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COVER STORY

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Chasing the Rush

Miners Freddy Dodge and Dave Turin bring gold fever from the Yukon Territory into the comfort of your home.

12


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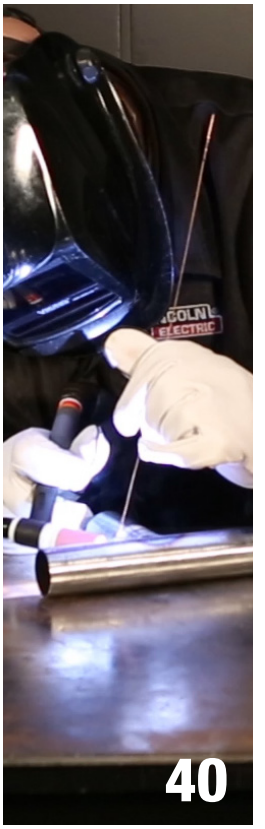
Sailing the Farm

Dreamboat

Norwegian sailor/adventurer Jonny Birkelund's most important discovery: If you build it, they will come.

22

CONT



Ask the Experts

The Application Engineering team at Lincoln Electric answers your welding questions

10

Beginner Tips & Tricks

Using an angle iron as a jig, and other tips from *ARC* readers

30

Holiday Gift Guide

17 gifts you really wanted but didn't get

32

Master Class

TIG Welding 4130: eliminating the mystery

40

Flashback

September 1940: TAXI!

42

Letters to the Editor

Readers revisit *Gas Monkey Garage* (Fall issue) and more

8

Arcs & Culture

Artist Steve Manka goes public with metal sculpture

38

CONTENTS

This icon means there's additional content available on the tablet version of *ARC Magazine.*™ Access it by downloading the Lincoln Library App, available in Apple's App Store and Google Play.

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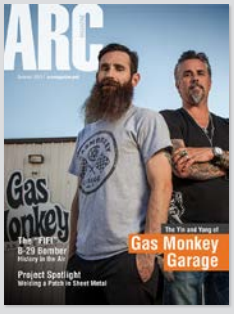

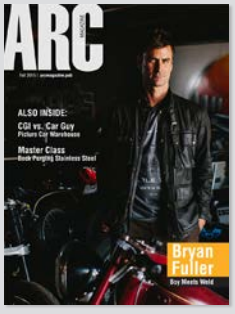

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DEAR EDITOR: Reality TV shows are anything but reality. I would like articles on how to repair odd things like welding cast, welding thick stock to thin (i.e., 18 gauge to ½-inch aluminum or steel), how to properly prepare a broken vice casting, or how to hardface a lawnmower blade safely.

Having been a car fabricator for a number of years, I know that there is no room for "drama" in real life. If a customer sets an unrealistic deadline, most if not all shops will show that customer the door. We all realize that there is a line between reality and TV. Your last job mistake will be remembered ten-fold over the number of successes.

How about an article on how to prepare a repair on a frame crack. Something like this would appeal to the "average" builder or "newbie."

Gary Roushkolb, Wichita, KS

Gary: Thanks for the feedback. We're always on the lookout for ideas and suggestions about what readers are looking for. While shows like *Fast N' Loud* may not perfectly replicate the day-to-day realities of an automotive fabrication shop, they do throw a positive spotlight on trades that otherwise go largely unnoticed by mainstream audiences. In a time when welding and related trades are in need of new blood and a 21st century perspective, this can only be a good thing.

– John C. Bruening, Editor

DEAR EDITOR: I love this magazine. It fills a void where *The Stabilizer* left off. *The Stabilizer* was a great publication too! I did not receive the first issue of *Arc Magazine* for some reason. I was wondering if there were any left so I might read the first one. I have always believed these publications serve the welding community with great tips, new Lincoln Electric products and great general interest stories. *The Stabilizer*'s "How I Did It" section was really great. I especially enjoyed, seeing some of the great welding rigs built by readers across this great country of ours.

Photo Courtesy of Lincoln Electric © Kim Leeson 2015

I know these publications are expensive to publish, but they actually do work to keep Lincoln Electric products foremost in peoples' minds when they buy welding goods. I know, *The Stabilizer* did so for my dad and also for me. Keep up the great work!

Bill Drylie, Fargo, ND


LINCOLN ELECTRIC

STABILIZER

Published for welders who take pride in their jobs

GME INCENTIVE MANAGEMENT MAKES THE DIFFERENCE

The Liberty Bell Story

> "It appears that many Americans are waking up to the fact that we can't run a nation with only sociologists and accountants. We also need those who know which end of a wrench to pick up."

DEAR EDITOR: Wow, *The Stabilizer* is back in a new form and new name. I was disappointed when *The Stabilizer* discontinued publishing. It was really enjoyable reading. But now all is well. Thanks. *ARC Magazine* is a very good one. I enjoy it and look forward to the next issue.

Bob Szentimrey, El Sobrante, CA

Bill and Bob: Thanks to both of you for remembering *ARC Magazine's* highly regarded predecessor. For those readers who may be too young to know what you're referring to, *The Stabilizer* was a quarterly Lincoln Electric publication that ran from the 1920s to the 1990s. It focused on prominent individuals and companies in the welding trade and related industries. It also included reports on industry trends, project ideas, tips about various techniques and processes, and other helpful content. *The Stabilizer* enjoyed a dedicated following for seven decades, and *ARC Magazine* is proud to continue the tradition.

Bill, regarding your request for our first issue, all of the content from our earlier issues – along with videos and other enhanced content not found in the print edition – is still available via our tablet edition. And the best part: it's all free! Visit arcmagazine.pub/subscribe to subscribe.

