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CONTENTS



MR. FIX-IT

By Jeffrey Herrington

Whether plugging broken water pipes or rescuing failing gold mines, cable TV star Juan Ibarra, Jr. is proving daily that he's your handy man.

10

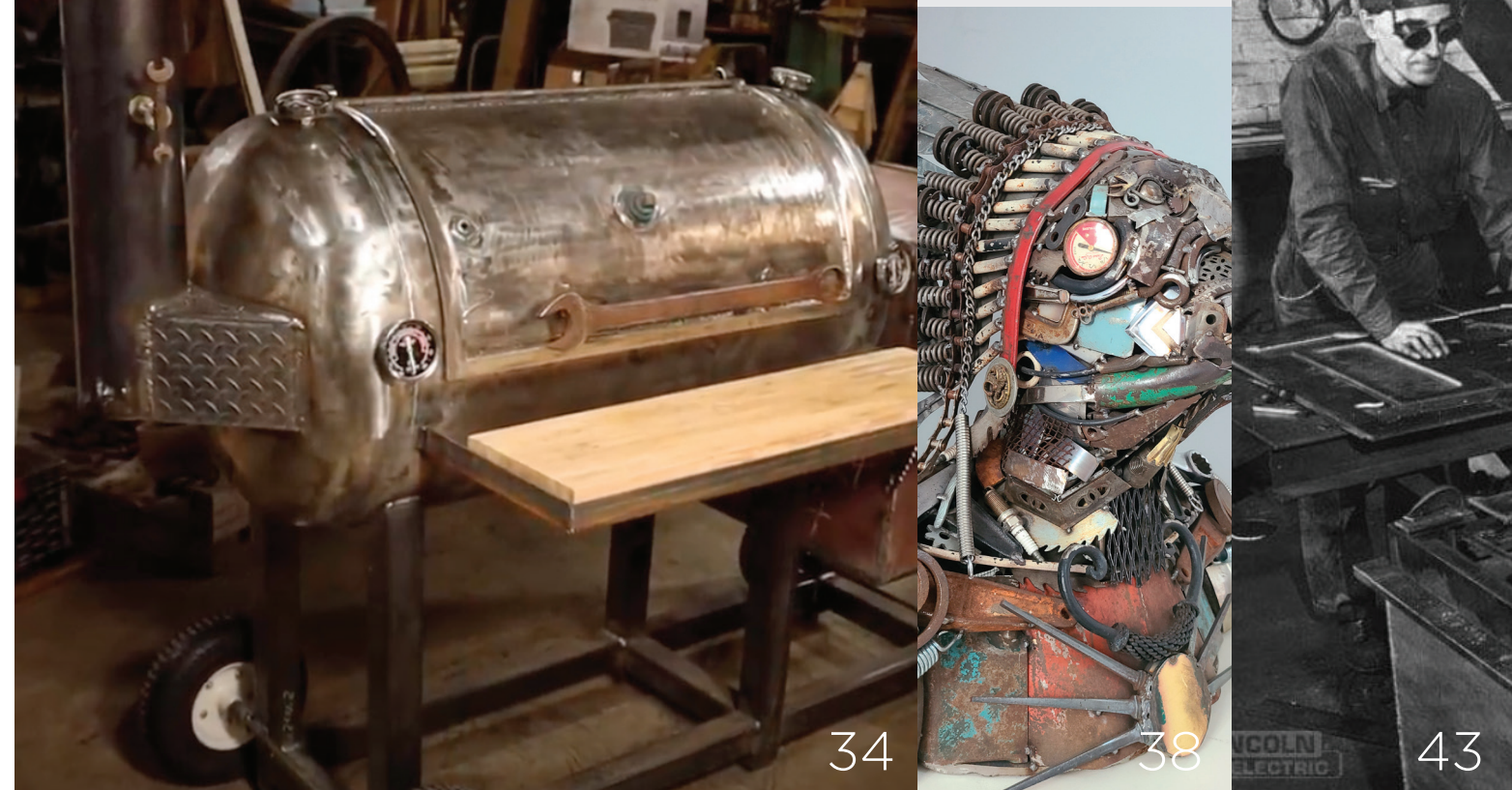


BUILDING ON 125

By John C. Bruening

Lincoln Electric Celebrates A Landmark Anniversary By Recognizing Ambitious Welding Projects.

20



34

38

43

QUESTION MARK

Veteran tradesman, educator and author Mark Prosser answers questions from students and other welders.

18

SHOP TRICKS & TOOLS

Time- and money-saving ideas to improve the quality of your projects, and the process by which you complete them.

30

PROJECT SPOTLIGHT

Jimmy DiResta: Building a Smoker From a Compressor Tank

34

ARCS & CULTURE

The Art of the Imperfect

38

FLASHBACK

July 1945: Wartime Cutting

43



This icon means there's video content available on the *ARC Magazine*™ website.

Visit us at arcmagazine.pub

EDUCATOR SPOTLIGHT

Kevin Corgan: Learning by Doing

32

MASTER CLASS

Back Purging Stainless Steel

40



Jeff **Herrington** **Writer**

A Dallas-based writer, Jeff Herrington has traveled to more than 40 countries on five continents. His interview subjects include a prime minister of New Zealand, a top heart surgeon in France and the CEO of Argentina's state oil company, as well as hurricane-ravaged business owners and Nazi-occupation survivors. Along the way, he's climbed Sri Lankan ruins and reported on a Japanese ice festival in below-zero weather. He is the author of two mystery novels, *Murder Becomes Manhattan* (2014) and *Murder Becomes Miami* (2015).



John C. Bruening **Writer**

John C. Bruening is the editor of *Arc Magazine*. His career as a writer and editor spans three decades and a range of specialties: industrial safety and health, scrap metal processing, architecture and construction, music, film, the visual arts, history and various segments of the pop culture spectrum. Along the way, his feature writing has scored awards from the Society of Professional Journalists and the American Society of Business Press Editors.



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.



Mark **Prosser** **Instructor**

Mark Prosser is an assistant professor of welding engineering at Ferris State University and has taught at different colleges around the country for the last two decades. He has welded in the automotive and motorsports industries, for a governmental contract shop, and on high-pressure chemical piping and aluminum tubing. Mark has authored numerous instructional books, including *Full-Bore Welding* and *Full-Bore Sheet Metal*, both of which he co-wrote with Bryan Fuller.



Scott **Skrjanc** **Instructor**

Scott Skrjanc is a former welding instructor for Lincoln Electric (from 1994 to 2001), where he taught many aspects of the welding school curriculum. He has also trained welders and instructors at multiple welding schools and national union training programs across the country. His current role at Lincoln Electric is Group Leader for trade shows and events that include celebrity management and product integration for television and movies.

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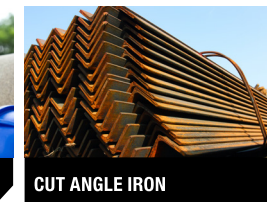
FIX A METAL TRICYCLE



HEAT A FROZEN LOCK



SOLDER WATER PIPES



CUT ANGLE IRON



CUT OFF A RUSTED BOLT

LETTERS TO THE EDITOR

DEAR EDITOR:

I just wanted to compliment everyone involved with the production of the Fall 2018 issue of *ARC* that I picked up at an Air Gas Supply in Arcata, California. Being an entrepreneur and business owner myself, and having taught many employees along the way, I was very impressed with the content and layout in this particular issue. I have two more issues that I am excited to read cover to cover. Thanks for publishing such a great magazine. Being a weekend fabricator, I'll be sharing it with friends.

— Thomas J. Masiewicz
Concord, California

► **Thanks for getting in touch, Thomas. Good to hear that an issue of *ARC* from two years ago is still getting some mileage and pulling in new readers – and also glad to hear that there's something in these pages that appeals to a business owner, trainer and “weekend warrior.” Keep up the good work on all fronts!**



DEAR EDITOR:

I am excited to have discovered your magazine. I am a retired New Jersey State Trooper and have been fabricating custom hot rods for about ten years now, and I'm proud to say my first welder was a Lincoln Electric machine! I recently read the spotlight article on Olivia McCleery [Summer 2020]. It was a great article, and I found myself connected with her journey, as I have had many career paths that have led me to this point in my life. I have a question about the Lincoln Electric welding school: My son is 17 years old, and he and knows the basics of MIG and TIG welding, but I thought it would be a fun experience for us to sharpen our skills together at the school after the Covid restrictions are lifted. Is there a minimum age for enrollment the school? In the meantime, I look forward to future issues of *ARC*.

— Daniel Studzinski
Burlington, New Jersey

► **Thanks for checking in with us, Daniel. Your plan sounds like a great way to spend some quality time with your son and develop some valuable welding skills in the process. The minimum age for enrollment at the Lincoln Electric Welding Technology and Training Center (W TTC) is 18, but that shouldn't be a deterrent. If your son will be turning 18 sometime in the next few months, he can enroll now in any courses that start after his birthday. We'd love to see both of you putting some time in at the welding school!**

DEAR EDITOR:

I have a 14-year-old who has taken to welding. I found your magazine at a local supply house and really enjoy the “Question Mark” section, as I get to ask my son questions to test his knowledge – but he is really teaching me. Do you think that a story about the next generation of welders might be on the horizon? I hooked him up with the Local Union 10 Welders, and they love when he shows up to practice. I look forward to learning more from your magazine.

— David Franke
Richmond, VA

► **If you're looking for coverage of up-and-coming young welders, look no further than this issue. Our feature story puts a spotlight on some of the finalists who participated in Lincoln Electric's 125th anniversary project competition. All of them are definitely on the younger side, and a couple – including the winner – participated in the competition while they were still in their last year of high school. These folks are just the tip of the iceberg. There's a lot of young talent out there to provide an inspiration for your son.**

As always, the communication channel is always open at *ARC* Magazine, and we welcome your feedback about what you see or what you'd like to see on these pages. Contact us at editor@arcmagazine.pub or publisher@arcmagazine.pub.



When the world is counting on you, you can count on us.

Being essential means the world is depending on you to keep moving forward, even when everything else is standing still. While the rest of the world is depending on you, you can depend on us.



Whether plugging broken water pipes or rescuing failing gold mines, cable TV star Juan Ibarra, Jr., is proving daily that he's your handy man.

