up her philosophy. "Whenever a kid says, 'I'm bored,' I tell them, 'No, you're not. We don't know what that word means here.' The same thing with 'I'm done.' My response is, 'No, you're not. There's more to do.'" ARC

© Project H Design


"WHENEVER A KID SAYS, 'I'M BORED,' I TELL THEM, 'NO, YOU'RE NOT. WE DON'T KNOW WHAT THAT WORD MEANS HERE.'"
CONNECT WITH EMILY AND THE PROJECT H TEAM
@ProjectHDesign
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BUILDING AN OUTDOOR BENCH

By Jimmy DiResta

Nothing is more inviting than an outdoor bench. It says, "Come and sit. Relax. Forget about your cares for a minute or two." It's also where you can spend time on a beautiful morning with a cup of coffee or with a frosty beverage at the end of the day, relishing the peace and quiet of a night sky.

Constructing an outdoor bench with metal and wood is a relatively straightforward project for fabricators with basic skills and tools. Using your own choices for materials, any hobbyist can turn a simple design into a piece of furniture that will add to the décor and beauty of your property.

ARC

Watch exclusive footage at arcmagazine.pub or in the *ARC Magazine*™ tablet edition (download it for free).

© Jimmy DiResta

MATERIALS

4 feet of 2 x 4 16 ga. box tubing
30 feet of 2 x 2 16 ga. box tubing
16 feet of 1 inch 16 ga. flat stock
40 feet of 1 x 4 hardwood
¾-inch wood screws
Wipe-on polyurethane
Clear spray lacquer

WELDING/CUTTING EQUIPMENT

Lincoln Electric POWER MIG® 210 MP
Bandsaw with metal cutting blade
Bar clamps
Electric drill/driver
Angle grinder with abrasive disk

SAFETY FIRST

Before you start any project involving welding, make sure you have the right Personal Protective Equipment (PPE), which includes, at least, an ANSI-approved welding helmet, safety glasses, appropriate welding gloves for the process you're using, and a flame-resistant shirt, jacket, or sleeves to protect from UV rays and burns. You should also keep a fire extinguisher close at hand. Use adequate ventilation when welding. A properly approved respirator should be used whenever fumes may enter your breathing zone and general area.

Imagery © Jimmy DiResta

Step 1: Cut all of your frame pieces

Start by cutting all the pieces for the largest parts of the sub assembly — the seat and back frames — first. It's important to make sure the two short pieces and two long pieces of the seat frame match each other so you can keep your bench seat perfectly square. To create the correct tilt on the seat back, cut one end of each piece at a 6-degree angle where it will meet the seat frame. A cross member will sit in the lower portion between the uprights to add support. It will be shorter than the top rail and cut square on each end.

Step 2: Weld up the seat frame

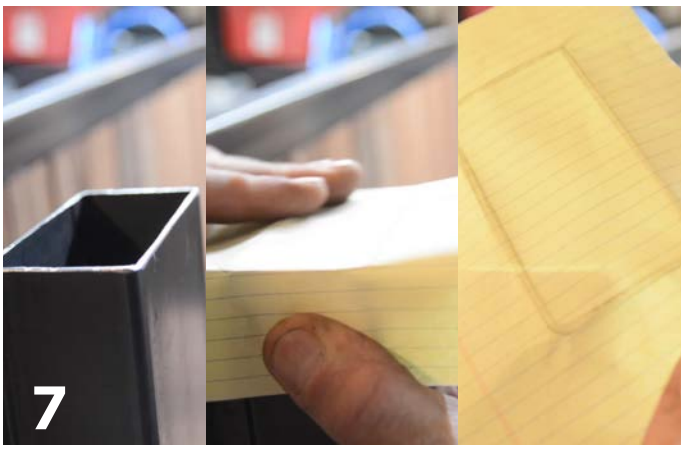
Tack weld the four pieces of the seat frame together. Check the diagonals and 90-degree angles to ensure that the frame is square. If the diagonals are off, a better fit can be had by gently persuading the frame with a dead-blow hammer or tapping the frame on the ground. Don't wait until after the final weld to square up the frame. At that point, it's too late. After you've ensured the frame is square, lay down your finish beads to bring the frame together and make it rigid. I like to grind my welds flat as I finish each subassembly, while I still have good access to the welds.

