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ONE MAD SCIENTIST

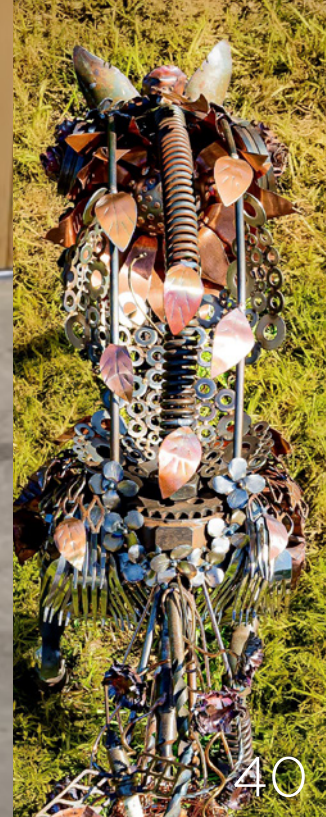
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John C. Bruening is the editor of *ARC Magazine*. His career as a writer and editor spans three decades and a range of specialties: industrial safety and health, scrap metal processing, architecture and construction, music, film, the visual arts, history 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.

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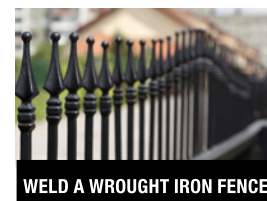
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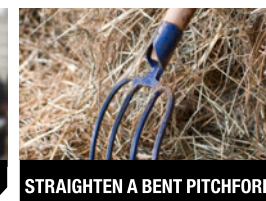
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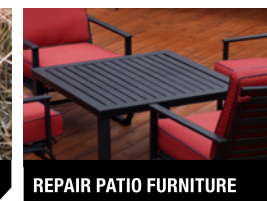
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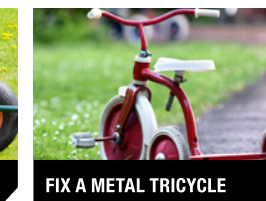
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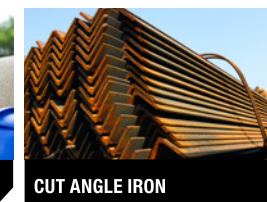
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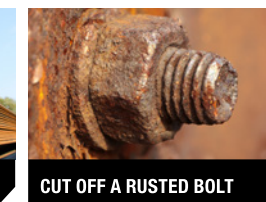
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SOLDER WATER PIPES



CUT ANGLE IRON



CUT OFF A RUSTED BOLT

LETTER FROM THE EDITOR

TAKING STOCK

▶ Those of us who make welding and fabricating a central part of our lives may not spend a lot of time with spreadsheets or ledgers, but at some point, we inevitably find ourselves doing some kind of accounting. Even if we don't own a large or small business, even if we're not in the midst of filling out income tax paperwork or managing our personal finances, we're still looking at our lives in terms of assets and liabilities, gains and losses. On some level, we're always thinking about what's important and what's trivial, what's helping us and what's getting in our way, what we want to hold onto and what we want to let go of.



Nate Bowman, aka "the Weld Scientist" and the subject of our cover story in this issue of ARC, understands this decision-making process implicitly. As director of welding optimization and education for Central Welding Supply in Vancouver, Washington, Bowman advises weld shops on how to produce superior welds, and trains their employees how to boost their productivity. He also maintains an Instagram page (@weldscientist) that showcases products and processes, as well as his experiences with WeldLabs, an education initiative he launched with welding professional Rush Kane. To date, Bowman has more than 25,000 Instagram followers.

Since the early years of his career, Bowman has never been afraid to throw out what wasn't working to make room for better options and new professional and creative opportunities for himself and others. He recalls taking a position years ago with a company that turned out to be highly resistant to the idea of

employees asking challenging questions about their approach to welding and how to sell welding equipment.

As part of his CWI, CWE and CWS training, he learned that "99.9 percent of how a weld will turn out is science," he recalls. "I ran down that rabbit hole, but when I did, I also learned some within the company didn't know the science and didn't want to change how they did things. When they rejected my idea of investing more on existing accounts, that's when the relationship went south."

Based on this and other experiences, Bowman maintains that success in the welding trade is very much about learning, looking forward, and trying new things to determine what works best. It's a process of fine-tuning and course correcting that never really ends. With that philosophy in mind, it's always a good idea to take a hard look at what's working and what's not – in your shop, in your welding and fabricating pursuits, and in your life – and rearrange accordingly.

By the time these words find their way to you, the summer months will be upon us and we're likely to be knee-deep in various welding and fabrication projects for fun or profit – or some combination of both. If following Nate Bowman's lead is part of your strategy along the way, you're in the right place. This issue of ARC includes a gift guide that features equipment, accessories, apparel and other Lincoln Electric items that will help you position yourself for success. Think of it as an important resource to help you get closer to your goals as a welder, fabricator and maker.

ARC and Lincoln Electric are committed to being your knowledgeable partner on that journey.

Here's to a happy, safe and productive summer.

— John C. Bruening, Editor-in-Chief
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ONE MAD SCIENTIST

Nate Bowman channels his frustration with the status quo into helping others become mad about all things welding.

By Jeff Herrington



“You can be a smart welder, and internalizing that mindset is how you get the respect you deserve”

When Copernicus, the Polish astronomer, theorized it was the sun – not the Earth – that occupied the center of our solar system, most people thought his idea was out of this world. And when Swedish physicist Lise Meitner shared her research leading to the discovery of nuclear fission – well, you can just imagine the reaction that caused.

Nate Bowman, whose online handle is @weldscientist, totally gets how those underappreciated scientists must have felt.

“I used to work for a large industrial company,” he says. “We’d have elaborate sales meetings where they’d push us to

go find lots of new customers. I suggested we grow our market share instead by strengthening our relationships with existing customers. By getting under the hood with them, helping them better understand the science of welding by using training to help them grow from a shop with five welders to one with ten.

These divergent business strategies turned out to be a career crossroads for Bowman. “That’s when I learned a big industry challenge is getting people to do things differently,” he says. “It’s also when I learned I didn’t want to work there anymore.”

