ARC MAGAZINE

Summer 2016 | **arcmagazine.pub**

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Handbuilt Motorcycle Show
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A Vital Shop Accessory from DIY Expert Jimmy DiResta

Steve Darnell
Gets to Work

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WHO SHOWED YOU THE WAY

Chances are, you didn't learn how to weld all by yourself. Somewhere along the way, there was that one person who inspired you, showed you the ropes, set you on the path. And whether that person knew it or not, he or she probably changed your life.

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ARC Magazine has launched a new editorial section to spotlight welding educators. We'll feature a different "teacher" in each issue who is doing or has done their part to introduce the art and craft of welding to a new generation. We're counting on you to help us find that person. Maybe it was someone at your high school. Maybe it was at a trade school or in a college program. Maybe it was a parent, grandparent, neighbor or friend. Whatever the case, we want to know about that man or woman who opened your eyes to the world of welding and metal fabricating.

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We want to tell the story of how gifted educators are changing the world of welding, one student at a time.

If your submission looks like a good fit for an upcoming issue, we'll contact you for more information.

ARC

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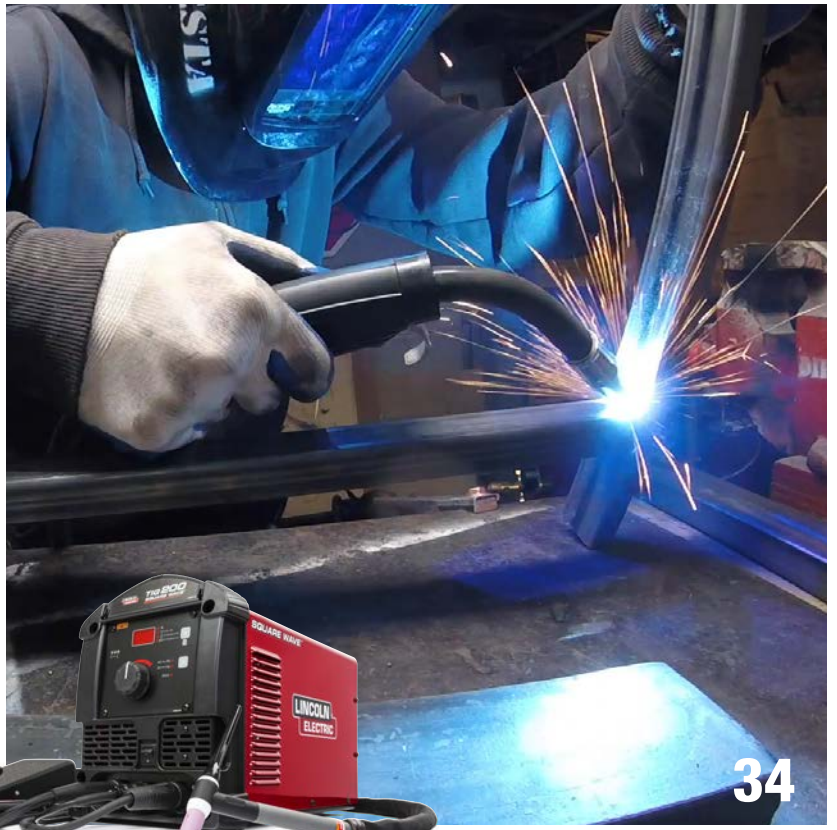

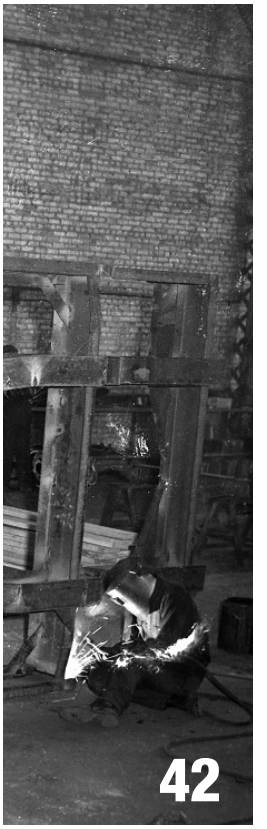

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Ken Krizner
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Jimmy DiResta
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LINCOLN ELECTRIC

DEAR EDITOR: After *The Stabilizer* came to an end several years ago, I was overjoyed to see Lincoln Electric introduce *Arc Magazine* in 2015, and I have enjoyed each issue. However, what's missing in the new magazine is the section in *The Stabilizer* where welders submitted pictures and/or plans of what they'd made. More times than not, these projects were all made from salvaged materials and/or scrap. The Project Spotlight section that included a step-by-step on how to make a railing was okay, but I would have rather seen a handful of project submissions – things we could build to make what we do easier, or something we could use at home or in the shop. These might include things like welding tables, welding carts, any shop accessory, truck welding rigs, or BBQ grills and smokers. I'd much rather see 10 projects from my fellow welders than any of the projects I've seen from *Arc Magazine*.

The section where you highlight one individual or company in each issue is interesting, but this is a magazine for welders about welding and the building trades. So when you highlight someone, whether it be Jessi Combs or Nick Offerman, I'd really enjoy a portion of that article to include an in-depth look into their shop layout, what makes their shop work for them and why. Just as important would be an overview of their favorite tools, jigs or rigs that they just couldn't do without, whether they were purchased or made in the shop. Forget about the fluff. Put us inside their shop and give us a feel for their tools and what they do with them. This is all about learning from one another and being better because of that unique interaction.

Don't get me wrong. I'm glad to see Lincoln Electric bring back a magazine for welders, but the reader project submissions were the best part of *The Stabilizer*, and it's what I miss the most. And I must say I love the Ask the Experts section, with Lincoln answering real-life, everyday questions. It can only make us all better and safer at what we all do.

Mike Gott, Alexandria, VA

Thanks for taking the time to share your thoughts, Mike. I agree that the ability to share projects and plans would be a great addition to the magazine, and we are considering adding that as a feature. As you can imagine, the variable nature of the projects we might get can be a little unnerving for a publication that has to work toward a deadline, but we are in the process of making changes to the website for *ARC Magazine* to allow for just this type of reader-contributed content, from which we hope to be able to cherry-pick the best projects to share in the printed version. Please stay tuned.

Regarding our cover stories on personalities within welding and the trades, one of the things *ARC* strives to do is attract new practitioners to the trade, as well as be a forum for folks like you who are already immersed in it. We're always looking for ways to show welding as an attractive, viable, rewarding career, hobby or craft. It's not intended to be a deep dive into the details, and we would be greatly limited in our ability to seek personalities to cover in *ARC* if that was our goal. Your characterization of *ARC* as "a magazine for welders" is spot-on, but it's for the welders of the future as much as the welders of today.

Keep the comments coming. We would love for you to contribute to the Tips and Tricks section with any of the jigs, tools or rigs you've developed over the years, or just good advice for the up-and-coming welder.

– Craig Coffey, Publisher

DEAR EDITOR: I'm only a hobby welder who restores a few old cars and motorbikes, but I've thoroughly enjoyed your publication – especially the Spring 2016 issue. First came the great interview with Nick Offerman, followed by the terrific Vocations series, which included one of my heroes, Jeremy Cupp! Jeremy is the real deal, and exactly the kind of person Mr. Offerman talked about in his interview – smart, talented, mentoring and making a living doing what he loves.