DEAR EDITOR: I totally enjoyed your first issue and have requested a subscription. It appears that many Americans are waking up to the fact that we can't run a nation with only sociologists and accountants. We also need those who know which end of a wrench to pick up. I'm the neighborhood shade tree welder and fix-it guy here in Penrose, Colorado, which is a community of small farmers and ranchers.

Having been in the magazine business, I know how challenging it can be to identify and reach your audience. You certainly have my attention and I look forward to the next issue. I will pass along the first issue to a young lady near here who has built a race car with her father. She now has a sister in Jessi Combs.

Very well done, and I hope for your continuing success.

Al Starner, Penrose, CO

Thanks, Al. You're absolutely right: there will always be a need in this country for skilled tradespeople, whether they're building high-tech aircraft in the Northwest or fixing fences in rural Colorado. *ARC Magazine* is for anyone on that spectrum.

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ASK THE EXPERTS

Welding experts at Lincoln Electric answer your questions about equipment setup, processes, techniques, safety and more.
Looking for guidance with technical issues? Contact us at questions@arcmagazine.pub

I live and work in Texas. Do you have any recommendations for safety equipment and precautions for MIG welding in places where it's 100°F in the shade?

Keith de Solla, Dripping Springs, Texas

A lot of welders in consistently high-temperature environments will wear a cooling vest to beat the heat. It's a vest that actually stores in a freezer when it's not in use. When it's time to go to work, you put on the vest and then put your clothes on over it. It keeps your body temperature cooler in very high-temperature work environments. Cooling vests are used quite a bit by the pit crews at NASCAR, where the heat coming off the cars and the track is very intense.

If you're in a high-temperature environment where positive airflow for respiratory protection may also be necessary, a powered air-purifying respirator (PAPR) can be a great option, as it also delivers cooling airflow while providing protection from exposure to airborne contaminants. It's a battery-powered system that draws air from the environment through a HEPA filter (and/or chemical cartridge) and delivers clean filtered air through a combination of helmet and hood that covers the user's entire head.

When TIG welding, you typically use an inert gas, which is a noble gas. So when using helium (which is not a noble gas) for TIG welding aluminum, it provides a greater heat for more penetration. How does helium accomplish this? Does it react differently with the ions? Please explain.

Jason Becker, Clermont, Florida

Just to clarify, helium is a noble gas. It burns at a hotter arc, due to the ionization of the gas. Each gas requires a certain amount of ionization voltage to charge the gas to carry the current. Helium needs 24.2 volts to charge the gas. Argon needs 15.4 volts. So if I were welding with helium at 100 amps and argon at 100 amps, the helium would actually burn hotter due to the higher ionization voltage requirement. But using helium by itself is not really recommended, because it's very volatile. You generally want to use it with argon to tame it down a little bit, while still getting the higher ionization value out of it.

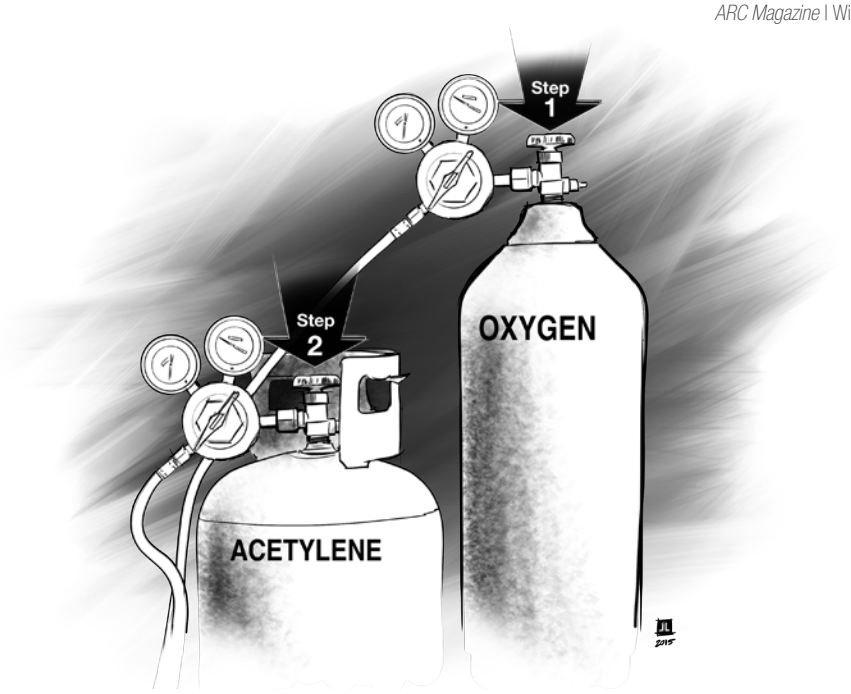
What is the proper procedure when shutting down an oxyfuel cutting torch?

Joel McLeod, Stratford, Ontario, Canada

This is a good question, because many times this is done improperly. The answer depends upon the fuel gas being used. If acetylene is the fuel gas, always close the oxygen valve first whenever shutting down the torch. By turning the oxygen valve off first, the volatile oxygen and acetylene gas mixture inside the equipment is burned off leaving just acetylene and preventing a flashback. This procedure also aids in the detection of even minute leaks in either the oxygen or fuel valves. When the oxygen valve is turned off first, one of two things may happen:

- If a flame remains on the tip after the fuel valve is closed, there is a leak in the fuel system.
- If a popping sound is heard when the fuel valve is closed, there is a leak in the oxygen system.

For fuel gases other than acetylene, follow the manufacturer's instructions for the equipment and/or fuel gas you are using. In most cases, shutting the oxygen off first will still be the correct procedure. However, under certain operating conditions, if the oxygen is turned off first, a very large fuel flame plume is generated that can blow back and potentially damage the equipment and/or burn the operator.