Bowman's ideas may have landed on deaf ears early on, but people sure are listening to him now. As director of welding optimization and education for Central Welding Supply in Vancouver, Washington, he advises scores of weld shops on how to produce superior welds, and trains their employees how to boost their productivity.

Through his WeldLabs initiative with welding professional Rush Kane, he's partnering with schools nationwide to update welding instructors on new techniques and technologies and inspire students to consider welding as a career.

Meanwhile, his social media presence includes multiple podcast appearances alongside the industry's rock stars, a series of high-energy videos on YouTube and Vimeo and more than 25,000 followers on Instagram.

Still, Bowman is the first to emphasize his objective isn't to build a celebrity persona, but rather to build respect for an industry whose image has been scruffy at best.

"In the movie *Grease*, all the troublemakers were sent to shop class," he says. "The industry's low wages don't help welding's reputation, either. I'm trying to communicate that being a welder doesn't mean you have to cuss and spit and be dirty and dumb. That you can be a smart welder and that internalizing that mindset is how you get the respect you deserve."

It makes perfect sense that Bowman wants to change the perception of welding as a grungy endeavor, since it was a spectacularly beautiful exhibition of it that first captured his attention.

"My dad owned a construction company, and when I was six, he took me to the dealership that was repairing his skid steer loader," he recalls. "We walked in and this guy on the mezzanine above was using a stick welder. My dad warned me that looking at it would hurt my eyes, but I was transfixed by the colors, the sparks and the streamers cascading to the floor below."

Soon after, Bowman became equally fascinated with *Road Construction Ahead*, a VHS tape franchise that featured mechanics fixing trucks wherever they'd broken down. "I thought it would be so cool to have that job of rescuing trucks," he says. "That's when I realized I wanted to work at something other than construction."



Growing up, Bowman was the smallest kid in his class. "I had ADHD and not many friends," he says. "I always had the latest issue of *Equipment World* magazine in my coat pocket. I'd read it cover to cover, then call the phone numbers in the back and ask whoever answered to please send me more information about the new Holland loader."

He was in middle school by the time he got the chance to commandeer a stick welder. "The results were underwhelming," he recalls, "probably because the teacher just told me to turn it on and try it." It wasn't until he started attending a welding program at a high school in Syracuse, New York, that the craft began to seep into his bones.

And his soul.

"By that time, shows like *Monster Garage* and *Junkyard Wars* were on television," he recalls, "and it blew

me away how they'd take a Ford Explorer and transform it into a garbage truck with a claw. I asked my instructor, 'At what point can you call yourself a professional welder?' and he replied, 'When you're getting paid to do it forty hours a week or more.'

"I see now that's when welding was becoming something more than a skill I was learning. It was becoming something that was giving me my sense of identity."

Bowman eventually found that forty-hour-a-week job at a typical welding shop, but the tedium of it soon set in.

"Pretty quickly, I couldn't find a project I couldn't already do," he recalls. "I knew I wasn't ever going to earn enough there to buy a Porsche, and that there had to be something more for me." So he moved across the country to join a company that was recognized nationwide, but not

very welcoming to someone with tattoos all over his hands and a habit of questioning the company's longstanding approaches to sales... and welding.

"I needed credentials to work on the company's advance team," he says. "So, I began my certified welding supervisor (CWS) designation. (He has since acquired that, as well as a CWI and a CWE, and advocates certification to everyone he can.) It was the certification textbooks, and some of my coworkers, that introduced me to the science of welding.

"I learned that 99.9 percent of how a weld will turn out is science. I ran down that rabbit hole, but when I did, I also learned some within the company didn't know the science and didn't want to change how they did things. When they rejected my idea of investing more on existing accounts, that's when the relationship went south."



“I’ve never seen a more efficient and energetic person than Nate.”

Fortunately, investing time on existing accounts is core to Bowman’s current job at Central Welding Supply. One week he might be introducing customers in Alaska to the latest clamp meter, the next he might be helping a shop in Oregon to prep its welds more effectively.

What “the scientist” doesn’t do – what he’s loath to doing -- is merely showing a customer which buttons to press.

His co-worker, Bryan Blackhurst, has been in the welding industry for a decade but insists, “I’ve never seen a more efficient and energetic person than Nate. He never sits, even for five minutes. And it doesn’t matter if the topic is verifying a weld or designing a joint. He explains every facet in terms so relatable, the customer always comes away saying, ‘I can’t believe it’s that simple.’”

Blackhurst professes that, because of Bowman, he’s a better welder and a better



adviser to other welders. “Nate’s taught me how to walk into a shop, ask the questions shop owners often don’t, and quickly diagnose what’s causing their problem. And how to provide a ‘bedside manner’ that avoids language like, ‘Here’s how you’re doing it wrong.’ I’ve even bought a five-foot-long whiteboard like the one he uses to track his goals and the status of projects.”

Bowman is also influencing budding welders in schools nationwide through his WeldLabs tours with Rush Kane.

Joe Biladeau, a welding instructor at the Seacoast School of Technology in Exeter, New Hampshire, knows first-hand how Bowman makes the science of welding fun for those just encountering it.

“One challenge for Nate and Rush while they were here was the diversity of our students,” Biladeau says. “This program serves six area high schools, and the students’ economic and social differences are substantial. Add to that the different levels of maturity between sophomores and seniors.”

Despite all of that, “Nate’s ability to connect with everyone was remarkable,” says Biladeau. “Even my shyest students eventually approached him to ask questions, and if they didn’t understand his first answer, he’d slow down and explain it ten different ways, if necessary.”

Bowman says the WeldLabs project has boosted his enthusiasm for the industry and his confidence in the next generation of welders.

“Rush and I saw that people were posting poor-quality work and bad advice online, and I wanted to counter that without criticizing anybody,” he says. “With WeldLabs, we just arrive at a high school, say, ‘Go!’ and try to set a good example. We teach the kids the right way to analyze a weld, the right personal protective equipment to wear, etc.”

“In New Hampshire, one girl welded with us during the day, then returned at six and welded until nine, despite having to show up for school at seven the next morning. I keep hearing the next generation is lazy, but WeldLabs has photographic and videographic evidence proving that just isn’t true.”