Step 3: Weld up the back frame

Using the seat frame as a guide, tack the two uprights and the top rail of the seat back frame together. Again, it is important to make sure that the back frame is level and square to the seat frame. At this point, you can set and tack weld your lower cross member into the seat back frame. While in the tack weld phase, continually check to make sure the frame doesn't twist. It will be difficult to untwist the frame after you've done your finish welds. Lift the back frame to where you want it and tack weld it into place. One you're satisfied with the placement of the back, proceed with your final welding and grinding (if needed).

Step 4: Front legs and armrests

Return to the chop saw to cut all the pieces for the legs and arm rests. Using clamps as needed, position the arm rests so they are parallel to the seat and perpendicular to the front legs. Once you're confident everything is squared up, tack weld both pieces into place, followed by finish welds. Repeat this process on the opposite side.



Step 5: Weld the rear legs to the seat frame, scribe and cut

My rear legs are 2 inches shorter than the front legs, because I wanted to give people sitting on the bench the impression that they're reclining. Tack the legs into place then finish weld. To get the best fit so the bench doesn't rock or wobble, set the assembled frame into the space where it will ultimately live and scribe each leg to the ground. As you can see in the video (see link), I didn't account for the slope of the sidewalk where the bench would go and had to use shims to compensate. Alternatively, you could use store-bought leveling feet.

Step 6: Support for the boards

Using pieces of ¾-inch wood as a guide, tack weld pieces of 1-inch-flat stock around the seat and back frames to act as supports for the seat and back slats. I used leftover wood from a prior job, so I bridged the short distance versus the longer one. If you decide to place your boards so they run parallel to the long side of the bench, you may need to add center supports. Drill holes into the flat stock and attach the slats with screws.

Step 7: Fill In the openings

To cap the open ends of the box tubing, I rubbed a profile of the bottom of the legs with paper and pencil to use as a template to cut out pieces of wood that will fit tightly into the openings. Once you've got a good fit, dab on a little two-part epoxy and tap them into place. You could also just as easily cut metal patches, weld them into place and grind them flush.

Step 8: Protect your work

If your bench is outside, you'll want it to withstand the elements. Use teak oil to help protect the wood pieces. Lacquer will help slow down rust on the metal pieces, though it won't eliminate it completely. If you've got deep pockets, you could build this out of stainless steel or even aluminum. A bench like that might even outlive you.

A detailed drawing and cut list for this project can be downloaded at **arcmagazine.pub.**

WINNING THE GOLD IN LARGE-SCALE ABSTRACT ART

By Ken Krizner

Olympic athletes work their entire lives with the singular objective of achieving greatness – and to stand on the podium with a gold medal around their neck in recognition of their accomplishments as the best in the world at what they do.

Sculptor Alexander Krivosheiw is also on a quest to be recognized as the best. Like Olympic athletes, he has worked his entire life to learn the skills of sculpting, fabricating and artistry to create large-scale abstract metal sculptures.

Krivosheiw's work has intersected with the Olympics. Thomas Bach, president of the International Olympic Committee (IOC), became familiar with his work and commissioned him to create "The President's Trophy," which Krivosheiw describes as an abstract bronze sculpture with five symbolic Olympic rings plated with a layer of 24-carat gold. "Each ring represents a part of an athlete's life, culminating in Olympic glory," he says.

Krivosheiw was on hand at the Summer Olympics in Rio de Janeiro, Brazil, in August to watch as Bach presented the trophy to world leaders and heads of state of the 50 nations that participated in the games. Bach also presented a "President's Trophy" to Jamaican track legend and nine-time Olympic gold medalist Usain Bolt.

With the Rio games completed, Krivosheiw will turn his attention to creating the trophy's large-scale counterpart.

Based on his "President's Trophy" design, Krivosheiw was commissioned to create a monumental polished abstract stainless steel sculpture. Destined to be installed in front of the new headquarters of the IOC in Lausanne, Switzerland, the sculpture will reflect off the waters of Lake Geneva and be visible from the French Alps.

Krivosheiw is no stranger to large-scale projects. Working out of his studio in West Palm Beach, Florida, he has fashioned a career out of bronze, aluminum and stainless steel abstract designs. He honed his fabrication and welding skills on aluminum, beginning at age 16. To earn money, he took fabricating and welding jobs. Eventually, he realized that he could connect his artistic skills with his fabrication skills to create large abstract sculptures.