What shielding gas should be used for stainless steel? There are many differing opinions. Some recommend the tri-gas helium. Others suggest the argon/CO_2 (98/2) for lighter gauge metals. But others say that any CO_2 in the gas will cause the weld to rust.

Timothy Hubosky, New Providence, Pennsylvania

The answer to your question is a little bit technical, but we can boil it down. Generally, tri-mix gas is used for short arc – a process for thin material. Your higher argon mixes – 98/2 oxygen or 98/2 CO_2 – are for spray arc, pulse applications and out-of-position welding. Can you use the tri-mix for spray? Yes. But you won't generate as good of a puddle, and it will not wet out as well as 98/2. CO_2 works better than oxygen, but oxygen puts more energy into the arc. So to keep it simple: use tri-mix for light-gauge, short arc welding. Use 98/2 for heavy-gauge, spray arc or pulse spray welding. **ARC**

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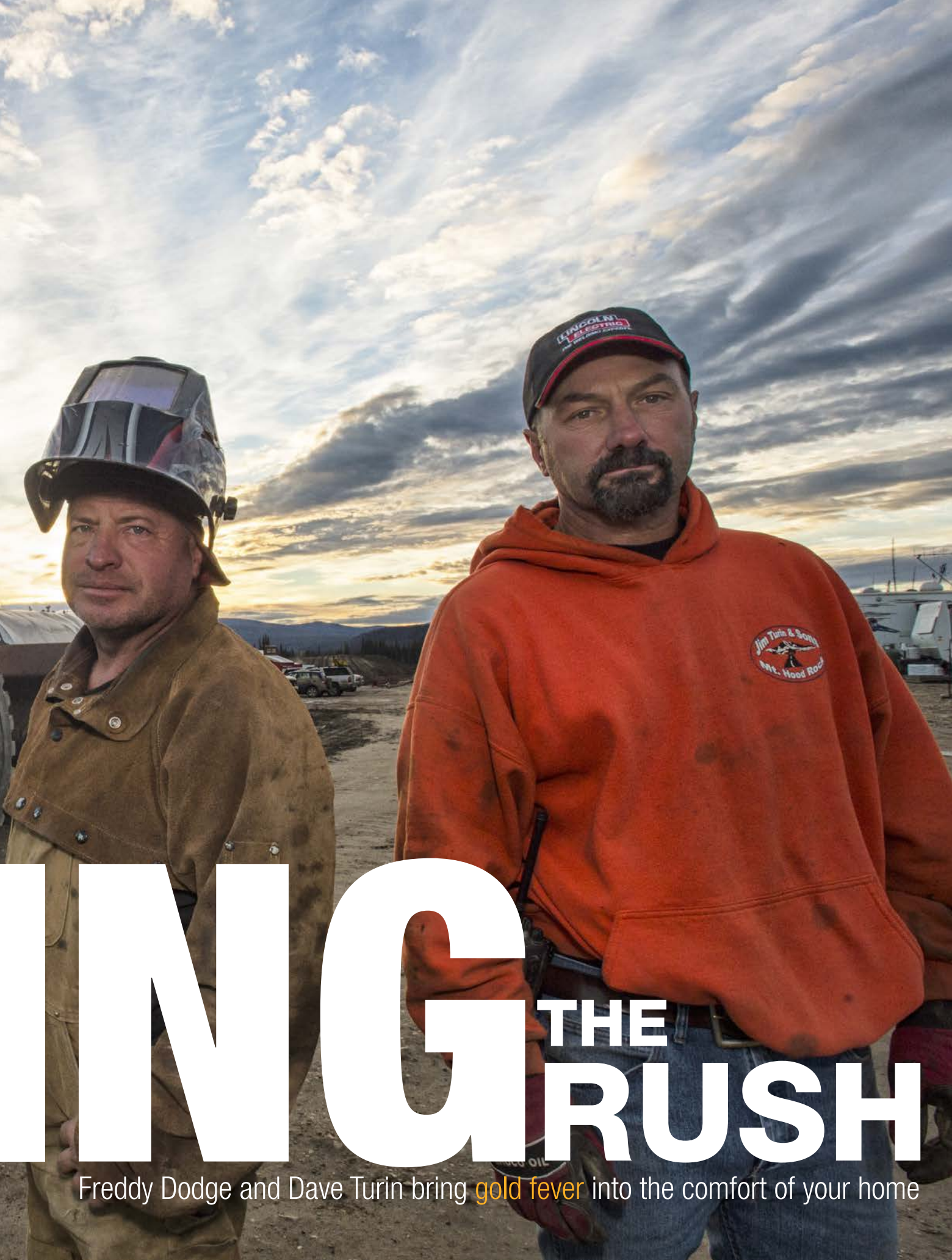
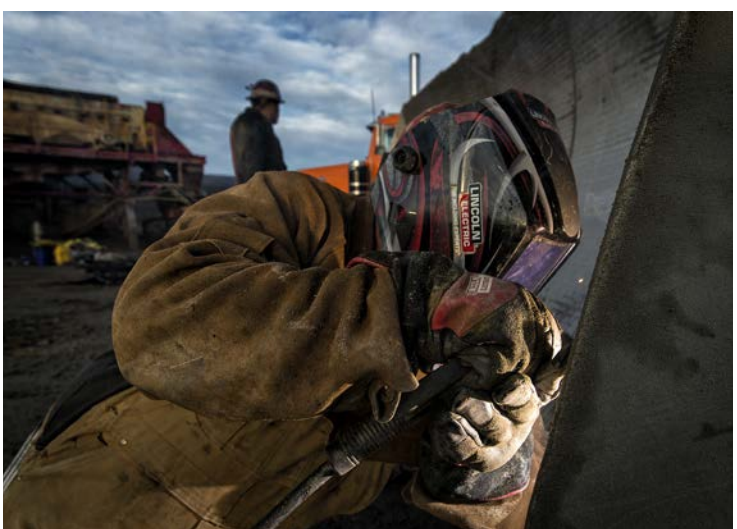
By Ken Krizner | Photography by Peter Mather



ING THE RUSH

Freddy Dodge and Dave Turin bring gold fever into the comfort of your home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The allure of gold is as old as man's ability to walk upright. For centuries, prospectors traveled deserts and mountains, crossed rivers and oceans, and confronted hostile indigenous people for the dream of finding their personal Eldorado. Gold's siren call is no less hypnotic in the 21st century.