If anyone is proficient at using photography and videography to showcase the welding experience, it's Bowman. His Instagram account teems with pictures that range from colorful close-ups of vintage welding equipment, to spark-intensive shots of welding tools pushed to their limits, to highly stylized photos of Bowman and his friends modeling the latest welding apparel.

Bowman attributes the arty look of his feed to those issues of *Equipment World* he devoured as a kid.

"A lot of the photographs in that magazine were grainy, and I knew that was the style I wanted for my photographs," he says. Another influence was his bartender friend, George, who used to shoot weddings.

"Welding photography is the same as wedding photography in that both are, essentially, portraits," Bowman says. "George taught me how to shoot portraits, and

eventually I purchased a flagship Canon camera that captures the brightness and shadows of welding like no other."

Meanwhile, Bowman's WeldScience videos on YouTube give viewers a rush they don't often get from welding content. Shot by Emmy-Award-winning cinematographer Jesse Larson, the videos "tell stories about welding one can't get in a classroom," Bowman says. "We strive to produce videos that will make viewers say, 'OMG, that's so sick!' and yet portray the reality of welding something, whether that's a lawn mower or a spaceship."

A spaceship? Yes, Bowman believes welding in space will become more commonplace. So will using collaborative robots and -- as factories connect their equipment to data collection interfaces -- producing traceable welds. Bowman also sees tomorrow's welders coming from more diverse backgrounds, and "that's exactly what this profession needs," he says. Emerging technologies may perfectly match this new breed

of welders, and I'm interested to see how they utilize them." His message to veteran welders? "The new technologies aren't coming to take your jobs. They're coming to help you. But if you're not an educated welder, you'll get left behind as they move in."

And what does the future hold for the 'Mad Scientist,' who will soon be knocking on the door of middle age?

"I'd love to see an annual schedule of WeldLabs events in schools all over the country," he says. "I also want our WeldScience videos to become the go-to place for watching the best applications of welding technology. Meanwhile, I expect my work at Central Welding will be even cooler, with new customers and new challenges to address."

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"Emerging technologies may perfectly match this new breed of welders, and I'm interested to see how they utilize them."

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.

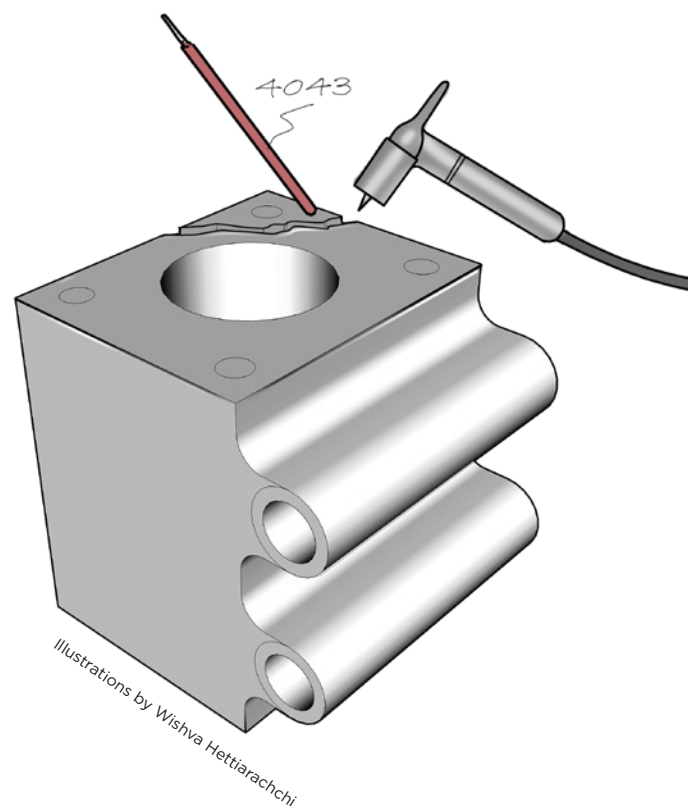
I am trying to repair an aluminum casting with TIG. What filler should I use?

► There are several ways to answer this question. Repair welds on aluminum castings are challenging for a couple reasons. It can be difficult to know the best filler to use because there's often no way to determine exactly what the casting is made of. In addition, the casting material is often dirty, especially if the casting is used to hold oil or other fluids, so repairs can be challenging to the inexperienced welder.

It helps to understand the basic function of the part you're repairing. Is it a structural part, or does it just need to be sealed up because it's made to hold oil, for example? A filler like 4043 has silicon in it and this filler has a good flow, good strength and is suitable for many applications. 5356, which contains magnesium, might also be a good choice. However, there are many different aluminum fillers that are more specific and could be the better choice. Some research up front will help you make an educated guess.

Cleaning the casting material can be a challenge. Once the joint is properly prepped, the part can be preheated with a torch to help burn any fluids or impurities out of the pores of the aluminum. The AC current of the TIG welder can also be very helpful. When you start welding on a casting, the impurities will usually surface in a black soot that makes it difficult to establish a puddle. Before you even make a puddle, run the AC back and forth across the weld joint to allow the current to boil out impurities from the material. Use a stainless-steel wire brush to clean the joint, then repeat the process until you've brushed away as much of the dirt and impurities as possible.

Once the joint is sufficiently clean, increase the amperage and start making the weld. Most aluminum castings are weldable and can be repaired successfully, but they can be tricky for the reasons mentioned above. The more you know about the type of material you're welding, and the cleaner you can make the joint, the better luck you'll have.

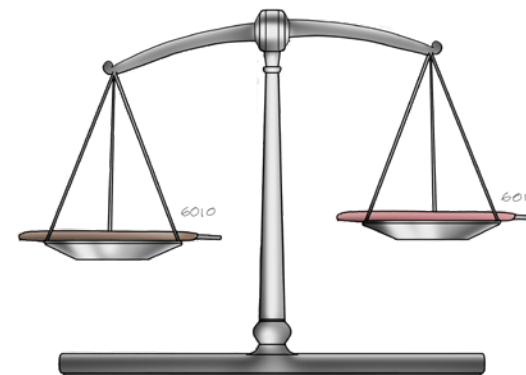


Illustrations by Wishva Hettiarachchi

What is the difference between 6011 and 6013 stick welding electrodes?