MR. FIX-IT

By Jeff Herrington

It wasn't the sort of project a plumber or mechanic runs into every day.

"About fifteen years ago, an eccentric woman here in Nevada won the Megabucks," recalls Juan Ibarra, Jr., the owner of Ibarra Industries outside of Reno. "She called me and asked if I would transform a massive RV garage on her property into an exercise area with an in-ground trampoline surrounded by cargo nets."

Ibarra chuckles at the memory, then shakes his head. "Oh, but it gets even better," he continues. "Just a few months later, she called to say she is done with the trampoline and now wants me to turn it into an underground bunker with a trap door she can activate by remote.

"It took a while, but we got it all welded up for her just the way she wanted it."

Fixing things is deeply embedded in the DNA of this first-generation American and second-generation-plumber. More than half of Ibarra's business is fixing (or installing from scratch) plumbing, septic and water heater systems in residential and commercial structures across Nevada. Other times, he's a fabricator or mechanic, making something operate more smoothly and efficiently.

Now, Ibarra's fix-it skills are gaining worldwide attention thanks to his appearance on the new discovery+ series, *Gold Rush: Freddy Dodge's Mine Rescue*. As Freddy Dodge's accomplice in helping faltering gold mine operators get back on track, Ibarra is usually the one tasked with replacing a poorly designed sluice or repairing a broken-down excavator.

Says one of Ibarra's social media fans (who goes by the name Royal Paine), "You cannot be replaced, Juan. You fix the world the rest of us screw up."





“I’m not the type to sit at a desk and manage paperwork all day.”

Growing up in a modest neighborhood near downtown Reno, Ibarra took naturally to fixing things that needed attention. “As a kid, I was fascinated by the Sears Craftsman catalog,” he remembers. “So much so, I told my mother when I was six that I wanted a toolbelt for my birthday instead of toys. She spent eighty dollars on one, and I was over the moon. I used that toolbelt until I was well into my teens.”

His mother played piano at a nearby ballet studio where his four older sisters took classes. Ibarra often tagged along, but his father quickly steered him into spending time at the plumbing business instead. “At first, he was always in my way, trying to fix things he shouldn’t

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be,” the senior Ibarra says with a chuckle. “But I eventually realized he was wanting to learn. When he was ten, he was little enough to crawl beneath the mobile homes we were plumbing. By sixteen, though, he was so big and strong, he could replace an 80-gallon hot water heater by himself.”

Although Ibarra’s now the owner of the family enterprise, he’s in the field a lot, he says, driving between projects in his white GMC Sierra 2500HD truck with an eight-foot service bed. “I still wear several hats,” he says, “and my days are really hectic, working on a 30-unit apartment building one day, an eight-unit building the next. But what I prefer is putting pipes in, digging trenches, etc. I’m not the type to sit at a desk and manage paperwork all day.”

He’s also not the type to accept mediocre work – from himself or others in his industry. “Anybody can go on YouTube these days and watch how to fix anything,” he says. “The difference between the okay tradesperson and the really good one is the attention| they pay to details and the pride they take in their work.

“Good tradespeople are always thinking three steps ahead and considering the consequences of each step,” he adds. “Take welding. I think it’s all the prep work we must do before the weld that matters most.”

Ibarra considers himself lucky to have lots of good tradespeople working for him at Ibarra Industries. “Too many people these days view the trades as shameful. In fact, one can make a great living in them and probably face less competition.”

Luck also played a key role in Ibarra becoming one of cable television's newest stars, a celebrity with a level of fandom so strong that some on his social media feed refer to him as the "Mexican Fabio." Ibarra was born in America and, ironically, was never bitten by the acting bug while he was growing up in the Reno area.

"I was never in plays," he remembers. "Being in front of a camera wasn't something I wanted, wasn't a blip on my radar."

But when the Great Recession quashed Northern Nevada's thirst for residential and commercial construction, Ibarra started searching for a new source of income. His attention was drawn to the mining industry, and fairly soon he was working underground, repairing equipment being used in the mines.

It was around that time that his brother-in-law, a fanboy of the Discovery Channel series "Gold Rush," spotted an online post from mining legend Todd Hoffman. The post advertised for a mechanic to join Hoffman's team on the show as they toiled for gold in the Yukon's Klondike region. The brother-in-law was adamant Ibarra apply for the job.

"I told him I wouldn't apply for it," Ibarra says, "but he could apply for me if he wanted to."

Which is precisely what his brother-in-law did, sprucing up Ibarra's resume and sending the application off to the

Hoffman enterprise. Almost before the plumber/mechanic could say "Eureka!" he was on a plane for Las Vegas, in front of a camera and then signed for several episodes. "The audition was really cool," he remembers, "but I was overwhelmed by instantly being on a mic and constantly having a camera on me."

The show's storyline had Ibarra's arrival on the team sparking a mutiny of sorts. Eventually, though, he settled in, helping Hoffman's crew in a subsequent season extract more than \$3 million worth of gold in Oregon. When Hoffman departed "Gold Rush" in 2018, Ibarra transferred to a crew run by Tony Beets, continuing his supporting role for two more seasons.

"It really wasn't acting, per se," Ibarra says. "There isn't an opportunity for that, because the producer is constantly throwing questions and directions at you while you're trying to get the work done."

One television producer who has worked with Ibarra says his combination of technical know-how and dogged persistence is what's created a following that stretches from New Hampshire to New Zealand. "Juan's an expert in his field," the producer says, "and the sooner his fixes get things up and running, the more profitable the situation becomes for everyone involved. But he's also appealing to TV audiences because he has this can-do attitude that helps him find a creative and workable solution to whatever problem is at hand."



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Starting this January, Ibarra's expertise and fix-it skills have moved more directly into the spotlight thanks to his co-starring role on the Gold Rush spinoff series featuring mining veteran, Freddy Dodge. The new show is giving the mechanic/fabricator/plumber new opportunities to demonstrate what he's capable of, both in front of a camera and a wash plant.

However, Ibarra emphasizes his profile on Gold Rush: Freddy Dodge's Mine Rescue differs meaningfully from what it was on the previous show.

"On Gold Rush, I was one of 32 people in a 47-minute-long program," he says. "In the new series, I'm in partnership with Freddy. My role is explaining what's wrong to those whose mines are in trouble and then fixing what's wrong. That enables the audience to see a lot more of who I am as a person."

Those who know Ibarra well say his off-camera persona might surprise a lot of viewers.

"On the show, Juan is pretty matter-of-fact," says one industry colleague. "But he's a genuinely good guy who's willing to help out wherever and whenever he can. For example, in addition to his main line of work, he supervises a crew that handles snow removal around the Reno area, troubleshooting any mechanical breakdowns that crop up day or night."

Juan's father agrees that the sometimes-blunt son he sees on television is nowhere near that gruff in real life. "He's always been a good role model, even as a kid," he says. "Whenever we'd have winter storms here in Reno, he'd go looking for cars stuck in the snow and help the drivers out."



"But my wife has reprimand him for swearing on the show," he admits. "We think he could be more polite."

Ibarra acknowledges that, like most mother lodes, his run as a cable TV sensation will eventually come to an end. Not only is the handyman prepared for that to happen - he's clear about what direction he will take when that time arrives.

"I love what we're doing on the show," he says, "but who knows what its shelf life will be? What I do know is, when it's over I will probably return to Reno and to the family business."

"For the last seven years, I've felt like a transient, spending six months here, six months there. So, I look forward to staying in one place for a while and expanding Ibarra Industries, so my son can take it over when he's ready to start fixing things for a living." **ARC**

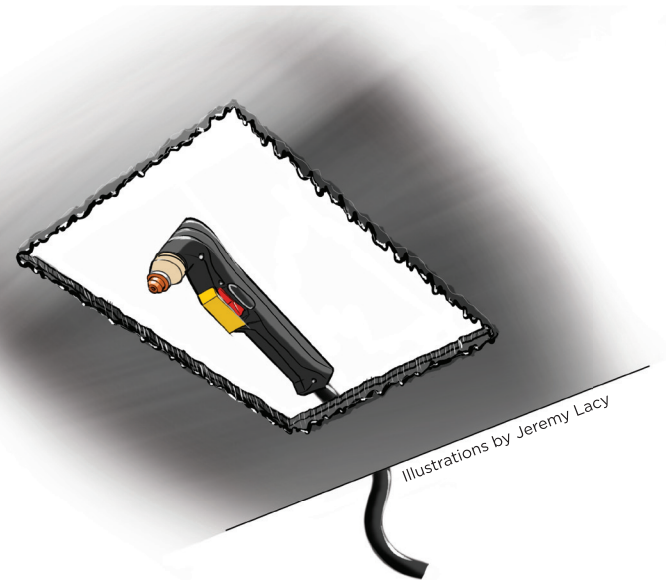
QUESTION MARK



ARC taps into the vast experience of veteran tradesman, educator and author Mark Prosser (CWI/CWE). In addition to many years as a welder for the automotive and motorsports industries, Mark has also spent the last 15 years teaching welding at the college level, where he fields challenging questions from his students every day. He shares some of those questions – and his answers – with *ARC* in every issue.

Why do I get so much slag on the backside of my torch cuts?

▶ The slag on the backside of a torch or plasma cut is also referred to as dross, and whether you are using an oxy-fuel cutting torch or a plasma torch, it's caused primarily by incorrect travel speed. Beginners often move slowly with the plasma or oxy-fuel cutting torch. The phenomenon is very similar to what we see with travel speeds relative to welding. The only difference is that you aren't watching the puddle and carrying it across the joint. You're watching the metal be removed. However, the principle is the same. With an oxy-fuel torch, the flame setting is important but the travel speed is critical for a clean cut. Material thickness plays an important role in adjusting either the plasma cutter or the oxy-fuel torch, but when the big variables are correct, clean cuts come down to travel speed. Most of the time, you can move the torch with either process a bit faster than you think you can if you have the skill. This will help produce a cleaner cut on the back side of your material.



Illustrations by Jeremy Lacy

Are shaded goggles a necessity when cutting with an oxy-fuel torch?