David Bradley, Quinton, VA

Glad you're enjoying the magazine, David, but don't sell yourself short by describing yourself as "only a hobby welder." Weekend warriors like you bring a lot of fresh, creative energy to the welding and metalworking trades. Keep up the good work!

– John C. Bruening, Editor

> "...when you highlight someone, I'd really enjoy a portion of that article to include an in-depth look into their shop layout..."

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!

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

CORRECTION: In the Ask the Experts section of our Spring issue, a reader submitted the following question: *What would be the proper amperage and voltage to weld F22 material using GTAW and FCAW processes?* We've since learned that the answer we provided was incorrect. Mike Barrett, Application Engineer at Lincoln Electric, sets the record straight with the response below. We apologize for the error.

ASTM A182 Grade F22 is a 2.25% chromium/1.0% molybdenum low-alloy steel. When welded to itself or other Grade 22 materials, a consumable with a matching chemistry should be used. The correct consumables should have the AWS chemistry designator –B3 in the AWS classification. Lincoln ER90S-B3 (AWS ER90S-B3) TIG-cut lengths and Cormet 2 (AWS E91T1-B3C/M-H4) gas shielded flux cored wire would be the appropriate consumables to weld this material. The recommended current range for making the TIG weld with a 3/32-inch (2.4mm) diameter filler rod is 75-140 amps and 90-160 for an 1/8-inch (3.2 mm) diameter rod. Typical operating parameters for the Cormet 2 gas shielded flux cored wires are 155-175 amps and 25-27 volts. Preheat and interpass temperatures are usually 300°F (150°C) minimum and 600°F (315°F) maximum. The welding code being followed may list specific preheat and interpass temperatures for this material.

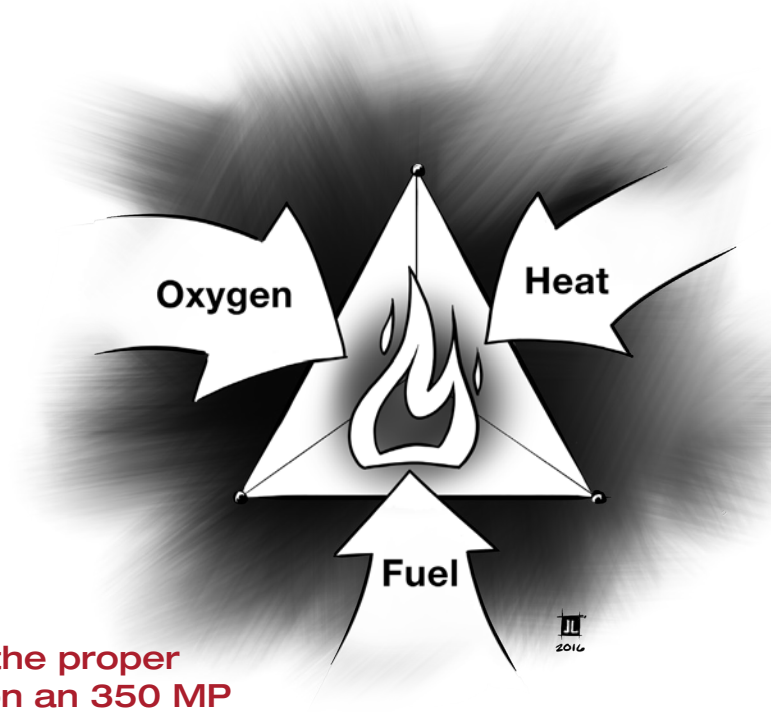
ASK THE EXPERTS

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 a student, and I'm currently learning about polarity. Can you discuss the different polarities and which is most appropriate for different welding processes. For example, flux-cored welding is usually done in reverse polarity. TIG welding aluminum is generally done using AC. TIG welding steel is done using DC. Can you talk about how the different polarities relate to different processes?

Rob Fitzgerald, Des Moines, IA

Different polarities are used for different processes to achieve a variety of results: stable arc, control of penetration in the weld joint, strength, oxide removal, etc. The variables that control the arc in each process will change depending on whether you're using stick electrodes, self-shielded flux-cored electrodes, gas-shielded flux-cored or other processes or types of electrodes. One of the biggest differences in how the process relates to polarity is in the transfer of metal across the arc. For example, there is no metal transfer across a TIG arc, but there is a metal transfer across a stick, MIG or flux-cored arc. See the electrode manufacturer's product information for their polarity recommendations.



What is the proper setting on an 350 MP for pulse-on-pulse welding of 3/16 6061 aluminum using 3/64 4043 wire. Where can I find a chart of recommended start settings?

Brian Donovan, Address not Provided

For best results, start with the following settings and adjust as necessary: Mode: 99. Wire feed speed (WFS): 320 inches per minute. Voltage: 22-23. Use 100% argon gas. Stickout or CTWD should be ½ inch. Generally speaking, pulse-on-pulse works better when welding thinner aluminum. For more information about proper settings for the MP 350 – or any other Lincoln Electric machine – check out the Weld Parameters App from Lincoln Electric. It's available via the App Store on your iPhone or Android device.

What is the fire triangle and how does it relate to welding?

John Hindel, Chicago Ridge, IL

The "fire triangle" or "triangle of combustion" is a safety concept that pertains to more than just welding. It's a reference to the three elements that – when they occur simultaneously – are likely to cause a fire: oxygen, a fuel source (something that will burn) and some form of ignition (the welding arc, an open flame, matches, friction, etc.). If you're working in an environment where fire prevention is a high priority – such as welding – it's important to eliminate at least one of these three elements, and the fuel source or flammable material is usually the easiest one to eliminate. If you do this, the occurrence of a fire is far less likely.

What is the best and most economical shielding gas to use while teaching high school students the GMAW and FCAW welding process?

Joel Schmidt, Richland, MI

If you're going to do FCAW with gas, 100% CO_2 is your best option, but you have to make sure you're using a consumable that will accept CO_2. The next best option would be 75/25 (argon/CO_2).

I know that the 6010 electrode will weld through paint, but should we clean off the paint? Or will the 6010 be okay to use?

Colin Young, Dansville, NY

An E6010 electrode is part of a fast-freeze group of electrodes that are designed to operate in gaps or where there is a need to control an arc in a poor fit-up or pipe welding. Because of the flux on the electrode, E6010 can weld on "dirty" materials – metals that may have some degree of rust, grease, mill scale, etc. But even when you're using E6010, cleaner is always better. The more you clean the area to be welded, the better the consumable will perform and the better the weld will be.

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PAVED WITH GRIT

A RELENTLESS WORK ETHIC HELPED PUT WELDERUP'S STEVE DARNELL FIRMLY ON THE ROAD TO SUCCESS

By Ken Krizner


WELDERUP
LAS VEGAS

STEVE DARNELL ISN'T AFRAID TO TELL YOU WHAT HE THINKS IS WRONG WITH THE WORLD.

Too many children sitting in front of computer screens and not learning critical skills, and too many adults taking shortcuts to success and without putting in anything more than the minimal effort to get there.

Unlike some who decry shortcomings in society but offer no real solutions to make things better, Darnell has what he believes is the anecdote to what ails the world: a return to the value of hard work.

"We have to teach our kids the role that hard work can play in accomplishing their goals," he says. "They don't know how to work hard or that a good work ethic will remain with them for the rest of their lives."

Hard work is more than just an axiom for Darnell; it's his way of life. He is a self-described beaten-down man in his mid-40s who has done more work up until this point in life than the combined lives of three retired people. He has the bumps and bruises to show for his efforts, but refuses to give in. That's not in his DNA.