► We often hear about 6010 and 7018 stick electrodes because they are probably the most commonly used electrodes for many different applications. Keep in mind that all stick electrodes have different characteristics for different deposition rates, different materials, different thicknesses and even for welding in different positions. 6010 and 7018 are the most common combination, but 6011 and 6013 are also a good choice for certain applications.

6011 is an all-position, deep-penetrating electrode that can run on DC, but runs best on AC. 6011 is the alternative to 6010 if an AC welder is your only option, but both have similar characteristics and abilities. 6011 handles surface impurities well, has a thin cellulose/potassium-based flaky slag, and is commonly used for repair and maintenance welding.



Illustrations by Wishva Hettiarachchi

6013 is quite different because of the thick high-potassium type of slag. 6013 is also an all-position electrode that can run on AC or DC. This electrode has a smooth arc which many welders prefer in comparison to 6010 or 6011. 6013 creates a wide, shallow penetration with a heavy flux, but it does not handle surface impurities very well. The 6013 is commonly used on thin materials with little or no surface impurities.

These are the basic differences between 6011 and 6013. Both electrodes have desirable characteristics, but as always, it's best to do as much research as possible and understand the differences well enough to make educated choices about what to use.

Why does my MIG wire sometimes push against the metal without arcing?

► For the purposes of this conversation, we'll assume the machine is set up correctly. Incorrect machine settings can certainly cause the wire to push too hard into the materials. But there can be several other reasons why this is happening, and they're usually simple. MIG welders are, after all, fairly simple machines, but the components within them need to work together to feed the electrode consistently.

First, let's start with the work clamp. We string our welding leads across the room everyday and wrap them up in different configurations all the time, so it's very easy for a cable to become loose, particularly at the connection where the cable attaches to the work clamp. Remember that welding is one big electrical circuit, and circuits need good connections to work, so make sure to check all the cable connections. You should also place the work clamp as close to the work area as possible. A slight bad connection can cause the wire to stub into the metal before arcing.

Second, check the contact tip. This is very often overlooked, but can be a very simple fix. The contact tip is where the electrical connection is made with the wire in the MIG welding process. If the contact tip is loose or worn, it can cause problems. Contact tips are consumables that need to be replaced when they wear out.

Another possible issue is the silicon ball that forms on the end of the wire when you stop welding. This can make arc starts more difficult. Clipping the end of the wire off will help with arc ignition.

Wire pushing into the metal with bad arc starts can be very frustrating but these issues are usually pretty easy to identify and fix with a little effort. Always start with the basics, such as machine settings and connections – the areas that are the most commonly overlooked.





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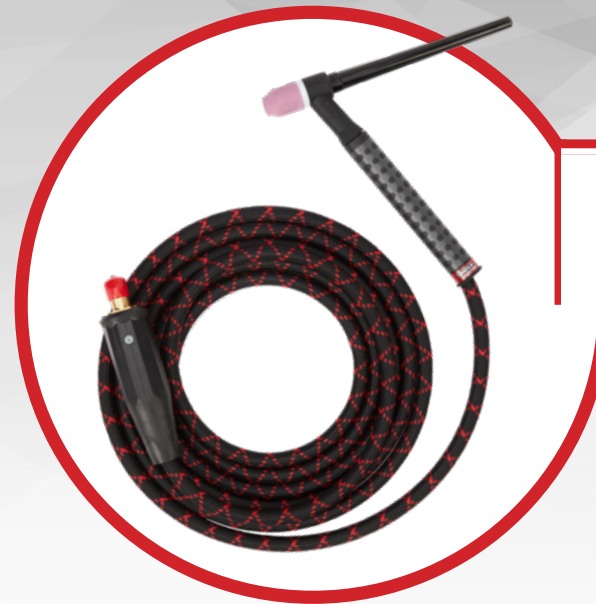
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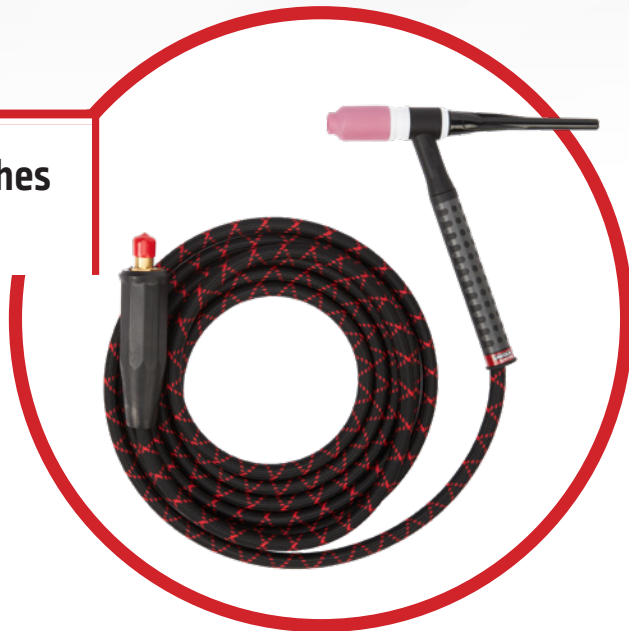


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Engine Driven Welder | K4779-1



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Welding Gun | K126 PRO



K126® PRO Innershield® 350A FCAW-SS-
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XVI Industrial FR
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2023 MID-YEAR GEAR



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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.

SHEET METAL HAND BREAK

► Bending large sections of thin-gauge sheet metal – 16 gauge and thinner – is usually a fairly easy process, but when the pieces get smaller or shorter, creating simple flanges and making 90-degree bends becomes more challenging.