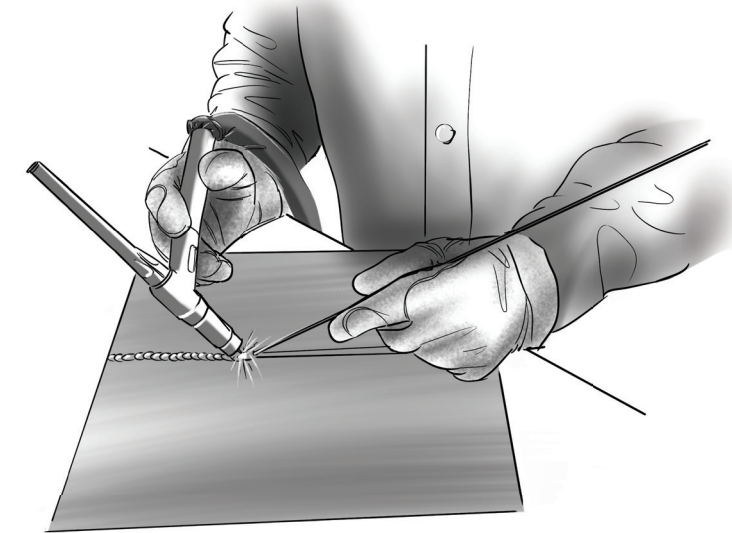
▶ Bottom line, proper personal protective equipment – eye-related or otherwise – should always be used when welding or cutting. These are processes that generate light at intensities that are potentially dangerous to the human eye. The light from an oxy-fuel welding or cutting torch is referred to as visible light – similar to looking at the sun for a few seconds or having a flashlight beam pointed directly at your eyes at night. This type of light causes temporary blindness, but the effect usually dissipates after a few seconds. But while it's not permanent, it can damage your eyesight over time – in the same way that not wearing proper hearing protection can cause permanent hearing impairment over time. Bottom line, you need to wear shaded lenses as a basic safety precaution when using a cutting torch. In addition to protecting against light exposure, they can also protect your eyes against exposure to particulates resulting from dirty tips, malfunctioning torches and other factors. Don't take unnecessary risks. Eye injuries can be very serious. Always wear proper protection.



Illustrations by Jeremy Lacy

Why is TIG welding aluminum more difficult than TIG welding steel?

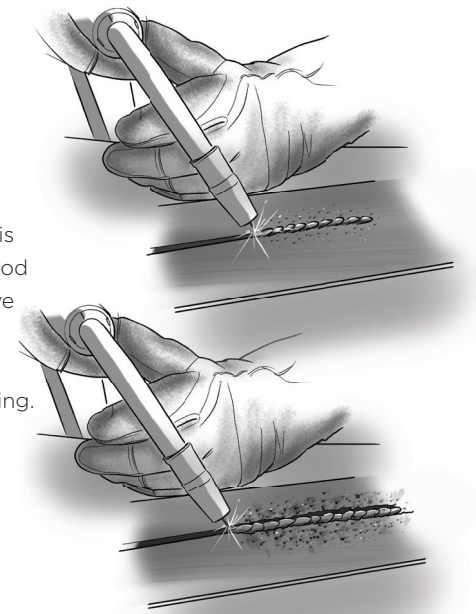
▶ People who learn to TIG weld steel often find welding aluminum a bit more difficult. Most of the difficulty stems from the need for cleanliness and oxide removal. This is why we use AC current on aluminum when TIG welding. The AC current removes the oxide and melts the material at the same time. The other important difference between welding steel and aluminum is the melting point. The melting temperature of aluminum is approximately half that of steel. This means the welder must develop faster reaction times when moving and dipping the filler, because the melting time is much quicker. It takes practice, time and patience to develop the proper reaction time to the puddle, but when you finally get it, welding aluminum can be a satisfying experience.



Illustrations by Jeremy Lacy

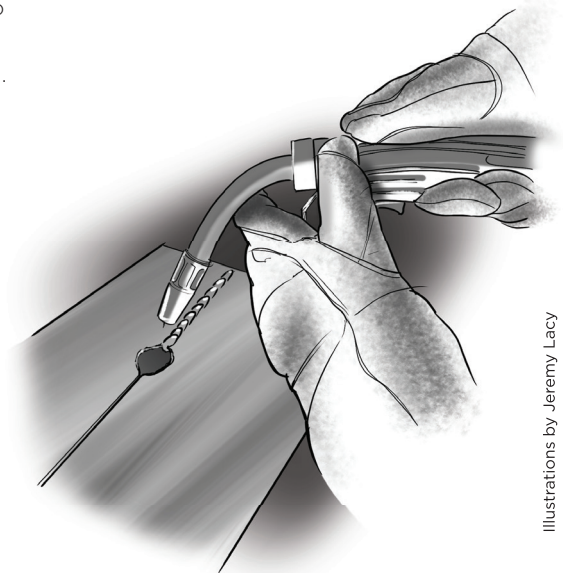
What is difference between Argon mix and CO₂ gas use for MIG welding?

▶ The two most typical gases used for welding short circuit MIG are CO₂ and 75/25 Argon/CO₂ mix. For reasons too complex to explain here, MIG welding steel with 100% is not an option. CO₂ produces a slightly hotter arc and is cheaper than 75/25, so it's a good choice for industrial applications. CO₂ creates a more erratic arc and has a less attractive appearance. The best choice for all of your MIG welding needs – and by far the most common gas – is 75% Argon and 25% CO₂. This creates a stable arc, good penetration characteristics and better weld bead appearance, assuming you know what you are doing. The difference in gas can make a huge difference in the quality of your welds.



Why do I keep burning through my sheet metal even when my MIG machine is turned way down?

▶ Welding thin sheet metal can be tricky, even for experienced welders who weld thicker materials all the time. The MIG process is good for welding sheet metal, especially if you don't have access to the backside of the metal. Depending on how you're planning to finish the metal, the MIG process can be a good option. If you turn down your machine to the point of spitting and sputtering, you probably need to move to a smaller electrode size. If you're using a .035 wire on 20-gauge sheet metal, the material is .037. This means you need as much electricity to melt the wire as you do to melt the material. This scenario makes it almost impossible to make the welds without burning through. Of course, we're assuming all variables are appropriate to the equipment you're using and to your skill level. Reducing the filler (wire) size will allow it to melt at lower temperatures than the material. This is the same principle that governs TIG welding. You wouldn't want to use 3/32-inch filler when welding 16-gauge material. The filler must always be equal to or less than the material thickness, which is why filler is available in so many different diameters. Personally, I use .025 or .030 wire size for all sheet metal. Anyone with aspirations to become a skilled welder still needs need to put in the hood time.



Illustrations by Jeremy Lacy

BUILDING ON 125

By John C. Bruening

Lincoln Electric Celebrates A Landmark Anniversary By Recognizing Ambitious Welding Projects.

Despite the challenges of the Covid pandemic, Lincoln Electric marked its milestone anniversary in 2020 in a number of ways throughout the year. Among the celebratory initiatives was the Lincoln Electric 125th Anniversary Project Contest, a competition that put the spotlight on welders who use our equipment to build items that are innovative, practical and visually compelling all at the same time.

By early October 2020, nearly 2500 competitors from around the country had submitted specs, photographs and other information highlighting their builds. Over the course of the month, a team of three industry influencers – Jimmy DiResta, Cynthia Gauthier and Chris Zeppieri – whittled the entries down to a handful of finalists.

Votes posted on Lincoln Electric social media led to the selection of a winner at the end of October. Brandon Rodriguez of Boerne, Texas, took the top spot for his Two-Ton Smoker project, built with a Lincoln Electric Power MIG 350MP welder.

In this issue of ARC, we throw the anniversary spotlight on Brandon and some of our other finalists.



FINALIST: Brandon Rodriguez
LOCATION: Boerne, Texas
PROJECT: The Two-Ton Smoker

Brandon Rodriguez built this upright smoker during his junior year at Samuel V. Champion High School in Boerne, Texas. The design, which includes a 42-inch-diameter smoking chamber, is a patchwork of ideas and elements he'd found elsewhere, but the result is something entirely unique. And yes, it does in fact weigh two tons.

"It was a collaborative effort between the welding instructor, myself and other students. The goal throughout the project was to create something you couldn't find on the internet, something you've never seen. Because if you can find it on the internet, then it's already been done."

The 1,100-hour project involved an immersion in physics and engineering as much as welding. The first step was a CAD drawing, "because it's a lot cheaper to make changes on the computer than it is in the middle of the build," says Rodriguez. By plugging data into an online calculator, he and his collaborators determined the optimal airflow and sizing, the proper height for the stacks, and various other dimensions and specifications.

"The entire pit is scientifically calculated so that the airflow comes completely into the inlets and through to the outlets," he says. "Everything is the correct size, which maintains an even heat throughout the entire cooking chamber. This isn't just a generic pit that you just throw together."

The cooking area is located behind the two top doors, and the grates are circular so the user can spin them for easy access to the food during the cooking process.

All of it – the main cooking chamber, grates, airflow ducts, stacks and more – came together with the help of a Lincoln Electric 350MP welder. "That entire project was actually pulse MIG welded with a Lincoln Electric machine and Lincoln Electric wire," says Rodriguez.

He also started his own custom fabrication business, Certified Best Welding Solutions, during the same year he was building the smoker. Since graduating from high school, the venture has become his full-time job.

"I do custom fabrication, structural welding, mobile welding, pipe welding..." he explains. "Bottom line, when people ask me what I do, I tell them, 'If it involves metal, I can cover you, at least to a certain extent.' I don't limit myself to anything. Some days I'll be in the shop working on something as small as firewood log racks to something as large as a complete metal staircase for a building, fencing an entire warehouse property, fabricating a railing, putting up a metal building, or whatever else."

Despite the obstacles and challenges that Covid created for so many 2020 high school grads, the Two Ton Smoker has helped set Rodriguez on a path that appears to be a promising career track.

"I would say I developed my interest in welding right there in high school during my sophomore and junior years," he says. "That's where it really took off. I realized, 'Wow, not only do I like this, but I'm really good at it.' It was something that came second-nature to me."