"I was raised with the mentality of doing things the right way and no shortcuts," he says.

Darnell credits hard work for the success he's had in life. He is the virtuoso behind Welderup, the Las Vegas-based custom shop where he and his crew create "rat rods" – old, broken down beaters that are transformed into wild rides or newer, perfectly good vehicles that get a boost in horsepower and performance, along with a sleek, new look. Darnell is also the artist and producer behind Discovery Channel's *Vegas Rat Rods*, where discarded "treasures" – everything from electric chairs and shotgun parts to Mason jars and horseshoes – are salvaged to build "Mad Max-style rat rods." Call it performance art on wheels. A new season is in production, though no premiere date has been set.

His attraction to the world of cars began during childhood, when his dad owned a '57 Chevy and he and his parents would cruise the Las Vegas Strip in one hot rod or another. From that time, he's been into anything with a motor in it.

Childhood is where his uncompromising work ethic took root, inspired in large part by the examples set by his father and grandfather.

Growing up in Las Vegas, Darnell watched his father start a steel company during the economic turbulence of the late 1970s. Tough times did not deter his father, who often worked seven days a week, sometimes even on Christmas and other holidays, doing everything in his power to make the business succeed and provide for his family.

The commitment left a lasting impression on Darnell. When he was young, he wanted to do what other kids his age were doing. In Las Vegas, that usually meant cruising the Strip. But while his friends were out having a good time, Darnell felt obligated to work in the steel yard so he would not disappoint his father. "I didn't want to show any signs of weakness to my


JUSTIN
KRAMER
Shop Foreman
Metal Fabricator
Chassis Specialist
DOMINICO
MANNI
Fabricator
MERLON
JOHNSON
Mechanic/Cummins Specialist
STEVE
DARNELL
Owner
DAN
COGGINS
Mechanic

dad," he recalls, "because I respected him and his work ethic."

Watching the father made a man out of the son. "The key to my success is that I cannot be outworked," Darnell insists. "I work every day, and it started by watching my dad. He's the toughest guy I know."

Darnell's grandfather, too, had a remarkable work ethic. After returning home from the Pacific, where he saw combat during World War II, his grandfather spent the next decade and a half driving a 48-foot rig, traveling hundreds of miles on each run, in all weather conditions and without any hour restrictions, and single-handedly loading and unloading his cargo of potatoes.

As he learned lessons from his father and grandfather, Darnell is passing those same lessons on to his teenage sons, Chase and Kash. At an early age, the two boys were refabricating second-hand bicycles with any scrap and parts they could find. Now, it's not uncommon to see one or the other pull a motor out of a truck by himself. They work with their dad in the Welderup garage. "I tell my sons all the time that I would rather have them try and screw up than not try at all," Darnell says. Both sons are prepared for life, in part because of their work ethic, Darnell proudly points out. "They make mistakes but learn from them."

Darnell admits to his own share of screwups as he was growing up, but he also maintains that the mistakes were part of his own learning process and his own journey toward becoming a man. After working in the steel yard until age 30, he decided to strike out on his own. Initially, he fabricated anything and everything for a range of clients. He became adept at building chimpanzee cages, including one that measured 3,000 square feet. This was the birth of Welderup.

Gradually, the business began to evolve into his love of vehicle customization, especially as the economy slowed in 2006 and 2007. Darnell's dream was to have something more than a conventional customization shop. By any measure, he has achieved that dream, fabricating some of the most outlandish—and outstanding—vehicles you'll see. He wants his creations to have character, depth and personality, and he wants them to stand the test of time. "The rat rods I built a decade ago have not been forgotten," he asserts. Building rat rods allows Darnell to match his talents for fabrication with his love of art and vehicles.

His Welderup team is comprised of individuals who see life in the same way and bring the same work ethic to the garage that Darnell demands of himself. "We have equal respect for each other," Darnell says of his team. "Sometimes, people want to jump onboard and help you make it. I have that type of crew. I'll put them up against anyone."

Of course, Darnell and his crew won't take any shortcuts to put together a rat rod. "We don't do it the easy way," he says. "We tear the car down to nothing and build the chassis. If we have to morph some kind of body from the 1950s on top of something from the 1990s, we'll make it work."

"I'M SO PASSIONATE, BECAUSE HARD WORK IS HOW I GOT HERE. **HARD WORK IS MY LEGACY.**"

Even on their days off, Darnell's father and grandfather were always working, or thinking about work. "If I wanted to hang out with my dad or my grandfather, I had to work because they were working," he says. "I didn't realize it at the time, but I was learning lessons for life."

Darnell yearns for a time when America's work ethic gets back to the days of his grandfather's generation. This is a group of men who built large-scale projects like Hoover Dam and the Golden Gate Bridge during the 1930s, defended freedom in World War II and returned home to build out modern America. Not a bad generational resume.

"I've always had a lot of respect for my grandfather, but that respect has only grown as I've gotten older," Darnell notes. "Not only for the way he lived his life, but for his war effort as well." As for his grandfather's generation, often called the Greatest Generation, Darnell says, "We cannot forget the people who built this country."

Vegas Rat Rods is an extension of Welderup. The show's appeal, according to Darnell, is that he is not afraid to demonstrate the hard work needed to fabricate one-of-a-kind hot rods. On more than one occasion, fathers have told Darnell the show has motivated them to get off the couch and into the garage with their kids to customize their own machines. "We inspire our audience," Darnell says.

That's what Darnell would like to see: dads working on beat-up cars with their sons, even if they don't know what they're doing. You can always figure it out and put it back together again. At the very least, dads are spending valuable time with their kids, teaching them how to work with their hands and the lessons of hard work that they can fall back on for life.

"I'm so passionate, because hard work is how I got here," Darnell says. "Hard work is my legacy." **ARC**

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THE LAST DETAIL

By Jeff Herrington // Photography © Julia Robinson

When it comes to staging a show of hand-built motorcycles, it's the details that make all the difference.

They say the devil's in the details.

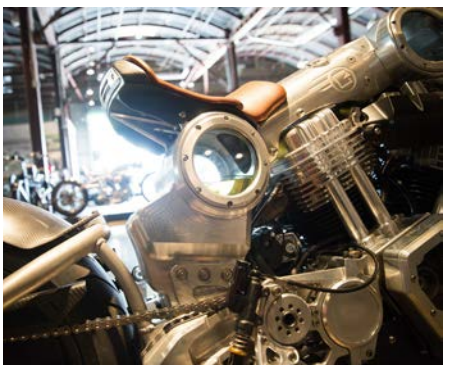
If that's true, it might explain why the Handbuilt Motorcycle Show in Austin, Texas, has quickly become one hell of an experience for those who craft – and admire – mods, rockers, café racers and choppers. In three years, the show has gone from newbie on the block to the continent's premier exposition, attracting thousands of motorbike aficionados to the scruffy, uber-hip, east side of Austin.

But the success of the show, and the bikes it showcases, isn't the result of random happenstance. Instead, it stems from a dedication to details that set each bike apart from the others on display, and sets the show apart from others on the circuit.

"I think this is now the best show of hand-built motorcycles in the United States," says Paul d'Orleans, custom and style editor at Cycle World magazine. "It does an excellent job with those little things that make it easier to appreciate custom motorcycles, like spacing them so you can really view the artistry of each bike. And it's doing an excellent job at making hand-built motorcycles appealing to younger generations."