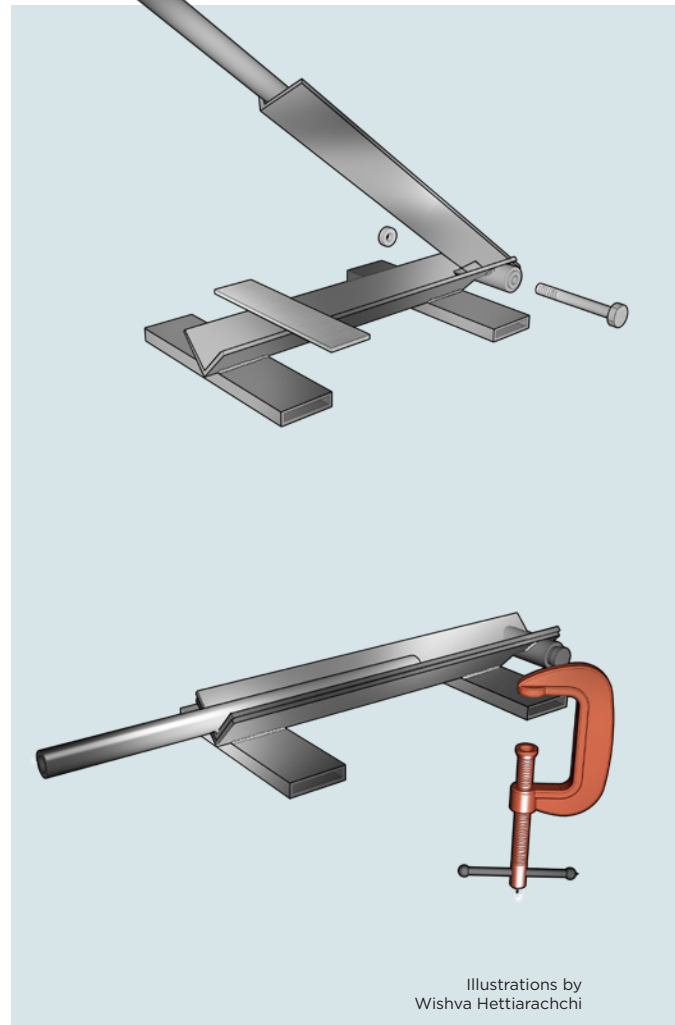
A metal hand break will bend thin sheet metal easily and accurately in most cases, and it's easy to make. It can be constructed with different sizes and thicknesses of materials, depending on the thickness of metal that you'll be bending, but for the purposes of this conversation, we'll focus on thin sheet.

You'll need two pieces of angle iron – one 3x3 inch and the other 2x2 inch. The thickness of both can be 1/8 inch or 3/16 inch. You'll also need two pieces of square tubing for the framework, a 6- to 8-inch piece of round tube, and a 2- to 3-foot piece of solid bar for a handle.

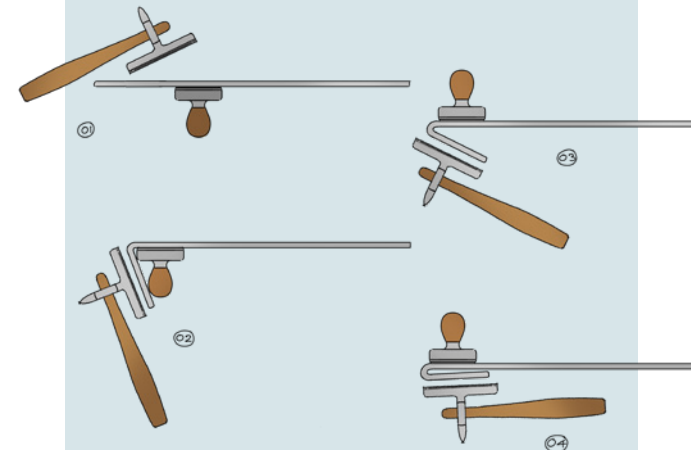
Start with the large angle iron and weld the angle to the square tube framework. Weld the square tube on each end of the angle facing up to create a "V" with legs. The second smaller piece of angle will lay inside the larger angle, with the swivel point welded to one end.

Cut the round tube into three sections. Weld one section to the small angle. Weld the other two sections to either side of the large angle to form the pivot point. Use a bolt or piece of round bar to hold the pivot point together. Now the smaller angle will sit inside the larger angle and pivot up and down. Make sure to deburr all the edges and sharp points of the angle. Attach the solid bar handle by welding it inside the smaller angle.

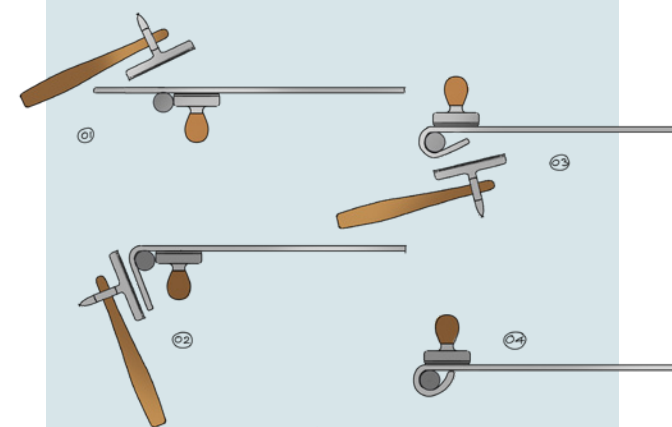
To use the hand break, clamp the framework to your worktable, insert the sheet metal between the angles, and apply pressure by hand to bend the metal. This tool can be easily modified for different sizes and thicknesses of material, but if you have simple bends to make in your sheet metal, it can do the job quickly and easily.



HEMMED EDGE



WIRED EDGE



STRENGTHENING SHEET METAL EDGES

► When fabricating sheet metal, there are different ways to strengthen thin, flimsy material. The weakest parts of a sheet panel are usually the edges. For example, the edges of a motorcycle or car fender are always very flimsy, and usually need strengthening to prevent distortion and cracking of the metal. In addition, primer and paint generally don't adhere consistently to the edges of sheet metal.

A hemmed edge or wired edge can be effective solutions for these challenges. They can greatly increase the strength of the sheet metal and also provide a better surface for coatings.

Creating a hemmed edge involves folding the edge of the sheet metal on top of itself to create a stronger double layer with a rounded edge more suitable for coatings. It was a common technique in the automotive industry many years ago to strengthen the edges of the sheet metal used in the assembly process. A wired edge is very similar to a hemmed edge, but it involves welding a wire to the edge of the sheet metal and sometimes wrapping the metal around the wire. The wired edge technique is used for 16-gauge metal or thinner.