FINALIST: Andy Garcia
LOCATION: Bandera, Texas
PROJECT: Goose Neck Trailer

If you have something heavy you want to take on the road, Andy Garcia will get you where you want to go. His agricultural mechanics project during his senior year of high school was the construction of a 40-foot gooseneck trailer. Using an Idealarc 250 stick welder from Lincoln Electric, Garcia built the trailer for his local chapter of Future Farmers of America, so other students like him could haul their large-scale projects to and from regional FFA competitions and expositions.

"I built it in the ag shop of our high school," says Garcia. "It took about 750 hours. I had two friends helping me, but I was the only welder on the project. They pretty much held parts for me while I was welding, and they helped get things lined up so I could take measurements."

His design for the trailer incorporates various elements he'd seen elsewhere. "We looked at other trailer designs online," he recalls, "and we sat down and figured out what features we liked, and then we looked at all the measurements. We consulted with an engineer and he approved of our measurements, so that was the green light for us."

Garcia recalls burning through about five tubs of rods to complete the project. "That's a lot of welding," he says. "

The Idealarc 250 kept the occasional bumpy stretches of the project under control, says Garcia. "Honestly, I've always liked welding with Lincoln," he says. "We had the competing version of the Idealarc on hand, but to me, it was rougher. I liked how smooth the Lincoln was, and how consistent the arc was. It just provided deeper penetration and made a better finish on the weld."

Garcia, 19, has been welding for about five years, since the eighth grade. "It was a challenge when I first started," he admits. "I struggled with it, and I wanted to get better at it, so I just kept pushing myself. I just kept going, all the way through high school."

He currently works in the gas industry in nearby San Antonio, where he does some occasional welding jobs in the yard until he can get the proper certification to weld on a more regular basis in a rig environment. Until then, he maintains his own welding business on the side. "I build fences, car ports, a lot of small structures," he says. "I'm learning that there are a lot of ways to make a living as a welder."



FINALIST: Mason Haynes
LOCATION: McDonald, Ohio
PROJECT: "The Curious Octopus"

Mason Haynes spent about 65 hours putting together "The Curious Octopus" with nothing more than a Lincoln Electric AC-225-S and a healthy dose of patience and persistence. The eight-armed creature is two feet high, three feet wide and 3.5 feet long. At 250 pounds, it would have trouble staying afloat, so it's definitely a decorative piece for dry land.

"I follow a lot of different metal artists on Instagram," says Haynes, "and I saw that a couple of them had put an octopus together. I liked theirs, but I thought they were a little simpler than what I envisioned doing. I just decided that I wanted to try my hand at it."

There were stops and starts along the way, but he finished the project in the fall of 2020. "I worked on it a lot," he recalls. "I probably put 30 hours into it in 2019. I didn't have a welding table or anything like that to work on. I was working on the floor. I got really sore from doing it, and I put it down for almost a year before I picked it back up. It was sitting in the garage before I finished it."

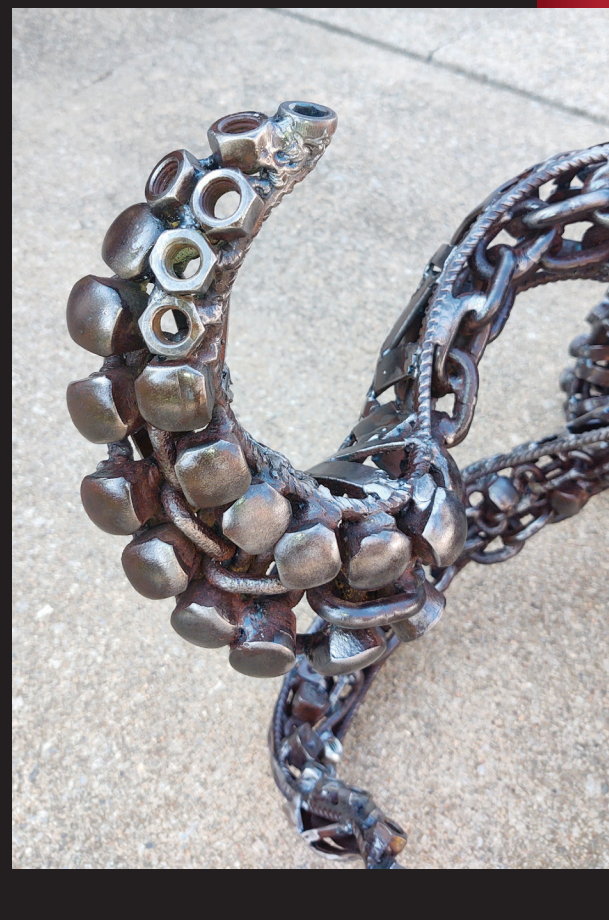
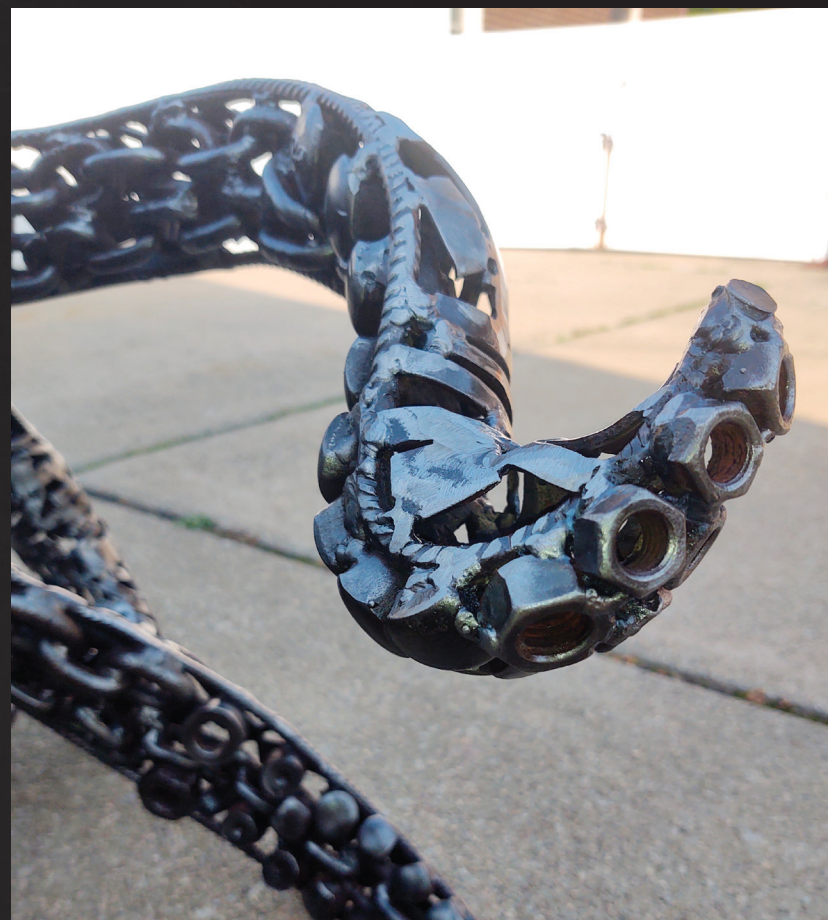
The octopus is just one of many pieces Haynes has crafted in recent years. He tends to find his creative muse in animals and other aspects of the natural world. The fascination with welding, both as a form of artistic expression and as a professional trade, started in a high school art class when he was 16.

"I really enjoyed it, and I kind of had the itch to do it ever since," he says. "I'd wanted to do it for a living – more than just building sculptures with it – but I didn't. I went out and chased a different career for about ten years."

After burning out on a decade's worth of drafting reports for the oil and gas

industry, Haynes hit the reset button near the end of 2020 and went to work in a specialty welding shop in Northeast Ohio that provides fabrication and repair services for aluminum and other alloys. But he plans to continue sculpting on the side, just to see where it might take him.

"I do better just making what I want to make," he says. "If somebody wants to buy it, that's fine. I struggle with the idea of specific commissions. I just want to keep honing my skill set."



FINALIST: Sean Lowery
LOCATION: Clearwater, Florida
PROJECT: "The Life Tree" drum cage and riser

Musician, audio engineer and metal fabricator Shawn Lowery has spent his adult life banging on more than just his drum kit. He also cuts, hammers and welds metal into a variety of decorative pieces – including "The Life Tree," one of the most ornate drum cages in the rock touring circuit.

Lowery used a Lincoln Electric SP100 – a hand-me-down from his father that has been in service for more than 20 years – to craft this intricate yet functional sculpture that consists of more than 1300 feet of steel and weighs in at more than 500 pounds. It breaks down into more than 50 pieces, and can be reassembled by one person with a wrench in as little as 20 minutes.

"I had already fabricated the top portion, which is the actual drum cage, back in 2005," he says. "I didn't do the full design because I was traveling so much that the riser wasn't necessary. In a lot of places we played, either the ceilings were too low, or we already had risers at the venues. I used the cage for a good five years, then I started work on the riser. I finished it more than ten months later."

The idea first came to him when he was only about six years old. He saw the cover of a Kiss album and started drawing his own costumes and stage designs. Among these were the initial drawings of "The Life Tree." All of this happened at least a decade before he started playing music in his teenage years. His father, who welded in a factory for as much as ten hours a day, taught him some welding basics, and he ran with it.

Like most touring musicians, Lowery was sidelined for most of 2020 by Covid – which opened up more time for him to spend with Sawbladehead Designs, his fabrication shop in Clearwater, Florida. Operating under the alias of "Mr. Sawbladehead," Lowery makes furniture and decorative pieces for homes, microphone stands and other gear for musicians, and more. He recently upgraded to a Lincoln Electric Power MIG 210 MP, but "my entire business has been built off that SP100."