Top-left: 2014 Board Track Racer custom built by Jon McDowell of Bonneville Customs in Idaho Falls, ID. *Middle-left:* More than 1,000 people visit the hand-built creations over three days inside Austin's Fair Market. *Bottom-left:* The combination of stylish custom designs and bright color schemes is a common sight at the Handbuilt Motorcycle Show. *Center:* Alan Stulberg, co-founder and curator, Handbuilt Motorcycle Show and Revival Cycles. *Top-right:* Up close and personal with the G2 PSI Combat Fighter from Confederate Motors. *Bottom-right:* Handbuilt attendees discuss the design, craftsmanship and art work of various bikes.

It's a breezy, overcast Saturday afternoon in early April, on the eve of the 2016 show. Inside the walls of Fair Market, the recently renovated Quonset-style warehouse that has hosted the Handbuilt Motorcycle Show from the beginning, builders, sponsors and event organizers mill about, but with purpose. Some are rekindling long-time acquaintances or putting a final polish to their creations, others are arranging t-shirts or artwork they hope to sell. Everyone is in black. *Everyone*. And *most* everyone sports some form or fashion of facial hair.



The prelim for the show even has its own soundtrack, a mix of Parisian café tunes, operatic arias and bluegrass riffs that one observer calls "a Pandora channel of the weird." But that eclectic music is indicative of what makes *this* motorcycle show different from the others, says Alan Stulberg, the show's co-founder and curator.

"Growing up, what I was into – motorcycles – was cool. But I was a nerd. So, from the beginning, I wanted this show to feel accessible to everyone who was interested in the culture of cycling – and then way beyond that."

Stulberg is one of the co-founders of Revival Cycles, which crafts remarkable bikes of its own and sells bikes, motorcycle parts and accessories in a "cultural center for motorcyclists" on Austin's popular South Congress Avenue. He and his cohorts had dreamed for some time about staging a kick-ass motorcycle show. But looking back, Stulberg recalls two events in particular that signaled the

Handbuilt Motorcycle Show was evolving from long-time fantasy into doors-open reality.

The first was the announcement in 2010 that a motor racing facility was being constructed in nearby Elroy. "Austin had never been much of a motor sports town," Stulberg says, "so it was like someone had developed a website devoted entirely to screwing with me. I knew if the Circuit of the Americas was coming, so was the Motorcycle Grand Prix of the Americas, which has the same vibe we wanted our show to have."

The second moment came when he confronted the pile of permits the city said he needed to stage the show. "We opened the first, unofficial show without any power or bathrooms," he says with a smirk. "So I guess it wasn't really legal."

It may not have been legal, but it was all sorts of successful. Stulberg now combs through hundreds of candidate bikes to select the few that will get a spot on a pedestal. And where several hundred motorcycle fans "oohed" and "aahed" at the bikes on display at the first show, a few thousand are expected to show up for this year's event.

And that has Stulberg nervous.

"The worst thing that could happen," he says, "would be a lot of people who want to attend not getting in," he says. "We've worked hard to make this an event parents feel comfortable bringing their kids to and a variety of builders want to take part in. So I don't want anything happening that would say this show is limited to the 'cool kids club.'"

Nobody appreciates that non-snooty atmosphere more than Steve Iacona, a custom builder from Brooklyn, New York. This is his first appearance in Austin, and he's missing his son's first baseball game to flaunt his baby – a refashioned 1972 Triumph Bonneville Crusader he hopes to run soon on the Salt Flats in Utah. He's taken the bike to other shows. But none, he says, offered the laid-back atmosphere this one does.

"I'm blown away by the style of the bikes here and their diversity," Iacona says. "This show feels like an art exhibition, but there's none of the one-upmanship you see at other shows. It's great to come and not worry about whether you'll be judged well and win a trophy."

Iacona has built bikes professionally for 10 years, but he's been committed to the hand-built way of life since childhood. "As a kid, I wasn't into bats and balls, just benches and grease. It's the opportunity to add my own details that makes building custom bikes so rewarding. For example, I remade the back of this bike by stretching it 4 inches. I replaced one wheel with another from an old Harley-Davidson rocker. And I sanded the cases multiple times to give it that vintage look."

By inviting lesser-known and far-flung builders like Iacona to Austin, the show serves a purpose beyond putting cool bikes on display – it gives those builders exposure they might not get otherwise.

Where participating in the show may be a form of marketing for Steve Iacona, it's a form of therapy for Krystal Hess. Originally from Alberta, Hess left behind a nursing career and a dysfunctional relationship to move to Austin and launch a new life. The bad news: She discovered that her new boyfriend in Texas who was deep into motorcycles was also grappling with bipolar disorder. The good news: He left her with a half-built motorcycle and the expensive powder-coating equipment she had paid for.

"I realized I was either going to continue down the same destructive path or do something to change it," she says. "So I thought, 'You're going to learn how to ride motorcycles, and then you're going to finish building this one.'"

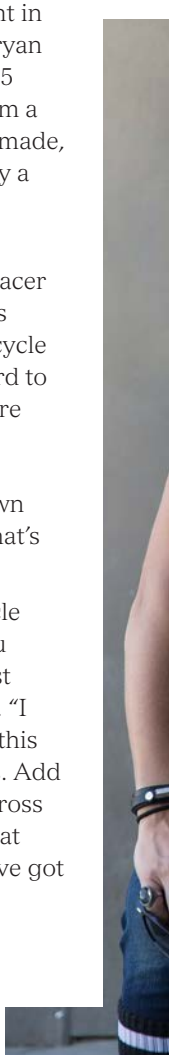
Which she did, via a series of YouTube videos. She completed the unfinished bike her ex-boyfriend had left with her. The Indian Scout she's displaying at this year's show marks the 11th bike built by her firm, Ricochet Creations. It's also the one she takes the greatest pride in.

Hess hopes to propel her passions for nursing and bikes into a non-profit that will equip veterans with PTSD with the skills they need to build motorcycles by hand. "Motorcycles saved my life," she says. "I want to give these veterans a sense of purpose and the pride that comes with having a bike in a show like this. How could they be anything but proud in themselves? The ingenuity and craftsmanship and fellowship they'll see at this show is everywhere. There is nothing here that doesn't impress."

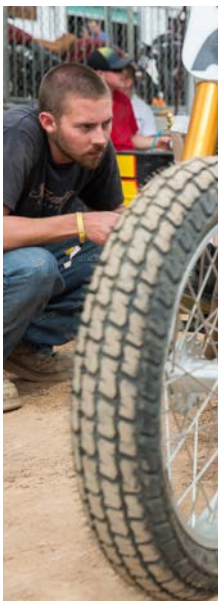
Impressive also describes the roster of builders attending this year's show. Max Hazan and Roland Sands have brought their latest creations from California. Walt Siegl of New Hampshire is exhibiting an MV Agusta Bol d'Or that's resplendent in red, white, blue and gold. And Bryan Fuller of Atlanta is showing a 1975 BMW R75/5 with a seat made from a vintage leather jacket and a handmade, stainless-latch gas cap inspired by a Grolsch beer bottle.