Only now, in the 21st century, heavy equipment and modern transportation make it "easier" to mine your claim. And the miners of yesteryear didn't have to dodge the television cameras recording their every move – both boom and bust – as they prospected. But for three intrepid teams mining for gold in the Klondike region of Canada's Yukon Territory, cameras are along for the ride. Their exploits make for must-see Friday night television on Discovery Channel's *Gold Rush*.

"We're the modern version of a gold rush," explains Freddy Dodge, a veteran of the show and longtime gold-mining expert from Walden, Colorado.

In its sixth season, *Gold Rush* focuses once again on the rivalries and competition between three teams–led by Todd Hoffman, Parker Schnabel and Tony Beets–in their quest to mine the most gold. The challenges, twists of fate and turns of emotion of each team are in the spotlight as they excavate millions of yards of rock and dirt, looking for that next strike.

Gold Rush has become Discovery Channel's No. 1 show and the most popular show on television for male viewers between ages 18 and 35. More than 170 million viewers worldwide watch the show each week, according to Discovery Channel. It's one of


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THE WELDING EXPERTS
Jim Turin & Sons
Mt. Hood Rock

left: Dave Turin
right: Freddy Dodge

several reality TV series broadcast by the network that is based in the northernmost reaches of the world, including *Alaska: The Last Frontier* and *Bering Sea Gold*, showing out-of-the-ordinary challenges and occupations found in this still wild territory.

"Many men live vicariously through us," points out Dave Turin, another show veteran and an expert at moving earth and operating construction equipment. Dodge adds, "People can sit on their couches on Friday nights and chase the dream."

Gold Rush's appeal stems in part from the makeup of the teams. These are "regular guys who have worked their butts off for most their lives and haven't been given anything," Turin says. The teams are comprised of people not unlike many viewers watching from home, coming from all walks of life and in search of a better future for themselves and their families, the same ethos that has driven many of history's gold rushes.

Dodge and Turin could be your next door neighbors. Both are driven to succeed and have a work ethic to back it up. They were brought to *Gold Rush* separately to join the Hoffman crew during the first season for their different but complementary talents.

Dodge knew at an early age that he wanted to mine gold. Growing up on his grandparents' cattle ranch in Walden, Colorado, the third of four brothers, he first panned for gold in local creeks when he was eight years old. Eventually, he started his own business.

"I've turned a hobby into a life," Dodge maintains. "Everybody thought I was crazy, especially in the '90s when nobody was interested in gold. But I just kept at it and have built a pretty fair business." Dodge's reputation as an expert on fine gold recovery and gold-catching equipment precedes him, which prompted Hoffman to bring him on. It wasn't long before Dodge's knowledge and experience made him a cornerstone of the Hoffman team.

He has a fan in Turin. "Freddy has tried so many sluice box configurations," Turin says. "He can find the most effective and efficient way to capture gold."

Turin spent most of his life in his family's rock quarry business in Sandy, Oregon. He was running the business with his father and three brothers when Hoffman, also from Sandy, asked him to come aboard as a consultant to help get the operation established. Never one to back away from a challenge, Turin jumped at the opportunity to become a full-time member of the Hoffman team in the show's second season. He calls that season a personal high point. It began with him doubting his ability to contribute to gold mining. It ended with him being an integral part of the team, which just missed its goal of mining 100 ounces.

Dodge describes Turin as someone who moves material more efficiently than anyone he's ever worked with. "Dave can look at a piece of property and have in mind how to move the dirt," Dodge says. "He's more than just an equipment guy, he's an all-around guy."

Their paths crossed infrequently during the early seasons, although Dodge made an impression on Turin. Prior to season three, they exchanged thoughts on building a wash plant to take to the Klondike. According to Turin, Dodge sketched his ideal wash plant on a napkin with what he believed were the necessary dimensions. Turin took the napkin to a mechanical engineer who interpreted the design as a CAD drawing. As it turned out, Dodge's napkin drawing was dimensionally correct and the wash plant was built to specifications. "That's Freddy Dodge," Turin says. "He does an amazing job."

The two men developed a close friendship after realizing they had much in common. The friendship was cemented when they traveled to Guyana to scout mine sites for season four.

Guyana exemplified why mining gold is not for the faint-hearted. It was a season that tested Dodge, Turin and the entire Hoffman team like no other before or since. The scouting mission found decent gold deposits, but when the crew showed up to begin production weeks later, illegal miners had already poached much of the gold. Complaints were lodged with the claim's owner and Guyanese government, but to no avail. Under pressure to start mining, Dodge and Turin found another area large enough to support the production crew (between 60 and 90 people). "That's where it fell apart," Turin admits. "We were in an area that already was mined. Most of the gold had been taken out."

The Hoffman team left after mining less than 2 ounces of gold. "That was my low point," Dodge acknowledges, "when I realized there was no gold."

But that's the chance you take. There is no guarantee you'll mine any gold at all, let alone enough to recover your investment in equipment and permits. Too many variables are completely out of your control, most importantly how much gold is actually in the ground.