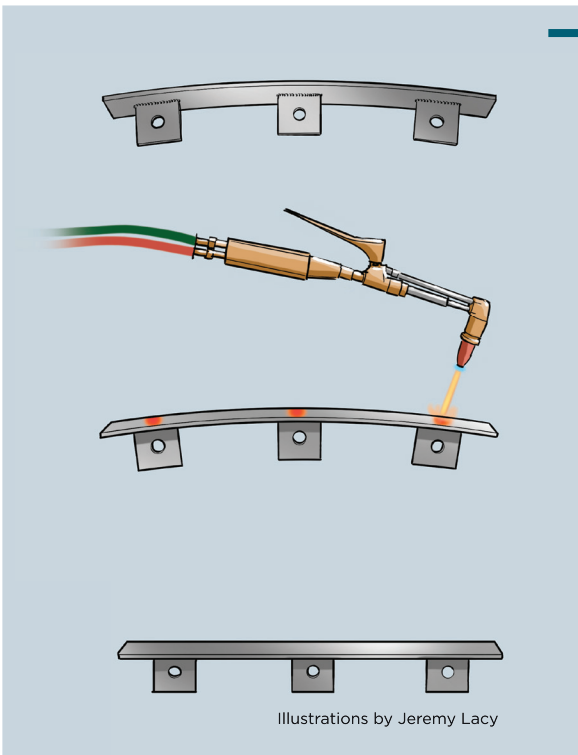
"The Life Tree" is currently on display at a music store in Clearwater, but Lowery insists that "it will hit the stage once again as the music venues open back up!"

ARC



SHOP TRICKS AND TOOLS

ARC brings you time-saving, money-saving ideas to improve the quality of your projects and the process by which you complete them.

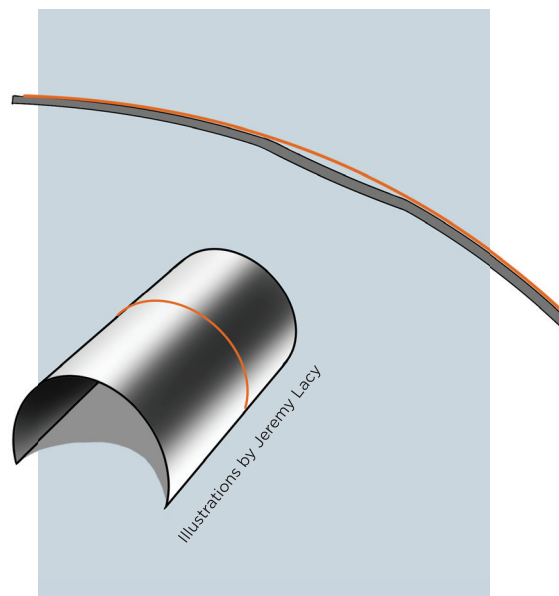


FLAME SHRINKING

► Most people who work with metal have used an oxy-fuel torch at some point to heat a stubborn bolt, bend a piece of metal or cut and weld something together. A torch can also be used for another important purpose: preforming heat shrinks to reverse distortion in your welded parts. Heat shrinking is a process of strategically heating a small area to counteract the shrinking caused by welding. The size and placement of the shrink depends mostly on the thickness of the material and where it is welded. We place the shrinks on the opposite side of the materials directly across from the welded areas to counteract the pull forces from welding. In the example, the flat bar has been distorted from welding the tabs on one side. The shrinking forces of the welds have pulled the material into a bowed shape, and it needs to be flattened. This is where heat shrinking is helpful. The key to heat shrinking is to use a small flame (not rosebud or multi-flame tip) to heat a small area – usually dime- or quarter-sized – until the metal turns red hot. As the heated area cools, it creates pulling (shrinking) forces in the opposite direction of the weld's pulling forces. When this technique is done correctly, you can actually see the material pull back into place. With a little practice and understanding, flame shrinking can be a great help when trying to fix distorted parts.

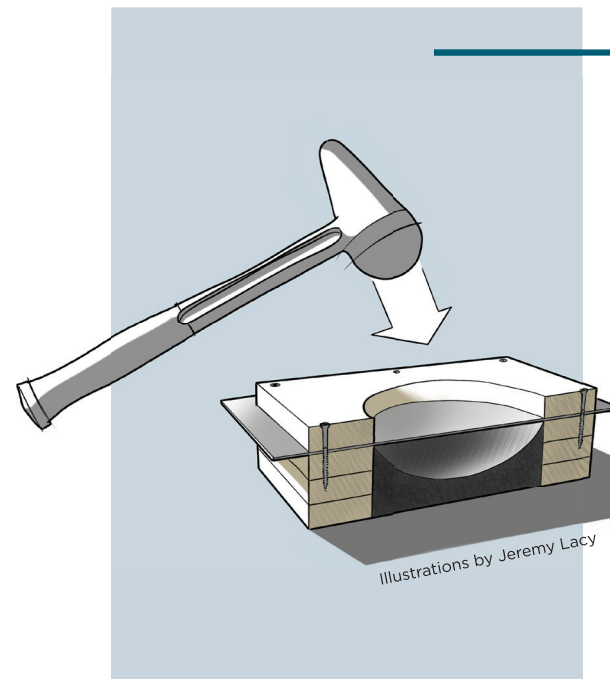
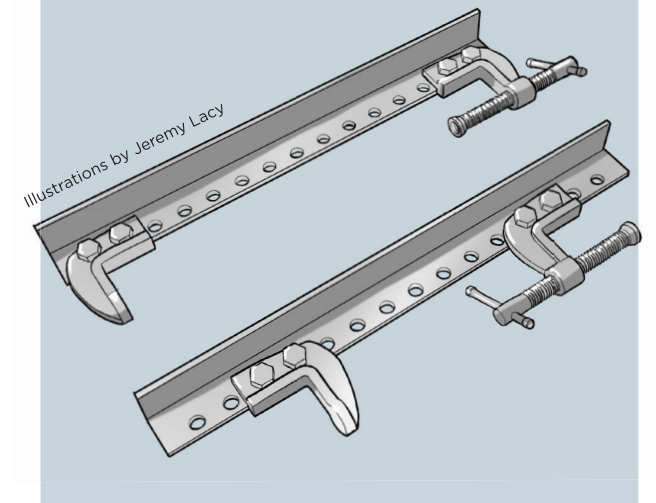
USING TIG FILLER IN A DIFFERENT WAY

► Making sure something is straight when fabricating is easily done with levels, fixtures, clamps and squares, but how do you make something straight that is initially curved or rounded? This is an easy trick I learned many years ago. A piece of TIG filler rod can be a very effective gauge tool on curved surfaces. TIG filler is very consistent in length and diameter. It holds its shape very well when it is bent. By using a piece of 1/8-inch or 3/32-inch filler, we can make quick and accurate patterns, create smooth and accurate curves for layout, and use it to check highs and lows in a curved or rounded panel. Filler can also be a very effective tool in finding high and low spots in a curved or round panel like a fender of an older car or a round tube. Filler can also be easily tacked together to create all kinds of patterns for making parts. It is one of the simplest and most effective methods in your shop for laying out rounded or curved lines, checking for low spots, holding parts in place for mock up, or making a metal realistic pattern of a simple part. With a little creativity and some practice, TIG filler rod can be a fast accurate and effective tool to make your curved parts straight.



CUSTOMIZED C-CLAMP

► C-clamps are probably one of the most common tools in any shop. They're available in all sizes and shapes, but sometimes they're just too small and we need a much larger throat depth to get the job done. The ability to clamp parts when fabricating is critical, but being able to push or expand parts away from each other can be very helpful too. There are many ways to construct a custom push/pull C-clamp. Yours can be modified to your needs, but the clamp shown here can be a very helpful tool for getting things in place. We start by cutting the C-clamp in half and drilling holes for adjustability. When the two halves are drilled, the same distance holes are drilled into a piece of angle at whatever length you need. The two halves of the clamp are bolted to the angle at a distance you require for bar type clamping techniques. Pushing things away from each other simply requires the clamps to be unbolted and turned around. Having a long clamp or the ability to push things apart is a very useful tool for your toolbox. Each application will be a little different, but creating an adjustable deep-throat clamping device that can apply pushing and pulling forces is worth sacrificing the old C-clamp that's been sitting around your shop.



SIMPLE HAMMER FORM

► Hammer forms have been used to create parts in the automotive and aerospace industries for decades. A hammer form is exactly what it sounds like: we create a form and hammer the metal into the form to give the metal a desired shape. Hammer forms such as this one can be easily constructed or can become extremely complex and intricate, but they are generally used for shaping thin materials – usually 16-gauge and thinner. This example was constructed to produce metal bowls for different applications, and can certainly be modified to your needs. The process and theory are the same for all hammer forms. We started with four layers of plywood with a 6-inch hole cut into each piece. The number of layers will depend on how deep you need the form. All pieces are screwed together to hold tolerance. A plastic or metal bowl will help you achieve the desired shape. Place the bowl in one end of the 6-inch holes and spray with a lubricant. Fill the form from the other side with fiberglass-reinforced automotive plastic filler. Once the filler is cured and the bowl is removed, the form is ready. Place sheet metal over the form, hold it in place with the top layer of the form, and screw it together to avoid any movement with the metal. Hammer the material into the form with a plastic or metal hammer to create the exact shape of the bowl used to create the form. Simple hammer forms can produce very smooth and consistent parts that otherwise would be difficult to make.

EDUCATOR SPOTLIGHT

KEVIN CORGAN

LEARNING BY DOING

By John C. Bruening

Kevin Corgan has spent enough time in and out of the classroom to know that organization and focus are key ingredients to success. After fourteen years as a full-time welding instructor at Southwestern Illinois College (SWIC), and more recently as coordinator of the college's welding program, he believes the best way to teach and the best way to learn is to get into the booth and get busy.

"I like to run a very organized, professional style class that doesn't waste time and gives the student as much arc time as possible," he says. "Parallel to that, I like to provide lots of encouragement and one-on-one student-instructor time. That kind of sums up the classes...I like to get in there and get it, and not waste any time."

Corgan's father was a welder, so he was exposed to the trade at an early age. By ninth grade, he had enrolled in metal shop, then participated in his high school's welding vocational program a couple years later. He earned an associate degree from SWIC in 1990, then took his TIG welding skills into a variety of industrial settings, including construction, foodservice and other areas.

After a couple years of part-time teaching at SWIC in tandem with the day jobs, he transitioned out of industry and started teaching full-time at the college in 2007. As of the 2019/2020 school year, he is now the coordinator of the program, although he continues to teach on a regular basis. His curriculum has covered

the full gamut over the years, but his more recent emphasis has been on MIG, TIG, pipe welding, robotics, CNC cutting and advanced blueprint reading.

For Corgan, imparting knowledge about welding has always been about doing. "I really stress to the students that we have a specific amount of time in the classroom," he says, "so we need to weld as much as possible while we're there. Obviously, there are times when you have to stop welding and discuss the process, but when it's time to weld, we want to just get in there and do it."