You'll need a dolly and a body hammer for either technique. To create the hemmed edge, measure about 1/2 inch from the edge of the metal. Use the hammer to create a slight bend along the entire length of the metal at the 1/2-inch mark. Repeat the process, bending more each time until the 1/2-inch edge is fully folded back onto itself. At some point during the bending process, the dolly will get in the way of the fold. When this happens, reposition the dolly to the opposite side of the metal so you can hammer from there.

To create the wired edge, position a length of 1/8-inch wire about 1/8 inch to 1/4 inch from the edge of the metal. The initial bend will help hold the wire in place, and a few tack welds can be helpful here (but they are not absolutely necessary).

Regardless of which type of edge you're creating – hemmed or wired – begin the hammering process on the line of the actual bend and work your way outward toward the edge of the metal in a smooth and controlled manner to avoid wrinkling the metal. If you simply hammer the edge of the metal to bend it without following the bend line, the material will not bend at the point where you want it to – which will likely result in some rework (and some frustration). When completed you will see the difference in the strength of the sheet metal edge.

Remember to take your time and maintain a light touch. It's only sheet metal, so leave the ball peen and sledge hammers in the tool box.

EDUCATOR SPOTLIGHT

SCOTT PRINCE

MORE VALUE IN THE LONG RUN

By John C. Bruening

After just a couple years of teaching welding at the high school level, Scott Prince is already taking the long view on his students' behalf.

Since the height of the Covid pandemic in 2020, Prince has been teaching stick, TIG, MIG and flux core welding to high school juniors and seniors for the Board of Cooperative Educational Services (BOCES) for Monroe County in New York State. He teaches close to 100 students every year – primarily from the Rochester area – and he's committed to teaching them skills that will not only get them started but sustain them throughout their careers.

"Things are going to change for these kids as they get older," says Prince. "Industry standards are going to change. I want them to be as prepared as I thought I was when I was starting out. The skills and abilities that I've learned are something that I want to pass on to these kids. When I do that, and they get it right, that's my victory."

Prince honed his welding skills in a variety of settings – pressure vessels, process pipe, bridge cranes and more – before he started teaching, so taking the long view is nothing new for him. His experience in the trade goes back at least a generation. His first teacher was his father, who did welding and fabrication for the railroad and aerospace industries (among others) before he retired.

"I was the generation that replaced my father," he says. "So these kids are going to be the generation that will replace me. My dad always said, 'Don't cut corners.

Don't look for shortcuts.' And I teach that to these kids."

One of the most consistent messages that Prince conveys to his students is that the wrong turns are just as important in the learning process as the things that come easy.

"He didn't just feed us information," says Marissa Pokol, who studied stick, TIG and MIG with Prince in her junior and senior years and currently works for Arco Industries, a metal fabricating shop in Rochester. "He actually expected us to take some initiative and do something on our own. And if you didn't do it right, he made you redo it until you got it right. If you failed, he would say, 'Okay, so what did you learn from that? What did you do wrong?'"

Likewise, Cierra Perrin, who currently does MIG and TIG work for Boss Precision, a metal fabricator in Spencerport, New York, discovered early on under Prince's tutelage that mistakes are just a step in the journey toward success.

"You're always going to make mistakes," she says. "You just have to let them go and overcome them. Scott definitely drilled that into my head a lot, because I tend to get down on myself if I make a mistake. To this day, every time I make a mistake, I think about his advice."

For Prince, long-term success boils down to a simple, three-part equation that any student can balance.

"I tell everybody they have a niche, a strength and a weakness," he says. "I tell them, 'Find your niche, play to your strength, and work on your weakness.' The more you can learn, the more valuable you are to an employer. If you can do a lot of things and you can do them efficiently, you're more valuable in the long run." **ARC**

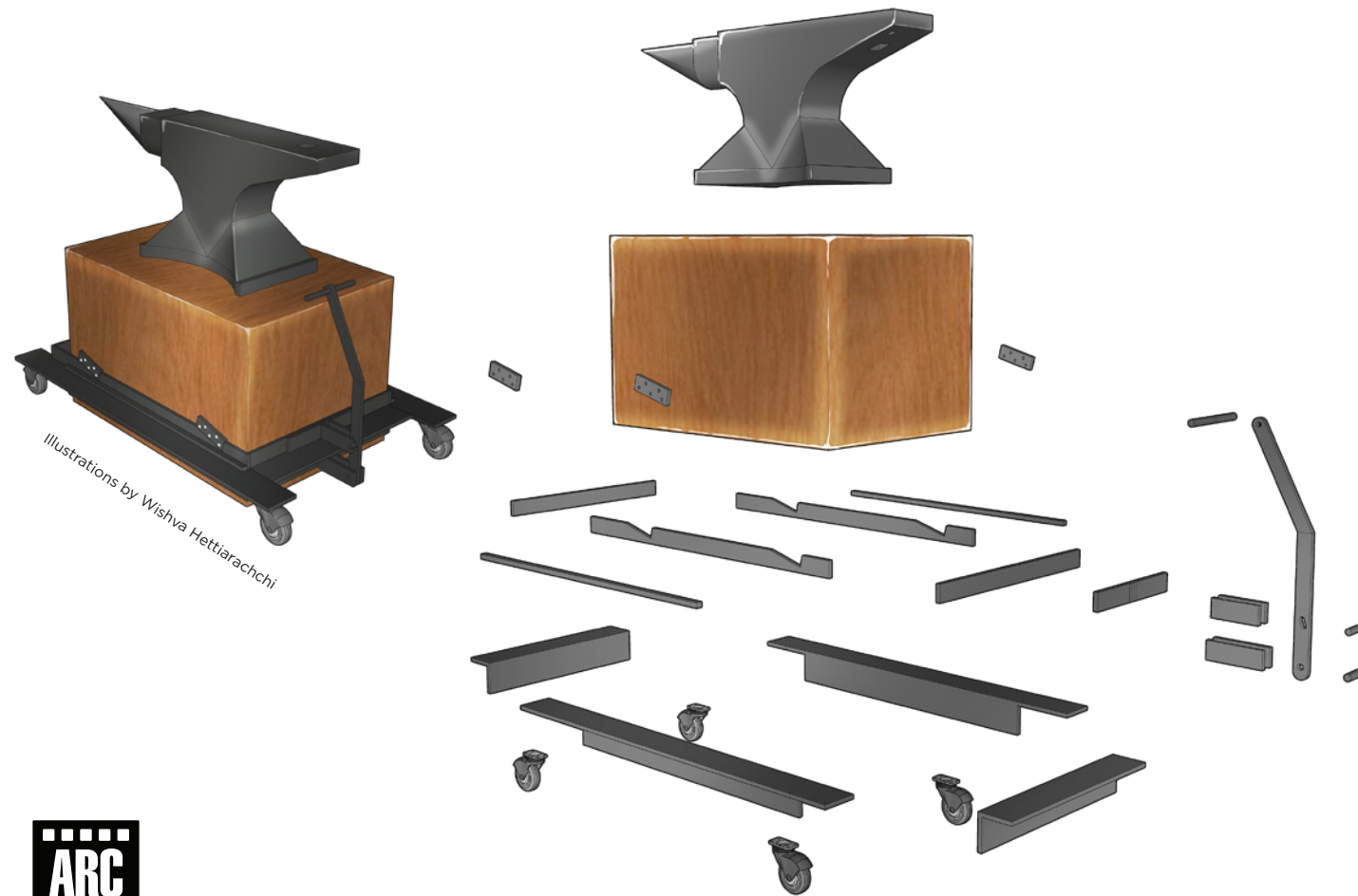
"FIND YOUR NICHE, PLAY TO YOUR STRENGTH, AND WORK ON YOUR WEAKNESS."