More than searching for gold, however, *Gold Rush* demonstrates how setbacks and mistakes can be overcome, even those with financial ramifications. "Millions of people see when Freddy and I make a mistake," Turin says. "Viewers also see how we handle those mistakes, stay as a team and remain friends."

A year after Guyana, the Hoffman team recovered to mine more than 1,300 ounces totaling more than $1.6 million in season five. But it wasn't enough to overcome their chief rivals on the show, the Schnabel team, which mined more than 2,500 ounces worth more than $3 million. The loss stung both Dodge and Turin. "Parker (Schnabel) beat us last year and rubbed our noses in it," Turin says. "Freddy and I are probably the two most competitive guys on our team. We put pressure on ourselves to find gold." The battle between the Hoffman and Schnabel teams is one of the main plots of season six.

That's the mindset it takes to mine for gold. Not many people have it but wish they did. That's why *Gold Rush* is so popular. "We've been given an opportunity to do something crazy," Turin says. "That appeals to most men. It has worldwide appeal." Given its popularity, Dodge and Turin believe the show will continue beyond season six.

Show or no show, both men plan to continue mining, and there is still plenty of gold to chase. "There are places around the world that haven't been touched," Dodge says. Their inspiration to continue searching for their personal Eldorados is the same that drove fortune-seekers of the past to risk their lives. "We want to find enough gold to build our dreams," Dodge emphasizes.

Dream big, gentlemen. The world will be watching. **ARC**

Be sure to check out *Gold Rush*, airing Fridays at 9 p.m. ET/PT on Discovery Channel.

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Dreamboat

by Clare O'Reilly

Imagine building a 40-foot aluminum sailboat in your backyard.

Now imagine your backyard is in the Norwegian countryside, 100 miles from the sea and at the mercy of long, harsh winters that regularly dip to more than 20 degrees below zero.

And now imagine building this 40-foot aluminum sailboat with the help of hundreds of volunteers from all over the world over the course of more than six years.

Sounds incredible, doesn't it? But it's very real, and it's happening right now as part of a very unique experiment known as Sailing the Farm.

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Portholes from Scratch: *Builders at Sailing the Farm create aluminum portholes by packing sand tightly around a wooden template secured by two wooden frames. The template is then removed and molten aluminum is poured into the sand mold. Each piece of the porthole takes about a half a day to make.*

AT SEA

The story of Sailing the Farm begins many miles – nautical and otherwise – from rural Norway. It starts on a small, plastic Albin Vega sailboat somewhere off the coast of Newfoundland in 2002. The man at the helm is a Norwegian computer analyst named Jonny Birkelund, and he is not a happy sailor. His crew dropped out at the last minute. Now he's single-handedly navigating the craft through the ice and fog of the North Atlantic Ocean.

As the sole person on board, Birkelund has to keep a watch for ice. He knows that if this plastic boat hits something, chances are he's going down, so he is hyper-vigilant. But this state of heightened awareness, coupled with the solitude of the voyage, affords him clarity. He envisions a boat strong enough to withstand these elements – a sailboat built of aluminum. In these treacherous conditions at sea, the first seeds of Sailing the Farm are sown.

Birkelund spends the next few years in China, where he works for a Norwegian computer startup. His original plan is to build the boat there with the help of some friends, but family obligations call him back home. Birkelund owns a farm there, where he processes honey and sells it locally. A farm in the Norwegian countryside may not be the most practical location to build a boat, but it's the place where the dream begins to take shape.

BUILD IT AND THEY WILL COME

Birkelund began construction of the elaborate lapstrake hull in 2009. Lapstrake construction calls for the overlapping of hull planks – not unlike roofing tiles – as opposed to carvel construction, in which planks are arranged and assembled seam-to-seam with no overlap. The hull assembly, based on original plans sourced from the Maritime Museum in Oslo, was Birkelund's first step in the construction of an all-aluminum replica of the *RS1 Colin Archer*, a famous Norwegian rescue boat from the 1890s, renowned for its seaworthiness.

Just like the *Colin Archer*, Birkelund's boat would be 40 feet long by nearly 15 feet wide. The replica, however, would require about five tons of aluminum. From the get-go, Birkelund committed himself to a DIY philosophy. As


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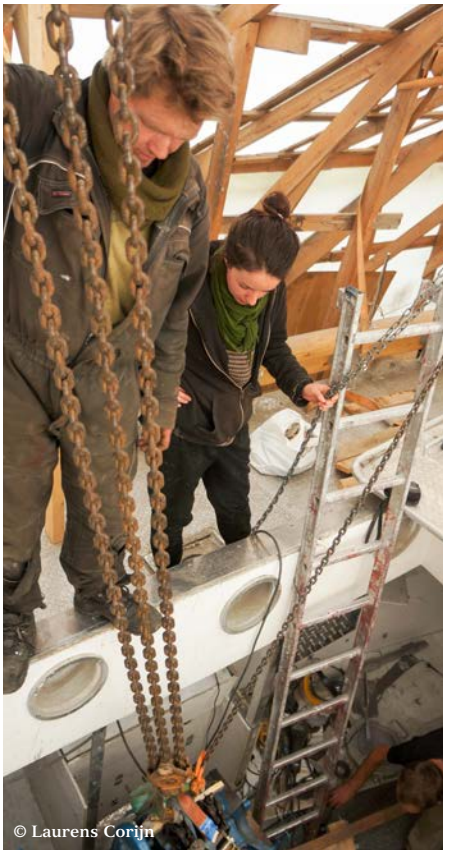
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many parts and fixtures as possible – aluminum and otherwise – would be made on location in the farm workshop.