Bryce Dickenson, currently a part-time welding instructor at SWIC, is also a 2018 alumnus of the college who took at least half of his welding courses in Corgan's classroom. For all of the structured coursework, though, Dickenson's more enduring memory is the teacher's generosity when Dickenson participated in the Skills USA competition. He remembers Corgan putting in some long nights - sometimes as late as five o'clock the following morning - to help him prepare for the preliminary competitions.

"If it wasn't for him, I wouldn't have made it as far as I did in the competitions," says Dickenson. "And that really helped me out in the years after, because now every time I have to do something hard, or something that I think may be difficult, it's a lot easier to get through it after all the stuff I went through with Kevin for the competition."

In the end, Corgan's formula for learning is a simple one: "Make a weld," he says. "Take a look at what might need to be adjusted with the next weld. Maybe go a little faster or a little slower. Maybe weave a little wider or pause longer on the sides. Whatever it happens to be, one thing is certain: the more you do, the better you get." **ARC**

"I LIKE TO RUN A VERY ORGANIZED, PROFESSIONAL STYLE CLASS THAT DOESN'T WASTE TIME AND GIVES THE STUDENT AS MUCH ARC TIME AS POSSIBLE,"

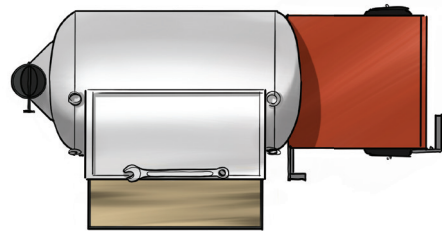
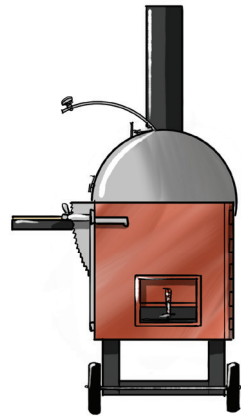
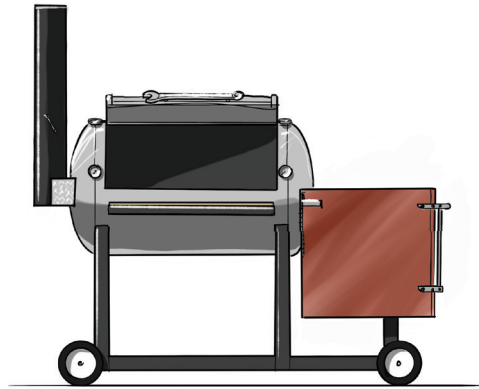
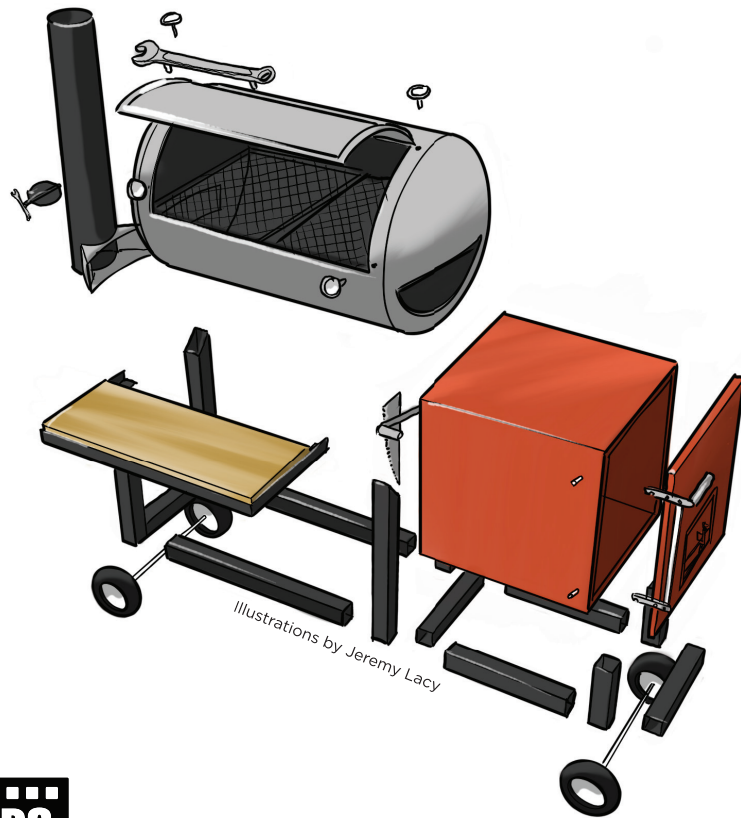


Photo courtesy of Southwestern Illinois College.

Project Spotlight

BUILDING A SMOKER FROM A COMPRESSOR TANK

By Jimmy DiResta



Illustrations by Jeremy Lacy



Watch exclusive footage at arcmagazine.pub

Summer is just around the corner, which opens up plenty of opportunities for outdoor gatherings. And outdoor gatherings often include cooking and eating. In this issue of *ARC*, Jimmy DiResta recycles an old compressor tank to build a meat smoker, with a firebox and flue to regulate the intensity of the heat and smoke inside the main chamber.

It's an elaborate build, but the result is a piece of backyard hardware that will produce plenty of culinary delights - not just in the summer months, but all year long. Be safe, enjoy the summer months, and bon appetit!

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. Use an approved respirator if exposure to welding fume cannot be controlled, or if welding outside and natural air movement is not sufficient to keep welding fume out of your breathing zone.

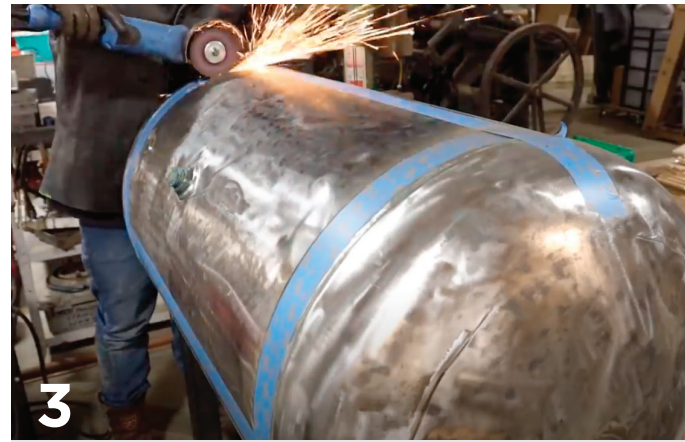
MATERIALS

- 80-gallon air compressor tank
- 30 feet of 2-inch x 2-inch tube (1/8-inch thick)
- 6 squares of 3/8-inch plate (22 inches x 22 inches)
- 6 squares of 1/4-inch plate (24 inches x 24 inches)
- Approximately 20 feet of 1/2-inch x 1/2-inch angle
- 4-foot x 4-foot expanded stainless steel mesh
- Approximately 25 feet of 1-inch x 1-inch stainless steel angle
- 4 barbecue thermometers
- 1 5-foot long x 6-inch diameter smoke tube
- 4 small tractor wheels

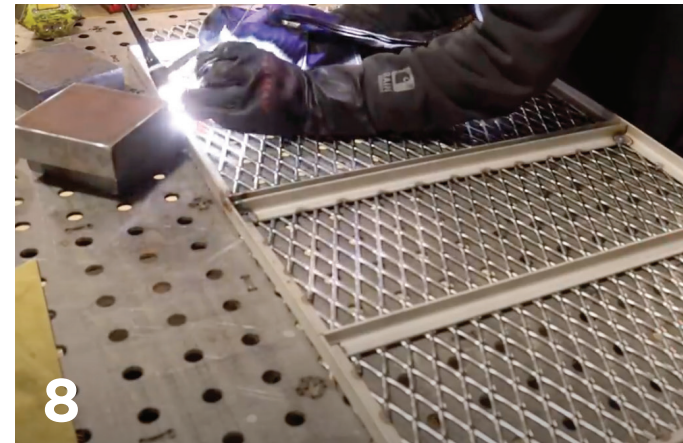
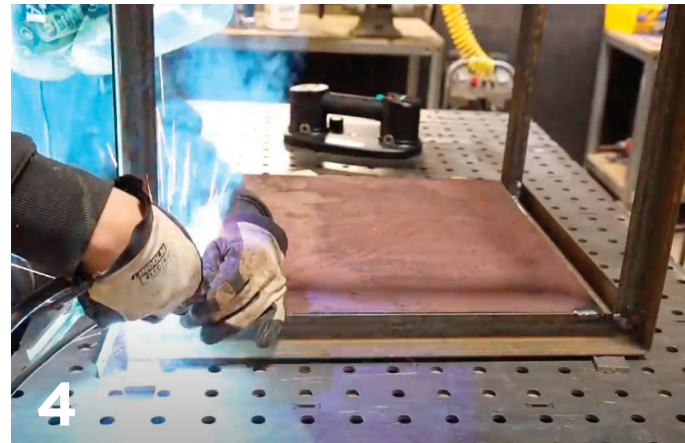
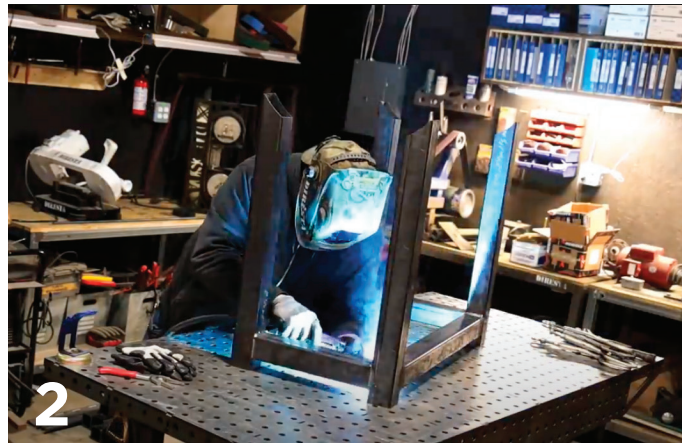
WELDING/CUTTING EQUIPMENT AND TOOLS

- Lincoln Electric Power MIG® 210 MP® multi-process welder
- Lincoln Electric Square Wave® TIG 200 TIG welder
- Lincoln Electric Power MIG® 140 MP® multi-process welder
- Lincoln Electric Power MIG® 260 MIG welder
- Tomahawk® 625 plasma cutter
- Metal hacksaw
- Band saw

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Imagery © Jimmy DiResta



Step 1:

Cut off the base and other extremities to take the tank down to its basic pill shape. Use a non-toxic paint remover and abrasive pads on your grinder to remove paint and other residue from the surface of the tank. Use a hack saw to cut the 2x2 square tubing to create the framework that will carry the legs, and square up the bottoms of the individual pieces with a disc sander. Tack the frame pieces together. Build two H frames - one for the left and one for the right - then connect the two.