Project Spotlight

BUILD A MOVEABLE ANVIL STAND FOR YOUR SHOP OR GARAGE

By Jimmy DiResta



Watch exclusive footage at arcmagazine.pub

If you use an anvil on a regular basis, you already know it can be a useful tool. It could be even more useful if it were portable, but anvils that weigh in at 600 or 800 pounds (or more) tend to stay in one place for obvious reasons. In this issue of ARC, Jimmy DiResta builds a movable stand that will put

your anvil on wheels and get it around your shop with minimal effort – because in the ideal work environment, scooting an anvil across the shop floor and positioning it closer to your work piece can be a lot easier than moving the work piece to the anvil.



STOP 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

- One large square or rectangular slab of pine (or other wood)
- 13 feet of 3x3-inch x 1/4-inch angle iron
- 13 feet of 1.5-inch x .5 inch square rod
- 13 feet of 3/8-inch rod
- 4 casters
- 1 anvil

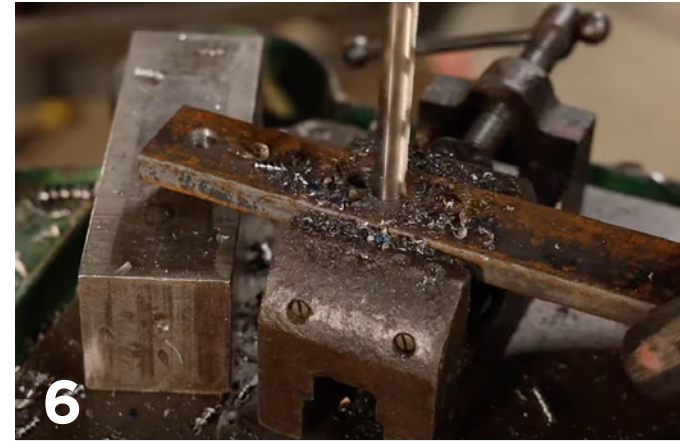
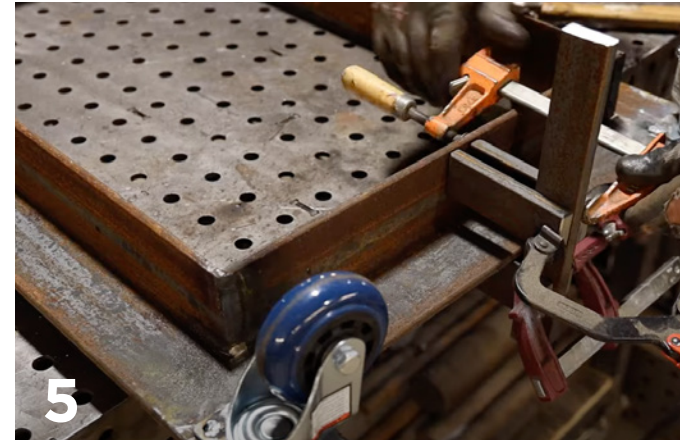
WELDING/CUTTING EQUIPMENT AND TOOLS

- Lincoln Electric MP 140
- Circular saw
- Hand saw
- Band saw
- Reciprocating saw
- Fireball squares
- Grinder
- Drill press

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Imagery © Jimmy DiResta



Step 1:

Use the circular saw and the hand saw to square up the ends of the pine block.

Step 2:

Use the chopping band saw to cut the angle iron to the appropriate lengths to accommodate the pine block. Using fireball squares at each corner, weld the angle iron at all four corners to create the stand frame. Use the reciprocating saw to cut away the excess squares at the four corners and smooth out the edges with the grinder.

Step 3:

Weld the casters onto the underside of each corner of the frame. Cut away the excess metal once the casters are attached. Check to make sure the frame with attached casters fits around the pine block.

Step 4:

Cut the square rod into two lateral strips. Tack weld the strips together and cut a diagonal/triangular notch into the stacked strips simultaneously. Separate the strips and weld them into place on opposite sides of the frame assembly. Weld the 3/8-inch rod in place on either side (along the lateral strips) to create a sliding channel.

Step 5:

With the stand inverted on your bench, weld the two pieces of the hasp to the frame, with sufficient space in between to accommodate the lever that will move inside the two pieces.

Step 6:

Use the drill press to drill appropriately spaced holes in the lever to accommodate the rods, then insert the rods and tack weld them to the edges of the hasp assembly at the top and bottom levels of the stand.

Step 7:

Slide the entire assembly onto the block. Cut the square rod into 4-inch sections to create the four lifters, and drill bolt holes in each lifter. Attach wood spacers to the lifters as well as the four corners of the wood block.