But you can't build a 40-foot boat with passion alone. The sheer magnitude of the project quickly became apparent, and Birkelund started to lose heart. "I was on the point of burning out," he explains. "The project was way too big for one person, so I started to advertise for volunteers. I really didn't know if anyone would show up."

But show up they did. In droves.

In the years that followed, hundreds of volunteers made their way to Norway to help on the project. Some stayed for just for a week, most for at least a month, and a dedicated few ended up staying long-term. Along the way, one man's dream slowly evolved into an international community project.

The motley crew of volunteers cast portholes, they melted lead for the ballasts, they cut and shaped aluminum plates, they turned stainless steel on the lathes, they welded, they soldered, they built. They also worked the picturesque Norwegian farm during the spring and summer months. There was honey to harvest, vegetables to tend and bees to keep.

Approximately 300 people have come to volunteer on the farm, from all corners of the globe. An overwhelming majority of the volunteers have been female, attracted by the chance to do hands-on work and learn new skills in what is traditionally considered a male domain.

Leona Nally, an Irish stage manager now based in London, lived on the farm in 2013. Her favorite task was casting the aluminum portholes.

The process involved packing sand tightly around a wooden template nestled within two wooden frames, then very carefully removing the template. The shape in the sand acted as a sort of mold. "We then melted down some aluminum," she remembers, "and poured it in through a carefully placed hole and *ta-daah!* The sand holds its shape and you have one piece of your porthole."

Nally adds, "Of course, when I say *ta-daah*, each element of the porthole took about half a day to do. It wasn't fast work. But it felt really nice to have a finished product at the end."

Designer and upholsterer Sarah Brunner from San Francisco, California, stayed in 2014 and contributed much of the sewing and upholstery work. But her favorite job? Hands down, it was melting lead for the ballasts. "It's a totally great, quirky thing, this project," she says. "It's quite inspired and just amazing that it's getting done at all."

For Will Donaldson, an engineer from Wales, the spirit of adventure and self-reliance is what attracted him to Sailing the Farm. "Back in the 1800s, if you wanted to explore the world, you couldn't just buy a ship. You had to build it yourself," he says. "There's something magical about that idea. And there are lots of stories from the 1960s and '70s about men building sailboats in their backyards. You just assume this kind of thing didn't happen anymore, but it's happening here."

Donaldson is a metalworker, and a relatively recent addition to the team. He's already put his stamp on the boat in the shape of the impressively designed rudder and stairs, among many other elements.

Nils Nisse, a professional baroque oboist from Sweden, is a regular visitor to the project. He first volunteered in 2010 and has come back almost every year since. For him, the project has been life-changing. "The people you meet here are the best in the world, everyone in a very different way. It feels very much like home." he says. "It's a great feeling to be a small part of this very unique project, and I very much hope to sail on the boat all over the world."

LIFE ON THE FARM

The typical day at Sailing the Farm begins when the four resident roosters start crowing. Breakfast starts at eight, and porridge is always on the menu (like it or not). Work begins at nine. Today, Charlotte from England and

Maia from Japan weave nets at the kitchen table, while Will from Wales is in the workshop putting the finishing touches on the aluminum ladder.

Lunchtime is spent discussing the boat's interior and poring over sailboat books for inspiration. A giant map of the world on the wall serves as the backdrop and has inspired many a lunchtime conversation. Potential routes are debated and discussed at length. An expedition to Antarctica is mentioned more than once. That might sound unlikely, but if you start to doubt the power of dreams, you only have to look inside the boat shed to remind yourself that if you put your mind to it, almost anything is possible.

With the building coming to an end, thoughts are naturally turning towards sailing. Why build a boat unless you plan to take it on some epic adventures? And boy, does this group have some adventures in mind. The crew will be made up of past volunteers – and priority will be given to those who've stayed the longest. The initial plan is to go south to escape the Norwegian winter. After that, the world really is their oyster. And once they've warmed up in the sun a bit first, the Antarctica trip is very much a part of the plan.

Every spring for the past few years, a family of swallows has made their nest in the portholes of the sailboat. And every autumn, in what must be a bittersweet moment, Birkelund watches as they depart for sunnier climes south of the Sahara. Next year, though, he is confident that the boat will meet them along the way.

What's next for Sailing the Farm? "Oh, another boat," Birkelund replies, surprised at the question. "Oh, yes. Definitely. We want to build a bigger one – maybe five meters longer, and this time with a workshop on board."

The talk around the dinner table soon turns to the number of lathes you could realistically fit on board, and whether a milling machine would be a good idea. And on this busy Norwegian farm, as the roosters crow, and the bees bed down for winter, another seemingly impossible dream sets sail. **ARC**

EDITOR'S NOTE: Since this article was written in the late summer of 2015, construction of the aluminum replica of *RS1 Colin Archer* was completed, and the ship was christened *Sailing the Farm* in honor of its place of origin and Norwegian sailor Jonny Birkelund's original vision. As we went to press, the Sailing the Farm team was preparing the ship for initial sea trials and eventually a world tour in 2016.

The First *Archer:* a Maritime Odyssey

The all-aluminum double-ender currently under construction at Sailing the Farm is a replica of the *RS1 Colin Archer*, a Norwegian rescue cutter designed and built in 1892 by Colin Archer, a Norwegian naval architect of Scottish descent. Commissioned by the Norwegian Society for Sea Rescue and launched in July 1893, the original ship featured a continuous deck, and measured 46 feet (13.95 meters) long by 15 feet (4.65 meters) wide. The combined area of the mainsail, mizzen, staysail, jib and topsail is 361 square feet (110 square meters).

The *RS1 Colin Archer* established an impressive rescue record in its very first year – so impressive that she became the prototype for every rescue cutter built in Norway for the next 30 years. By the time she was sold to a private owner 40 years later, she had saved 67 ships and 236 people, and assisted 1522 vessels carrying some 4500 crew members.