Step 2:

Use the band saw to cut the radius on the struts of one of the H frames, then use that H frame as a template to cut the struts of the opposite frame so that each is a mirror image of the other. Position the tank on the struts, then weld the supporting struts to the bottom of the tank.

Step 3:

Tape off the area on the upper part of the tank that will serve as the smoker door. Cut the left and right sides of the door, then tack the 1/4-inch by 1-inch flange to each side. After tacking, run a full bead on both sides. Tack and weld the same flange along the bottom, then cut the top and bottom of the door. (Following this sequence will prevent the curvature of the door panel from changing after it's cut away from the rest of the tank.) Use the band saw to cut the hinge to the desired width, then tack and weld the hinge to connect the top edge of the door to the upper edge of the door opening.

Step 4:

Use the cutter/notcher/bender to make the frames for what will be the firebox. Leaving the seam in the middle of two flats rather than a corner will make it easier to weld the frame together. Tack and weld the flat steel panels into the frame to create the firebox. Insert insulation in the space between the panels of each wall to mitigate heat buildup between the double walls of the box.

Step 5:

Cut away a semicircle at one end of the tank to accommodate the firebox. Measure the same semicircle on the side of the box, then cut the same measurement on a sheet of flat steel to create a valve for the opening on the side of the box to regulate the flow of heat and smoke. Position bolts on the edge of the firebox and the center of the valve panel to accommodate the lever mechanism that will raise and lower the valve. Line up the opening of the firebox with the opening at the end of the smoker chamber and weld the two pieces together. You'll probably need to assemble an additional set of legs underneath the firebox to accommodate the extra weight on one side of the chamber.

Step 6:

Cut an opening on the side of the chamber opposite the firebox to accommodate the tubing that will act as the flue. Drill a hole in the flue to accommodate the damper door control rod, then use a strip of 4 x 4 lumber to hold the damper door in place while welding the door to the rod. Fit up the flue with the opening at the end of the tank and weld the two assemblies together. Cut an airflow port into the lower half of the panel that will become the firebox door. Insert insulation into the door and weld the hinge to attach the door to the rest of the box.

Step 7:

Cut a length of steel rod and drill holes in the center to create the washers for the latching and locking mechanism. Weld each of these washers to either end of a connecting rod, then weld axle rods to the edge of the firedoor to hold the rod. Position locking posts on the side panel of the firebox to line up with the latching/locking assembly on the edge of the door. Cut the nuts and axles to size and put a weld at the end of each to cap them off. Weld an axle rod to the locking/latching mechanism to serve as a handle. Likewise, weld a handle to the door of the smoker.

Step 8:

Cut the stainless steel mesh to fit the inside the chamber, then cut and weld the L-shaped steel to frame up the mesh. Use a recycled C-clamp to construct an adjustable vent for the airflow port on the firebox door. Cut a strip of 1/8-inch steel in a curved configuration with a jagged edge to act as a ratcheting mechanism to control the firebox valve. Attach the tractor wheels to the feet to mobilize the entire assembly, and attach the barbecue thermometers to the exterior of the chamber.

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

THE ART OF THE IMPERFECT

By John C. Bruening

Matt Retzlaff's modest two-car garage at his home in Buffalo, New York, is more than just a place to park the family car. It's the space where he turns scraps of found metal into replicas of the animal kingdom and other aspects of the natural world.

His fascination with this particular subject matter may have started when he rode horses and communed with nature at the summer camp he attended as a kid. Whatever the source of inspiration, Retzlaff is committed to building something out of nothing and minimizing waste in the process.

"It's satisfying to take something that someone has thrown away - maybe something I just picked up from the side of the road - and make it part of a sculpture," he says. "I've been known to express displeasure if my wife is driving and won't stop for a pile of metal that's been left on the side of the road."

More specifically, his discarded raw materials of choice are metals that have already been weathered by nature. "They're small pieces of art in and of themselves," he says. "I just need to figure out how to fit them together and use each piece wisely."

Considering the quality and complexity of his work, it might come as a surprise that Retzlaff has only been fabricating and sculpting for five years. He admits that he still has much to learn, but he considers the occasional flaws and mistakes that make their way into the work to be part of the overall expression.

"I consider myself more of an artist than a metalworker," he says. "My welding has improved greatly over the past few

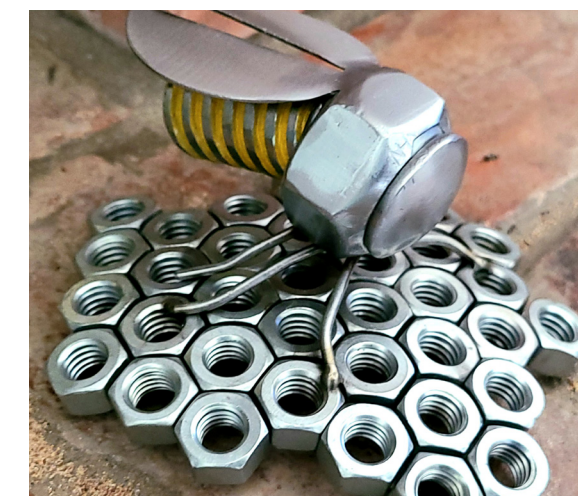
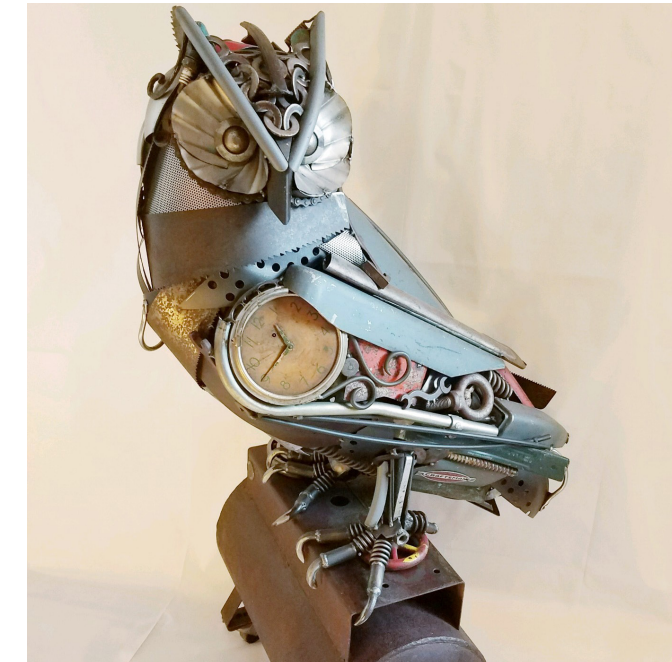
years, but my imperfect welds have also helped develop my style. In a sense, it's part of the art. However, I have come to appreciate having quality equipment that I can depend on every day. It pays to spend a little more on equipment and tools that will help you produce better quality and be more time-efficient."

Based on that premise, he appreciates the consistency of the Lincoln Electric Pro MIG 140 that he's been using for more than two years.

His favorite project to date is a sculpture of a horned owl that he calls "The Watcher." It was several months in the making, but he takes pride in his ability to persevere and finish.

"I had put some time into it, but then I stalled for about nine months after I hit a creative block," he recalls. "I really had no plan or drive to go any further with it. Then one day I said to myself, 'What the hell is wrong with me? I have to finish this thing.' I guess I had to prove to myself that I could do it. I changed his perch and it all started to come together. He gets the most attention whenever I share him on social media."

Given his current combination of passion and pace, Retzlaff expects that he will eventually outgrow his two-car garage. Ideally, he'd prefer a space dedicated to building and showing his work. He currently sells it online and through vendors, and he looks forward to getting back into the art show circuit once Covid-related restrictions on public gatherings have been lifted. If it all continues at a robust pace, it could become a full-time alternative to his day job as a manufacturing supervisor.



Until then, he'll keep tinkering in the garage on projects both large and small.