He believes metal is an ideal artistic medium because of its integrity and longevity. It is intended to outlive its designers, sometimes by centuries. "The first metal sculptures were created by the ancient Egyptians, and we're still viewing those thousands of years later," Krivosheiw notes.

Now, Krivosheiw will use the artistry and fabrication skills he has spent a lifetime learning to create a sculpture for the IOC that he envisions standing the test of time. "It will be viewed for generations," he says. ARC

Opposite page: Alexander Krivosheiw, left, presents his design, "The President's Trophy," to Thomas Bach, president of the International Olympic Committee. Right: Years of sharpening his fabrication skills has helped sculptor Krivosheiw to create large-scale abstract metal designs.

@alexander.krivosheiw
alexandersculptures.com

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ARC MAGAZINE

Master Class

A discussion of advanced materials and techniques for the seasoned welder.

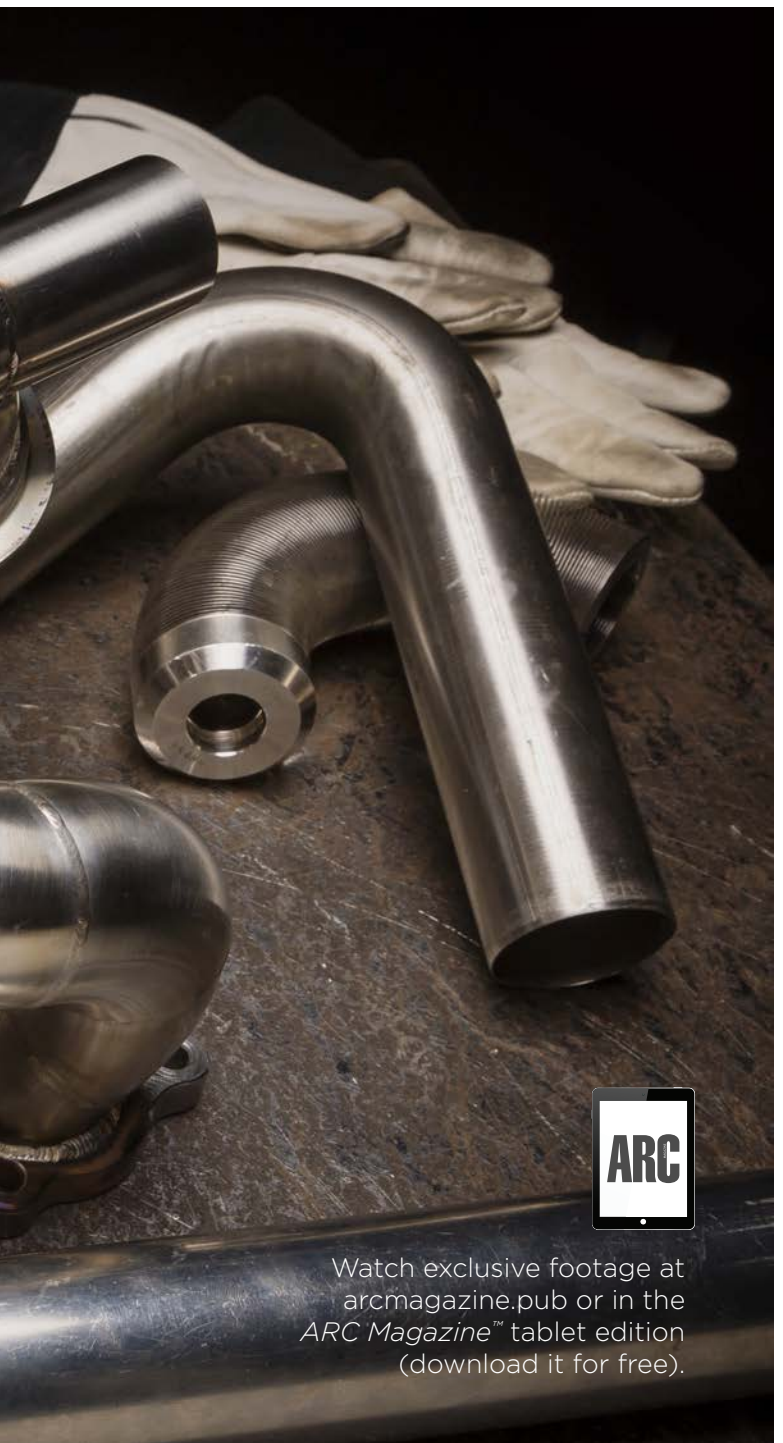
PRACTICAL ADVICE ON WELDING WITH INCONEL

By Karl Hoes, Welding School Instructor, The Lincoln Electric Company

Inconel™, a nickel chromium-based alloy, is becoming a favorite metal choice for the fabrication of high performance exhaust systems. It has excellent high temperature properties, allowing for a much thinner wall thickness.