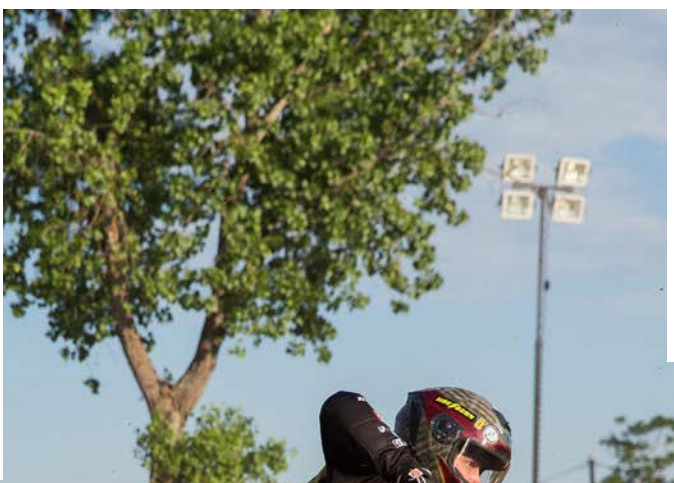
Sands, who won the 1998 AMA 250GP National Champion road racer championship, says he thinks he's attended every Handbuilt Motorcycle Show in Austin, "although it's hard to remember, after going to bed there every night at 5 a.m." He asserts the pairing of the show with the Motorcycle Grand Prix across town is the perfect example of a sum that's greater than its parts.

"Anytime you get more motorcycle people together it's better, for you realize all the similarities that exist across the moto culture," he says. "I love racing *and* custom bikes, so this show is one of my favorite events. Add to that the short track we built across the street, and the GNC National at Circuit of the Americas, and you've got moto insanity at its finest."



Top: Steve Iacona polishes his refashioned 1972 Triumph Bonneville Crusader. *Bottom-left:* Krystal Hess, owner of Ricochet Creations. *Middle-right:* The Scout Hillclimber built by Doug Siddens and Nick Jaquez of IndianMotorcycles.net. *Bottom-right:* A close-up of Krystal Hess' Indian Scout fuel tank.





Top-left: Wahl E. Walker rides his motorcycle along the Wall of Death. *Top-right:* Inside the American Motordome tent, spectators watch as daredevils defy the laws of gravity. *Center:* As dad gets ready to race, his son follows suit cleaning up his own bike. *Middle-left:* A racer laces his boots to prepare for his event. *Bottom-left:* Roland Sands Design worked with the city of Austin to set up a Motorcycle Grand Prix as additional entertainment for the motorcycle show's attendees. *Bottom-middle:* The Handbuilt Motorcycle Show logo prominently displayed on a banner hanging outside the Fair Market building. *Bottom-right:* The show and its organizers go out of their way to appeal to people of all ages.

The insanity builds slowly inside Fair Market. It's almost 6 p.m. and the show's official opening to the public is moments away. Latecomers quickly position their bikes onto the platforms, hoping not to knock into those adjacent. Across the way, a clothier is briskly putting motorcycle jackets, vests and hoodies onto hangars. The media has had access to the show for two hours, so the warehouse teems with tripods, cameras, cables and microphones.

And then, suddenly, the doors to Fair Market are open and it's show time. The crowd is respectful but within seconds, scores of people are surging into the warehouse, eager to glimpse this year's bikes. Dads outfitted in Hawaiian shirts, khaki shorts and boat shoes stand beside dudes sporting undercut hairstyles, who are to the right of a biker family all in leather, who stand just in front of a woman bedecked in a tie-dye dress and a massive sombrero.

Twenty minutes into the show, a quick glance outside reveals Alan Stulberg's concerns may have been warranted: the line to get into Fair Market is now a city block long. And it doesn't help that "cool kid" Jay Leno and his film crew have entered the building to promote the shenanigans underway.

But the line outside continues to filter in. No one is happier to have made it inside than Rick from Connecticut, who is toting his grandson around the show on his shoulders. The recent retiree has tried twice to come to the show without luck. The third time was the charm, and he's mighty impressed.

"I've been riding for 18 years, but I'm still amazed at the artistry and the attention to detail these builders have put into their bikes," he says, scanning the room. "That's one reason I brought my grandson, so he could start appreciating them and understand all the work that goes into them. I've never built a bike, but this show is really inspiring me to consider that."

Rick's enthusiasm would no doubt cause Alan Stulberg and his Handbuilt Motorcycle Show team to smile.

"One of the goals of this show is to get more people riding bikes and appreciating the attention to details that make the bikes we showcase really special," he says. "If we succeed only at that, then we know the show has been a success." ARC

BEFORE STARTING TO WELD, CHECK YOURSELF AND YOUR GAS CYLINDER, AND OTHER TIPS

DO A "DRY RUN" BEFORE WELDING

Before beginning your project, get your welding equipment dialed in on a practice piece of metal and also, with the welder turned off or without pressing the gun trigger, try to move the electrode holder or gun along the joint. This will ensure that you're in optimal position for the length of the bead. There is nothing worse than getting halfway into a weld, only to find that you're out of position, which will negatively impact the quality of the weld.

– Submitted by Paul Tavres, Hayward, California

CHECK YOUR CYLINDER

If the weld quality is decreasing while TIG or MIG welding, check your gas cylinders. Try changing the cylinder if the gauge shows one-quarter full or less. Sometimes, the cylinder gauge will not accurately read the lower pressures, and it seems the gas inside the bottle at the lower pressure does not weld as well. Here are some of the most common causes of porosity in MIG welds:

- The gas may be off.
- The regulator/gas hose is not well-connected.
- The gas bottle is empty. Before welding, be sure the bottle contains gas.
- An inadequate flow rate. The shielding gas will be ineffective if the rate is set too low.

– Submitted by Bob Pettegrew, Liberty, Missouri, and Colton Crevar, Jefferson Hills, Pennsylvania

KEEP IT GROUNDED

Keep a clean ground clamp when welding. A secure, good ground connection makes a world of difference in preventing stuck tips and bad starts.

– Submitted by Bill Shepherd, Las Vegas, Nevada

DIALING IN THE CORRECT AMPERAGE

When determining the appropriate amperage for SMAW, always consider the diameter of the electrode. For example, if you're going to weld with a 1/8-inch 7018 low hydrogen electrode, a good starting point is 125 amps. Keep the following rule of thumb in mind: 1 amp for every 1/1000 of an inch in the electrode diameter.

– Submitted by Mitch Cutsforth, Big Rapids, Michigan

HAVE A TIP OR A TRICK YOU'D LIKE TO SHARE WITH BEGINNERS?

OR MAYBE A WELDING ISSUE YOU'RE HAVING TROUBLE WITH?

LET US KNOW!

CLEAN, CLEAN, CLEAN

Any material to be welded should be as clean as possible, especially alloys. This includes filler material. Always brush, chip and grind between passes, when possible. The goal is zero contaminants.

– Submitted by Dwayne Hand, Brownsville, Indiana

MAP GAS TORCH FOR HEATING AND BENDING

Use two MAP gas torches to heat up thinner metal to the point it can be bent (without an oxy/acetylene setup). Point the flames at the spot on the metal that you want to bend from opposite sides. The metal will bend easily when it turns cherry red.

– Submitted by David Waelder, New York, New York

Send us your tip, trick or question, 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 baseball cap or an *ARC Magazine* t-shirt, plus you'll be entered into a drawing where two lucky winners will win their choice of a POWER MIG® 210 MP or Square Wave® TIG 200. Winners will be announced after the publication of the Winter 2017 issue.