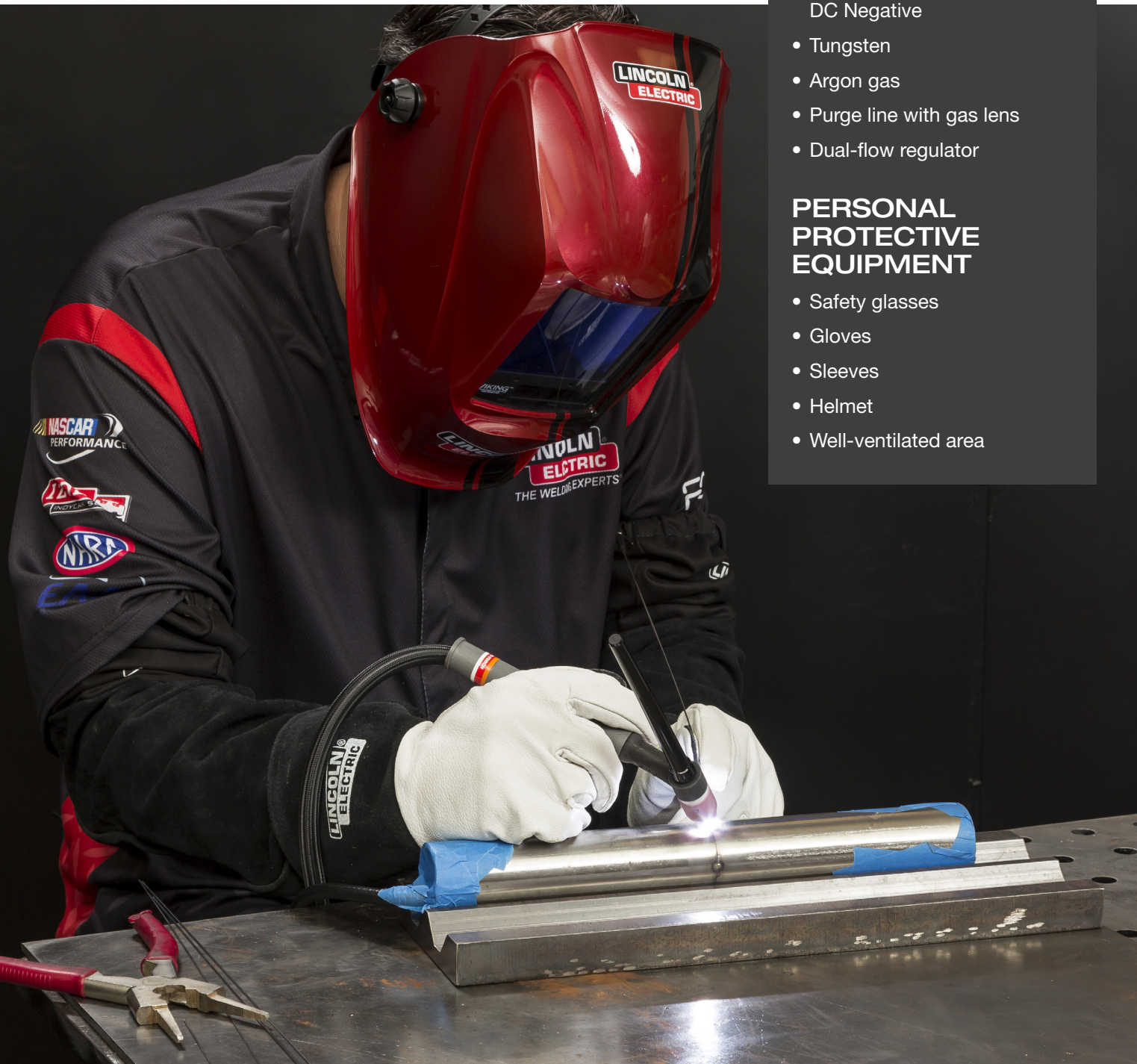
"I get comfortable being able to knock out a smaller sculpture in a few hours," he says, "but I always find the larger projects to be the most rewarding in the end. I always hit a sweet spot somewhere about halfway through a larger sculpture when my creative energy starts to flow. When I start to get excited about what I'm making and I can't shut my brain down - that's when I know I'm doing something right." **ARC**

Master Class

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

Back Purging Stainless Steel

By Scott Skrjanc, former Lincoln Electric welding instructor and current group leader



TOOLS

- 304L tubing
- Lincoln® ER308/308L filler rod
- Lincoln Electric Precision TIG® 225 Welder, DC Negative
- Tungsten
- Argon gas
- Purge line with gas lens
- Dual-flow regulator

PERSONAL PROTECTIVE EQUIPMENT

- Safety glasses
- Gloves
- Sleeves
- Helmet
- Well-ventilated area

Stainless steel is the preferred material in many applications because of its resistance to corrosion.

When preparing to weld a stainless steel pipe, purging is an important step to ensure that the weld is successful and that it remains intact for the long term.

While our demonstration involves a vehicle exhaust tube, purging stainless steel is important when welding pipe for food storage and other applications where impurities must be avoided. For example, failure to purge a pipe that transports food or beverage materials could lead to particles becoming trapped in hard-to-clean grooves, resulting in contamination.

On the outside, a weld on purged and non-purged stainless steel pipe looks identical. On the inside, however, is where the important difference occurs.

A purged weld is flat and tied in on the inside where the weld metal comes together. There are no valleys that could potentially threaten the integrity of the weld. Both portions of the tube look exactly alike.

A non-purged tube displays a “sugaring effect” resulting from the presence of chromium oxide. The presence of oxygen in the weld seam results in oxidation. A noticeable line forms where the weld metal comes together because it doesn’t fuse well. Non-purged stainless steel could crack, especially in high-vibration conditions. Caustic materials could become wedged in the line and eat away at the weld.

Purging removes oxygen and nitrogen and replaces those gases with a 100% argon gas atmosphere.

So to ensure the integrity of the weld, purging is an important part of the process when connecting (or repairing) stainless steel pipe.

The process starts with an examination of the pipe you intend to weld. It can be partially or completely separated. There

may be one or multiple cracks. If it is partially separated, it’s good to leave it that way (as opposed to breaking it into two pieces) because the fit will be much better.

A good cleaning of the tube is always recommended. Remember, TIG does not like dirty material. Make sure you clean the inside of the pipe if you have access to it. At the very least, clean the outside.

Safety is always a primary concern when welding. Make sure you’re welding in a well-ventilated area and wearing personal protective equipment. Once the work area is prepared, you can set up and begin the purge.

After cleaning, tape off one end completely with masking or other adhesive tape, then punch several holes in the tape to allow the oxygen and nitrogen inside to escape (we used a TIG rod for this; see Figure A). Place the purge hose with gas lens (to help with the gas flow) into the other end of the tube and tape off that side completely as well (see Figure B). This prevents the reintroduction of oxygen and nitrogen into the pipe.

Set the regulator (dual flow or separate tanks) to run 15 to 20 CFH of argon to initiate the purge. You’ll know the purge process is happening when you feel the gas escaping the perforated end of the pipe. You also want the argon on the outside of the tube.

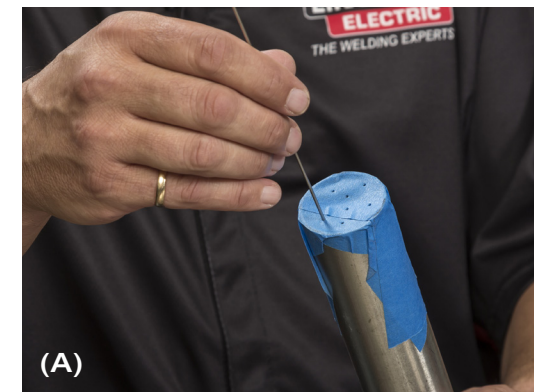
The length of time to purge prior to beginning to weld is based on the pipe’s diameter. Make sure the argon continues to flow during the entire welding process.

When you’re ready, place several tack welds around the pipe.

When it’s time for the final weld, the amperage should be based on the thickness of the tube. A general rule is 1 amp per thousandths of an inch. For example, a tube 0.035 thick requires 35 amps. Stainless steel is welded on DC negative.

Once the weld is complete, let it cool naturally.

Welding stainless steel is not difficult, but it does take practice—and so does purging. Weld on purged and non-purged materials to see the difference for yourself. Purging creates the best possible weld environment and ensures that the metal joins properly and stays together. **ARC**



(A)



(B)

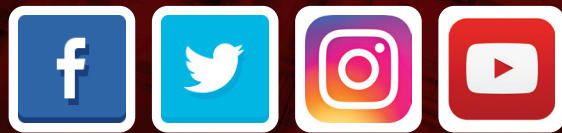


Purged

Non-purged

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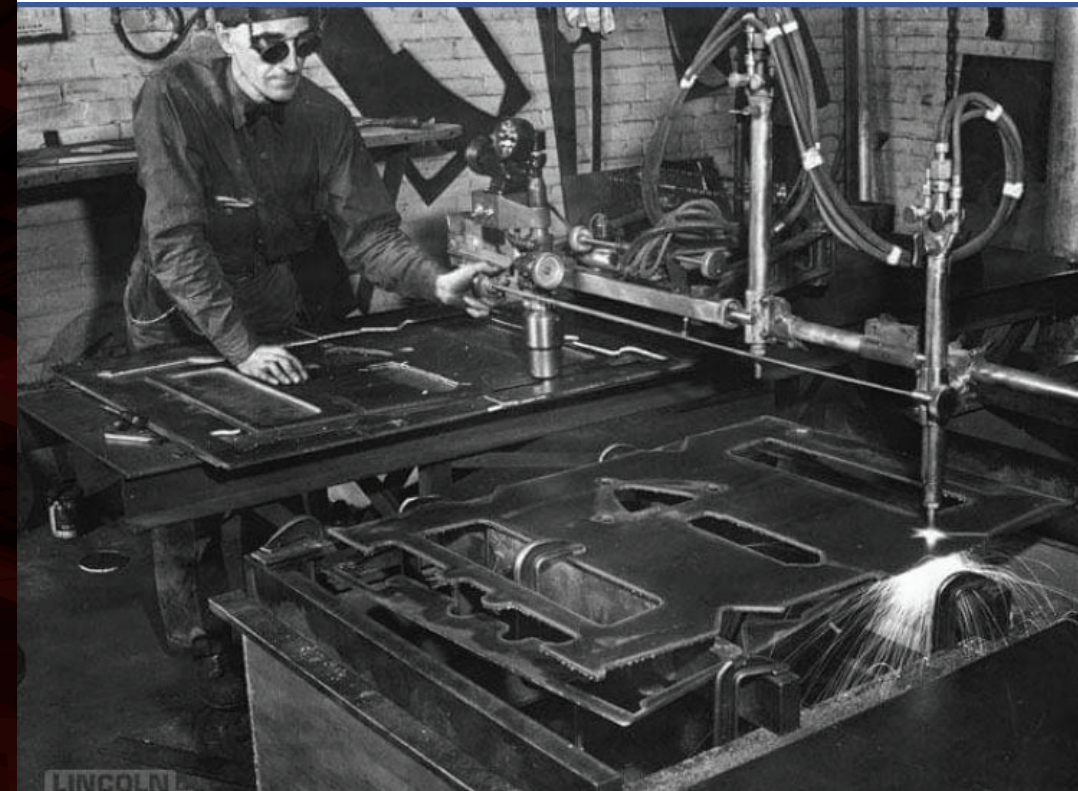
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Flashback

Wartime Cutting



June 1945

A worker at DeBourgh Manufacturing Company in Minneapolis, Minnesota, cuts sheet metal with a flame cutting machine. In addition to manufacturing lockers and security mechanisms, DeBourgh was a defense contractor in the 1940s that also made aircraft parts for the war effort. Cutting speeds with the unit pictured here were said to be as high as 45 inches per second. **ARC**

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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