The use of nickel alloy 625 (UNS N06625), commonly referred to as Inconel,™ is on the rise in the racing industry, specifically for the fabrication of high-performance exhaust systems. This nickel chromium-based alloy is sometimes identified under Aerospace Material Specifications.

There are a variety of different nickel-based alloys that fall under the Inconel name. They have all been extensively used in different industries because of their resistance to many types of severe corrosion and ability to withstand elevated temperature service.



Although nickel alloys are expensive and typically cost considerably more than stainless steel, the use of the 625 alloy is increasingly prevalent in the high budget motorsports industry because of its excellent high-temperature properties. This allows for much thinner wall thickness, which often reduces the weight of exhaust systems by half. Specialty exhaust system fabricators typically purchase the material in sheet form and use automated equipment to form and weld the tubes to the required diameter and thickness.

The wall thickness of nickel alloy exhaust components varies typically from 0.019 inch to 0.035 inch, but can run thicker for certain applications. Special heavy-duty mandrel benders are capable of making smooth tight radius bends. Shops specializing in this work sell the components to fabricators who build their own exhaust components and systems.

Thin-alloy 625 exhaust systems are usually joined by TIG (gas tungsten arc) welding. Aside from having a somewhat more sluggish or less fluid weld puddle, the alloy welds similarly to that of the 300 series of stainless steel. Both have low thermal conductivity and require less heat input to weld than carbon steel of the same thickness. Also, a nickel alloy tube, like stainless steel, needs to be purged with argon inside the tube (see our Master Class article on purging in the Fall 2015 issue of *ARC Magazine* for details).

A rule of thumb for optimum current settings for carbon steel is to use about 1 amp for every 0.001 inch of material thickness. When welding nickel alloy 625, as well as the 300 series of stainless steel, drop the amps by about 20% off of this rule. In general, try about 22 amps on 0.028-inch thickness material and adjust the current as needed with the remote.

One of the most important rules to successfully joining all nickel alloys is to thoroughly clean the base metal of all contaminants before welding or exposure to elevated temperatures. Some contaminants can lead to a loss of corrosion resistance and cracking in the welds or base metal. Sulphur, carbon, phosphorous, lead, zinc, copper and shop dirt are all known to cause problems. These contaminants can come from lubricants used in the secondary forming and cutting operations, marking crayons, paint sticks, ink, lay out dye, lead hammers, copper chill bars, etc. Fabricators should only use stainless steel wire brushes and abrasive disks that have not been in contact with iron or steel to clean nickel alloys.

Make sure to select the appropriate filler metal diameter to avoid excess amperage requirements needed to melt the thicker filler metal. A matching filler metal for joining alloy 625 is ER NiCrMo-3 (Techalloy® 625). It can be used to join 625 to stainless and carbon steel.

Avoid concave weld profiles and craters at the end of welds as they can be susceptible to hot cracking. ARC

Prepping for the October Classic

September 1939 — A worker from J.F. Harig Co. welds a section of the right-field seating pavilion at Crosley Field, home of the Cincinnati Reds from 1912 to 1970. The work on the pavilion was done in preparation for the upcoming World Series between the Reds and New York Yankees. Alas, the Reds fell to the Yankees in a four-game sweep during the first week of October, but they bounced back a year later and beat the Detroit Tigers in the 1940 Series. The pavilion remained a fixture at Crosley Field until the Reds' final game at the park in the middle of the 1970 season. Crosley was torn down in 1972.

Have any vintage (pre-1975) photos you'd like to share? Email them in jpeg format to editor@arcmagazine.pub with a date the photo was taken (actual or approximate), a brief description (three or four sentences), and an email address where we can reach you for additional information.

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