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2450 Series

VIKING®
2450D Series

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1840 Series

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CRISTIAN SOSA

MAKING THE BEST OF THE TOOLS AT HAND

By John C. Bruening

Mastering a skill is not about having the best tools. It's about making the best of the tools you have. This is one of the most important nuggets of wisdom Cristian Sosa tries to impart to all of his students.

Since 2012, Cristian and his brother Roberto have been the proprietors of Las Vegas-based Sosa Metal Works, a custom metal fab shop that specializes in metal shaping and full builds of bikes and cars. More recently, Cristian has begun teaching custom design and fabrication to students all over the world, from Austin to Australia to Japan.

It started as a one-off – a favor for a shop owner in Texas who asked Sosa to come down and show him and his crew how to build tools and machinery for fabrication work, and then show them how to use it. From there, the teaching opportunities grew organically. "It kind of evolved," says Sosa, "from private instruction to classes that were open to the public – classes that anyone could sign up for. I've been all over the place doing that."

Doing a lot with a little is a consistent thread that runs through Sosa's teaching philosophy.

"One of the most important ideas I try to get across is that you don't need anything special to do metal shaping or fabrication," he says. "I try to eliminate the excuse about 'I can't do this kind of work because I don't have this or that piece of equipment.' You can handle just about any project with whatever you have available to you, just by using your mind and figuring things out."

Jeremy Lacy is a Denver-based industrial designer by day, and a motorcycle enthusiast with four bikes currently parked in his garage. In recent years, his longtime interest in illustrating bikes – via his professional side venture, Downshift Studios – has been morphing into an itch to actually build them. This past January, he drove to Vegas to take one of Sosa's classes. The experience was more than just eye-opening.

"He showed us dies for his power hammer that cost thousands of dollars," says Lacy. "Then he showed us dies he made by just using half-inch diameter rod and his own methods. And the dies he created himself at a very low cost – and used on a power hammer that he designed and built himself – kind of blew my mind. I thought, 'Holy crap, anybody can do this. If you put your mind to it, you just make the tools you need to make the parts you need.'"

Sosa has made a living and built a life around doing something he's passionate about. He doesn't take that good fortune lightly.

"Over time, I feel like I've figured out what I really wanted to do," he says. "If you had asked me five years ago, I would have said that I just wanted to build cars and bikes. But teaching is something I want to continue doing. I wake up in the morning and I feel pretty lucky. I walk into the shop and I feel pretty lucky. So I feel like I need to pay some of that back. I owe it to the craft to give something back to other people. Maybe somebody else will get lucky like I did." ARC

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BUILDING FOLDING STEEL SAWHORSES

By Jimmy DiResta

Materials

- Extruded cold rolled box tubing
- Legs: ¾-inch-by-1½-inch rectangular tubing
- Saddle pieces: 1½-inch-by-1½-inch square tubing
- Stretchers: 1-inch-by-1-inch square tubing
- Hinges: 7-inch length (hole to hole)
- Piano Hinges: Same length as stretchers

Welding/Cutting Equipment

- Lincoln Electric Power MIG® 210 MP
- Gas, 75/25 mix (75% argon and 25% CO_2)
- MIG wire, 0.030-inch diameter
- Bandsaw with metal cutting blade

Additional Tools

- Clamps
- Square
- Self-tapping screws

Personal Protective Equipment

- ANSI-approved welding helmet
- Safety glasses
- Fire-retardant jacket
- Welding gloves
- Fire extinguisher

Building a functional and strong sawhorse is a relatively easy DIY project.

Sawhorses are useful in a number of situations, including providing support and elevation when a cut is needed. They also can act as a makeshift worktable. If constructed correctly, home hobbyists and fabricators can be confident that sawhorses can withstand thousands of pounds without fear of closing or splaying.

While sawhorses can be made of different materials, the advantage to building them with steel is that you can attach your ground clamp to them for use in welding projects.

Step 1: Making the cuts.

We're building two sawhorses, so we cut eight legs from ¾-inch-by-1½-inch rectangular tubing. We cut four saddle pieces out of 1½-inch-by-1½-inch square tubing and four stretchers from 1-inch-by-1-inch square tubing. The lengths and heights may vary when you build your own project; our measurements are noted in the accompanying illustration (page 37).

Step 2:
Fit the legs to the saddle pieces.

For a stronger weld connection, cut a 90 degree "birdsmouth" notch at the top of each leg where they will connect to the saddle pieces *(see tip)*. While I made these cuts with a bandsaw, they also can be made using a hacksaw or an angle grinder equipped with a cutting wheel.

TIP: Repetition Equals Consistency

Cut out a cardboard template to represent the "birdsmouth" cut that will form the connection points between the saddle and the legs. Tape it onto position and use spray paint to mark the cutout quickly and accurately on all eight legs.

Step 5:
Helps stay open, not closed.

When the sawhorses are open, you want them to stay open, ready to do the job. To do this, fashion a hinged brace that will connect to the opposite leg from a piece of ¾-inch bar stock (14 gauge). Drill a hole in one end to accept a fixed screw and cut a notch in the other end to accept the locking screw. Use self-tapping sheet metal screws to assemble the hinged brace/ braces mechanism.

Step 3:
Subassembly.

Tack weld each leg to the saddle pieces, followed by final welds on all. Then, tack and finish weld the stretchers to the legs. When you're done here you should have four halves of a sawhorse.

Step 4:
Put the horse together.

It is now time to connect the sides of each sawhorse to each other to open and close. Use a piano hinge to make the connection. In order to ensure that the hinge buckle doesn't stand proud of the saddle and interfere with the placement of anything you might put on the sawhorse, weld the hinges to the underside of the saddle pieces. When welding, tack in several locations along the length of each side of the hinge, staggering the location from one side to the other along the length of the hinge. This will help minimize the potential for metal distortion. Use the same approach when finish welding.

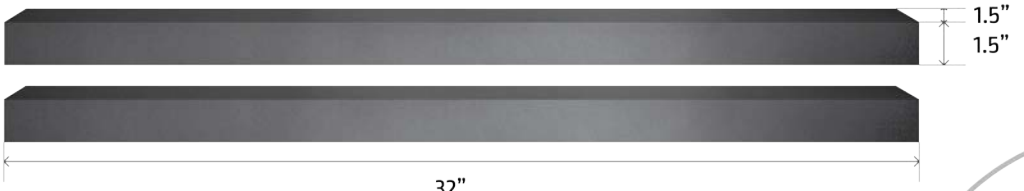
Step 6:
Flush to the floor.

To make sure the sawhorse feet are flat to the ground, open the horses on a table or other flat surface and lock the hinged brace/ braces. Mark a line parallel to the floor on all four legs. Close the horses and cut along the marked lines with a bandsaw or cutting wheel. ARC

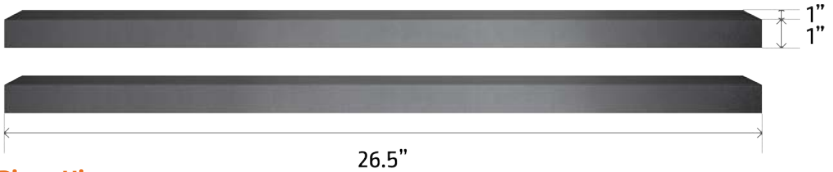
Measurements

Lengths and heights may vary.