But that was just the beginning of the adventure.

After she was decommissioned in 1933, the *RS1 Colin Archer* disappeared into obscurity for nearly three decades until she was found in the United States in 1961 in severe disrepair. The ship was brought back to Norway and acquired by the Norwegian Maritime Museum in 1972. After comprehensive hull repairs in 1977, she brought home the Overall Winner trophy in the 1983 Cutty Sark Tall Ships Race. She won two subsequent Tall Ships Races, once in 1987 and again in 1993.

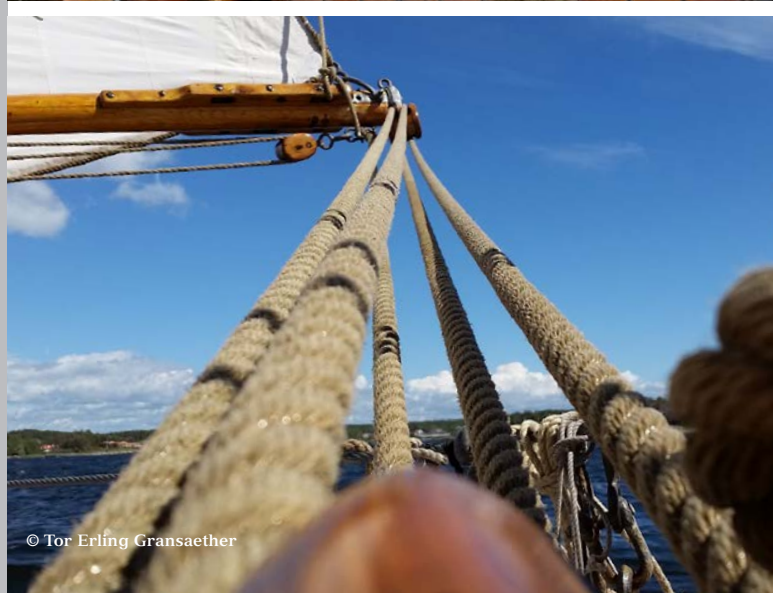
Around the time of the third Tall Ships victory, a full century after her original launch, the *RS1 Colin Archer* interior was refurbished and restored to her original colors. The Maritime Museum currently operates the ship as a living museum under the leadership of Captain Knut von Trepka and skippers Christian von Trepka (Knut's son) and former crewman Tor Erling Gransaether.

The ship caught fire in the spring of 2013, and required a full year of rebuilding before she was seaworthy again in the summer of 2014. But in a triumphant comeback that same year, the *RS1 Colin Archer* took home another Overall Winner trophy at the 2014 Tall Ships Race.

She remains seaworthy to this day, more than 120 years after her initial construction and launch.

© Thorvald Knudsen


© Tor Erling Gransaether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GETTING A BETTER ANGLE ON WELDING