Step 8:

Insert the lifters into the diagonal notches on the frame and bolt them to the side of the wood block. Grease the lever and all connecting and sliding points in the final assembly. Weld an additional length of square rod to the lever to create an angled lever arm for easier access and control.

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

CREATIVE CONNECTION

By John C. Bruening

Metal sculptor Michelle Moffitt starts with small, random pieces to satisfy a big artistic vision.

For more than a decade, she's been sculpting small to medium-sized decorative pieces that capture various aspects of the natural and mechanical world. Her shop in Reno, Nevada, is the birthplace of MIG-welded representations of flowers, animals, insects, trains, cars, bicycles, electric guitars and more.

The raw materials come from just about anywhere. She keeps her workspace well stocked with random and miscellaneous pieces from scrapyards, antique stores, flea markets – and her personal favorite, donations from generous supporters.

"It's a win-win when someone needs to clean out a garage or a shop and they automatically think of you," she says.

The artistic journey started when Moffitt was still working at her day job at eBay, and then coming home to what was then just a hobby.

"I was a weekend warrior," she says. "I started out making pieces for myself: horseshoe flowers, dogs, and goofy things that I wanted just for my home. I would be proud of my achievements and I would post pictures of my work on my social media page."

After a while, friends were asking for some version of what they were seeing online – either for themselves or as gift items. She found the feedback flattering and encouraging, and she ran with it.

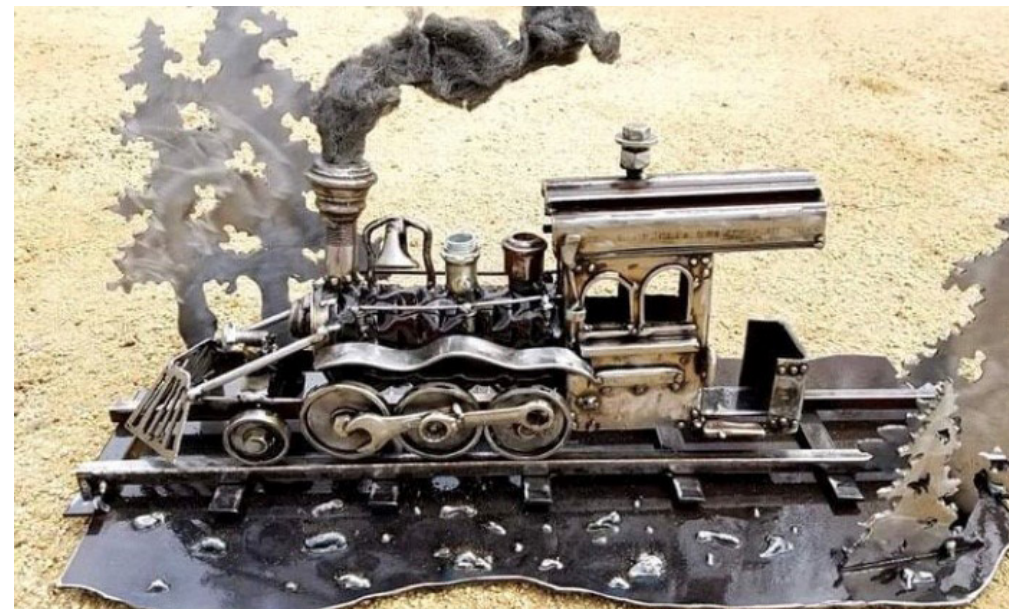
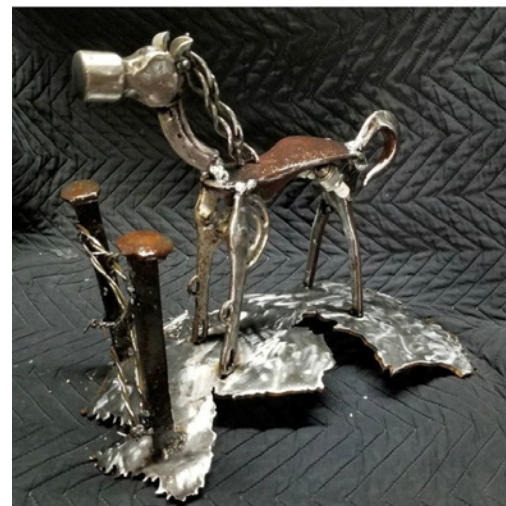
"I kept taking orders and ran out of weekend time to complete them," she recalls. "So I quit my day job seven years ago and went for it. It was the best thing I have ever done. I have never looked back."

While her sculptures may look like metallic interpretations of the world we all see every day, Moffitt tends to rely on an internal source – her own imagination – for the creative spark that ignites the process.

"If I can think it, I immediately start searching for shapes, textures, and pieces to build it," she says. "Sometimes a scrap piece of metal just needs to 'become' what you see in it. I am more about finding the perfect shapes or modifying pieces to become what I need them to be."

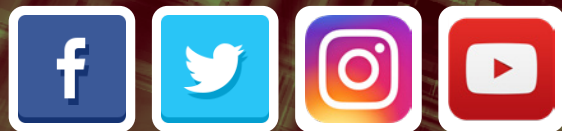
Her process and her resulting sculptures are ultimately her own, but Moffitt prefers to personalize each piece for the client whenever possible. She wants her work to reflect not only her own creative aesthetic, but also the personality and the back story of the person for whom she's making it.

"I like to include bits and pieces of 'connection' for my clients," she says. "Whether it be that tool grandpa or dad used that evokes a happy and meaningful memory, or just the pure joy and appreciation of the fact that the work became something that can be displayed. Or if the piece I'm creating is going to be a gift, it's that spark in the client's eyes when they see the finished piece they are giving to a special friend. It's beyond flattering when they're emotionally satisfied with the work." **ARC**



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Flashback

Long-Lasting Casting



October 1940

A worker at Horst Machine & Welding Company in Orrville, Ohio, fills in the blow holes on an iron casting using a Ferroweld Stick Electrode from Lincoln Electric. More than 80 years later, maintenance procedures like this can extend the life of heavy equipment by several years and reduce the costs of replacement by several thousand dollars. **ARC**

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