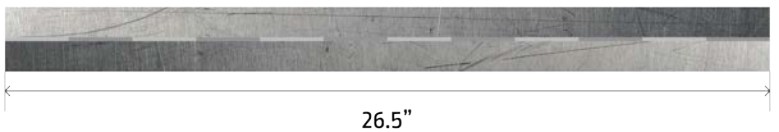
Saddles

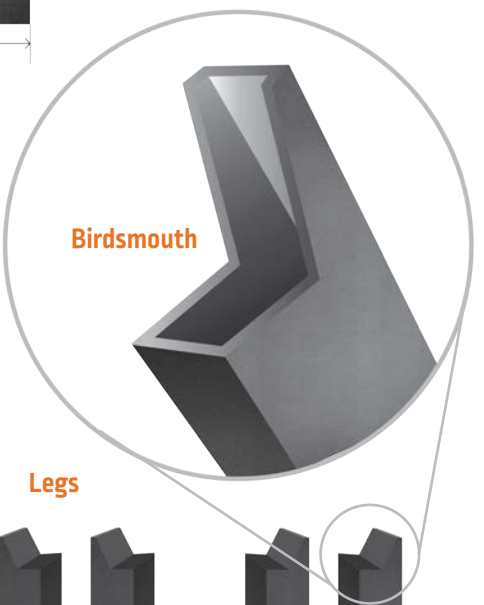


Stretchers



Piano Hinge





Hinged Brace

Legs

AFLOAT IN PHOENIX

By John C. Bruening

Keeping a lot of balls in the air is the common expression to describe any multifaceted and challenging job. For Union Digital, run by brothers Pat and Mike Murray, one of their more challenging jobs in recent months has involved keeping a lot of balls in the water.

We're talking golf balls, to be more specific – 140,000 of them. They fit inside a 6250-square-foot floating aluminum structure fabricated in the shape of the Waste Management logo. The floating logo has been a prominent attraction at the annual Waste Management Phoenix Open for the past seven years.

Union Digital's first version of the logo, built in 2009, had to be scrapped after the 2015 tournament due to problems with the flotation devices. The elements were degrading the Styrofoam, and the birds were tearing it apart and eating it (and defiling it in other ways, as one might imagine). The more recent version, completed this past January, is less susceptible to bird-related damage.

"There's something like a mile of aluminum angle on this thing," says Mike, "because there are cross members everywhere."

The frame is constructed of 1/8-inch 6061 aluminum angle and sheathed with 15 gauge aluminum sheet. The earlier version was movable only by flatbed truck, but this new version disassembles into 120 separate pieces that are small enough to fit into the back of a van for the sake of easier transport.

"We tried to make each piece small enough and light enough that one person could move it if they had to," says Mike Murray, "or two people could manage a single piece. Each piece weighs a maximum of 50 pounds."

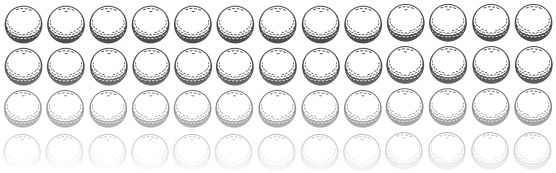
The Phoenix Open is "one of the largest sporting events by attendance in the world," says Pat. "More than 500,000 people came out this year. They get close to 200,000 – maybe slightly more than that – on Saturday alone, which is their peak day. It may not be a highly publicized media event, and it may not be known around the world, but in Phoenix and the Southwest, it's a really big deal."

Photography © Kevin Korczyk

1 TON (EMPTY)

50 TONS (FILLED WITH GOLF BALLS)

140,000 GOLF BALLS



50'

125'

6250 SQUARE FEET

1/8" 6061 ALUMINUM ANGLE SHEATHED WITH **15 GAUGE ALUMINUM SHEET FRAME**

MORE THAN
500,000
PEOPLE IN ATTENDANCE

120 PIECES
SMALL ENOUGH TO FIT INTO
THE BACK OF A VAN

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The Advantage of Silicon Bronze Filler Metal

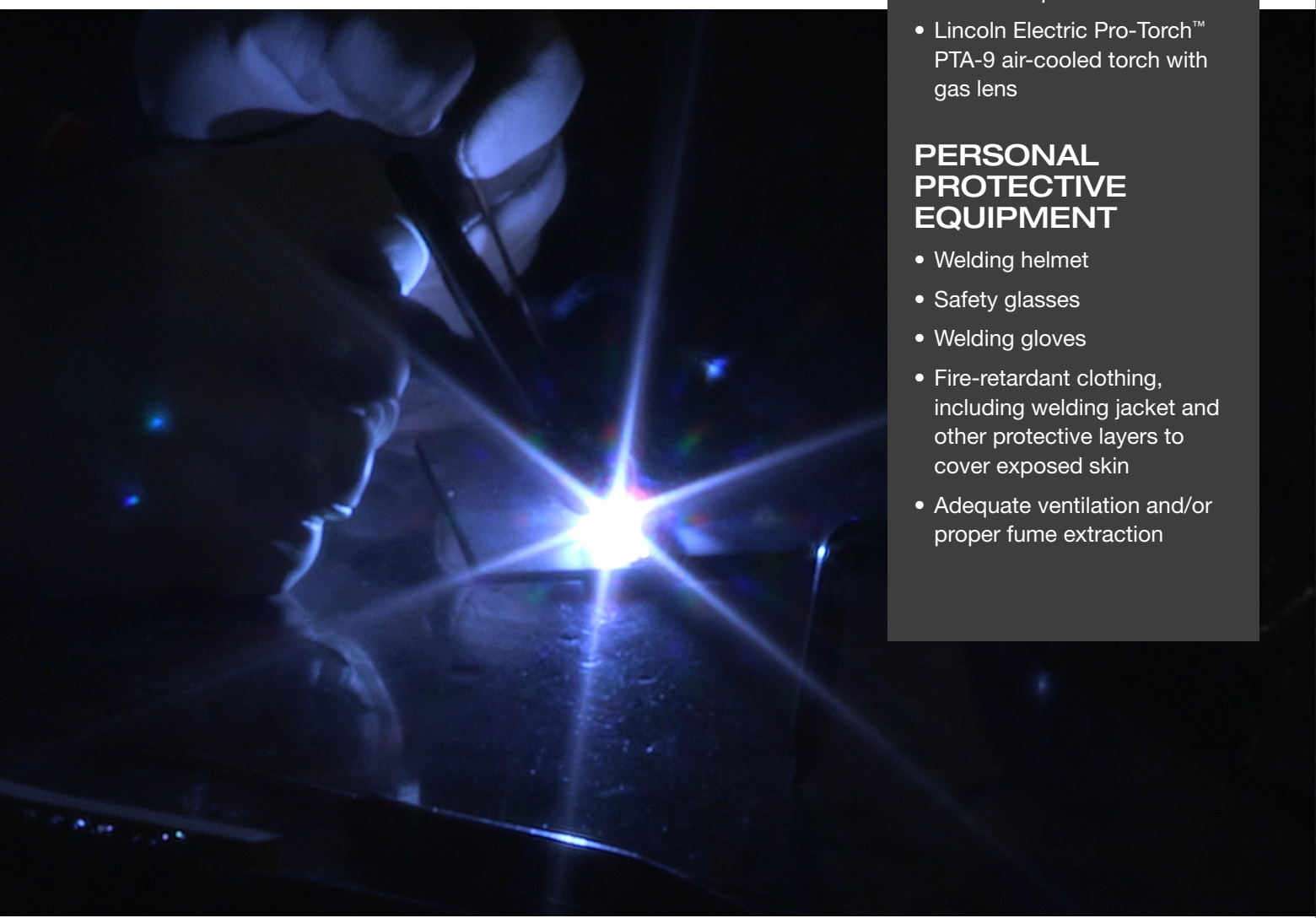
By Alex Tocco, Welding School Instructor, The Lincoln Electric Company

TOOLS

- Lincoln Electric Square Wave® TIG 200
- Harris Products Group silicon bronze filler metal, 3/32-inch diameter
- Argon gas
- Current, between 70 amps and 90 amps
- Lincoln Electric Pro-Torch™ PTA-9 air-cooled torch with gas lens

PERSONAL PROTECTIVE EQUIPMENT

- Welding helmet
- Safety glasses
- Welding gloves
- Fire-retardant clothing, including welding jacket and other protective layers to cover exposed skin
- Adequate ventilation and/or proper fume extraction



Silicon bronze is a copper-based filler metal that can be used in several different welding applications. It is an alloy of copper and silicon, which contains 2.8 to 4.0 Si (silicon). The American Welding Society (AWS) classification of silicon bronze is AWS A5.7: ERCuSi-A.

Silicon bronze can be used for welding bronze and brass materials, dissimilar welds between copper alloys and steel or other alloys, and for braze-welding galvanized steels. Silicon bronze can also be used to add color to welded art or a metal sculpture, helping the project stand out compared with an average piece of stamped out sheet metal.

One important thing to remember: The strength of silicon bronze filler metal is lower than steel. The minimum tensile strength for silicon bronze is 50 ksi (kilopound per square inch). Common steel filler metals, such as Lincoln Electric's ER70S-2 and ER70S-6, have a minimum tensile strength of 70 ksi.

Figure A

Figure B

This article addresses two applications using silicon bronze filler metal – brazing galvanized steel and welding on thinner sheet metal.

Coated Materials

Occasionally, a fabricator may have a need to weld on galvanized sheet metal. Removing the galvanized coating in the welding area is the best choice for welding the coated material. If the coating is not removed when using the TIG process, the tungsten will quickly become contaminated, causing an unstable arc (Figure A). Contamination is caused by the galvanized coating coming off the plate and attaching to the end of the tungsten (Figure B).

If removing the coating is not an option, it is possible to braze the sheets using a silicon bronze filler metal. The low melting point of the silicon bronze filler metal will allow the galvanized sheet to be joined without melting the base metal. The equipment set up to braze with silicon bronze is the same as welding steel: DC+ polarity and argon shielding gas.

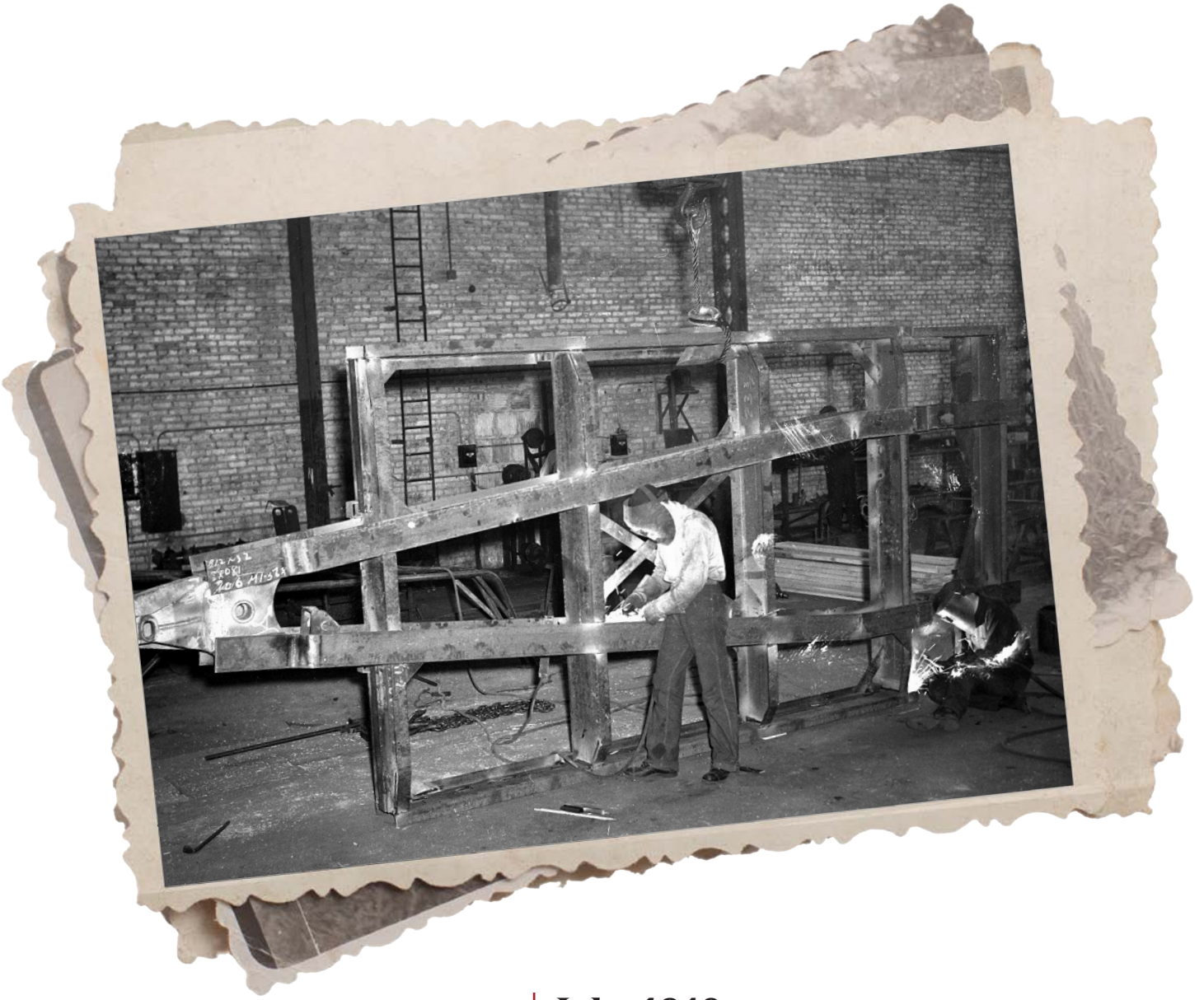
Thinner Sheet Metal

Silicon bronze can be used to reduce distortion on thinner sheet metal. The sheet metal can be joined with silicon bronze using a lower current procedure when compared with welds made to carbon steel filler metals. The lower heat input reduces distortion and burn through.

Travel speeds can be increased on thinner metals when using silicon bronze filler metal. An example would be a fabricator using 3/32-inch ERCuSi-A (silicon bronze) filler metal at the same current setting used for a carbon steel filler metal when joining sheet metal. The travel speed would be much quicker because with the silicon bronze filler metal, less heat is needed to melt the wire when compared with carbon steel filler wire. ARC

Silicon bronze filler metal will create a gold appearance when TIG welded, which can make a project stand out.

Windy City Welding:
Lower Weight, Lower Cost



July, 1940 — Workers at the C.R. John Company in Chicago, Illinois, weld the frame of a 10-ton capacity trailer using standard channels and I-beams. At the time, the company marketed its product based on the claim that its welded steel trailers weighed 5% less than trailers constructed with rivets. In addition, reduced manufacturing costs enabled C.R. John to lower the selling price of their welded trailers by 5% as well.

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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