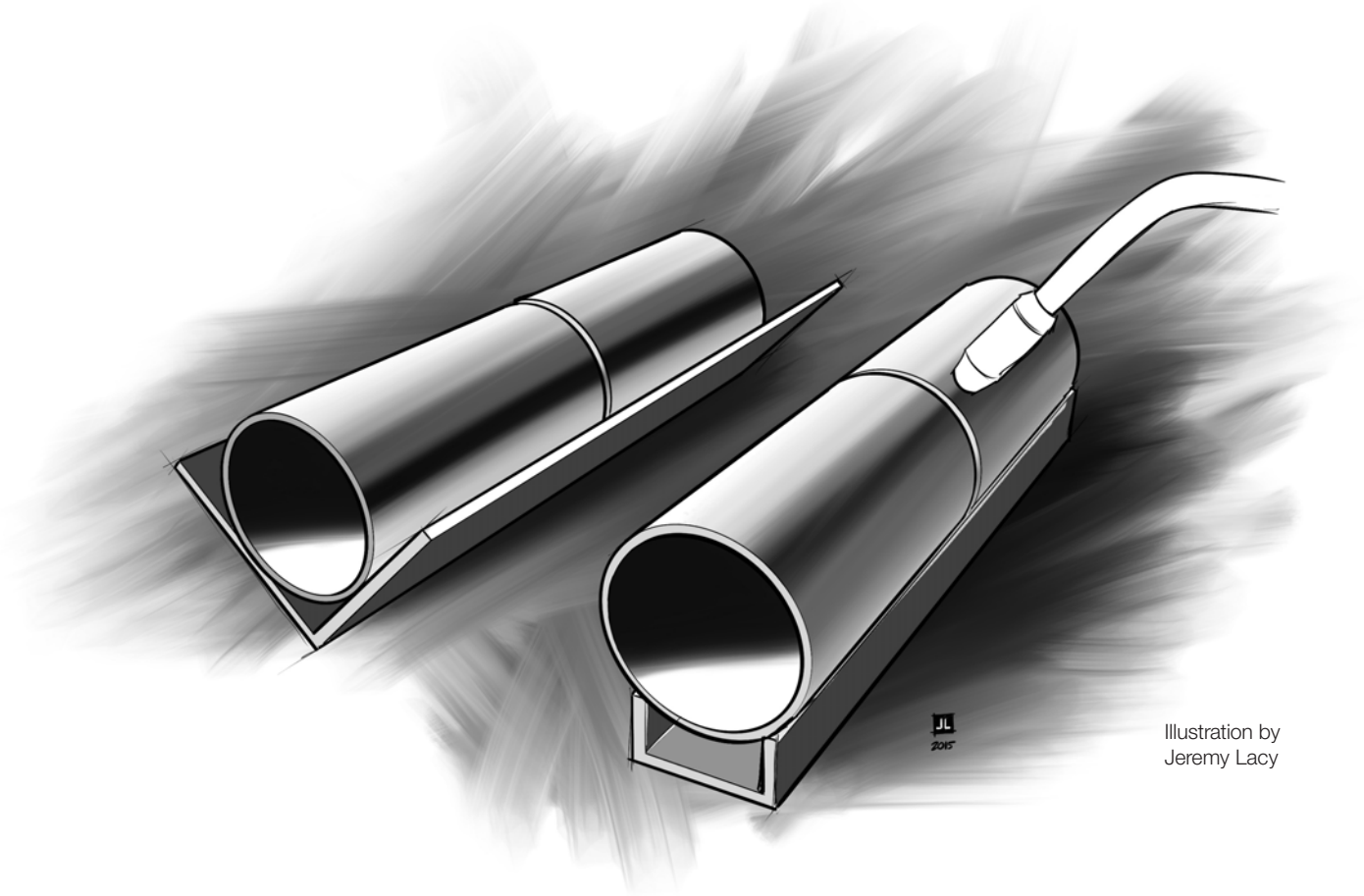


Illustration by Jeremy Lacy

USE ANGLE IRON AS A JIG

To align two pipes of the same diameter – and to make sure they stay in line with each other while you tack them into place – use a piece of angle iron that is slightly larger than the pipe you're welding as a jig. This will allow you to place several tacks around the pipe before finish welding. You can also use a piece of U-channel that is slightly smaller in width for the same result.

– *Submitted by Terry Kirkpatrick, Cleveland, Ohio*

TURN UP THE HEAT

Weld hot when tack welding – even on sheet metal. Fast is good and the heat is needed.

– *Submitted by Jerry Luke, Scottsdale, Arizona*

STICK OUT AND SNIP

In order to achieve a smoother arc start when MIG welding, allow the wire to stick out ¼ inch and snip the wire at a 45-degree angle. This allows for the wire to initiate an arc covering less surface area at the tip of the wire, creating less resistance at the gun.

– *Submitted by Alvaro Figueroa, Sacramento, California*

TILT YOUR TIG TORCH

To avoid the tungsten electrode from sticking when getting ready to TIG weld, hold the torch at a 30-degree angle with the ceramic shroud touching the weld area and slowly bring the torch upright while depressing the foot pedal. This will give a clean, non-stick start and is useful in avoiding stray arc strikes.

– *Submitted by Edward Hannon, Adelaide, South Australia, Australia*

TACK FIRST, THEN FINISH

When welding a trailer frame together, always tack the frame first then perform your finish weld. This will keep the steel from twisting.

– *Submitted by Glen Lee Adams, Montreal, Quebec, Canada*

GET IN THE THICK OF IT

When welding in small patches where you cut rust out of body parts, use a slightly thicker gauge metal for the patch. That way, when you start to weld the patch, the majority of the heat will be kept on thicker metal. This works really well if you have access to the back.

– *Submitted by James Hoff, Colorado Springs, Colorado*

EYE ON THE ARC

Make sure you can see the arc and recognize the weld puddle. Once you can see and recognize that weld puddle, you can control it. The weld puddle can tell you whether your work or travel angles are wrong, and whether you're traveling too fast or slow. If you're having trouble keeping your weld in the groove it might just be a matter of moving your head into a position where you can see the arc and weld puddle.

– *Submitted by Andrew Lamer, Cottonwood, Arizona*

HOLIDAY GIFT GUIDE

Curated By *ARC Magazine*

We've compiled this shopping guide to help you find just the right thing for that welder or fabricator in your life. All of these products are available at most Lincoln Electric distributors unless otherwise noted.

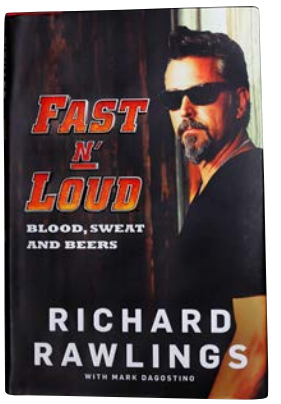
1.

1. POWER MIG® 210 MP and Square Wave® TIG 200 – These ultra-portable, multipurpose machines are the perfect start for – or addition to – your welding arsenal. Each weighing in at less than 45 pounds and capable of running on either 115V or 230V, they are defined by their intuitive controls and ease of use. Starting at $1,199

2. Magnetic Fixtures – It's like having an extra set of hands anytime you need them. Starting at $41

3. *Fast n' Loud* – Get You Some Of That! An autographed hardcover copy of Richard Rawlings new book from shop.gasmonkeygarage.com! Just $49.99

2.



3.

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8.

4. Welding Jackets – Stay protected in style with a wide range of welding jackets for him or her. From $31

5. Jessi vs. The Robot™ and Amp Angel® Welding Helmets – Helmets for her, too! Choose from the Jessi Combs line for the perfect union of fit and function. From $218

6. MIG Welding Wire – Keep your welder stocked up on welding consumables. It's the gift that keeps on giving! Starting at just $14.99

7. Magnum® PRO 100SG Spool Gun – Get ready to tackle aluminum with this reliable and precise spool gun for soft aluminum wire. The 100SG is easy to set up and is compatible with many Lincoln Electric MIG welders. From $288

8. Harris Products® Port-A-Torch™ – You *can* take it with you. Jobsite-friendly design in an easy to carry package. Available at Harris Products distributors. From $442

9.

10.

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13.

9. Century® Jump Starter – This little beauty will come in handy in a pinch, cranking power to start cold stubborn engines. LEDs indicate state of charge so you always know when it's ready, and a USB port for charging your devices. Centurytool.net. From $69.99

10. White Tail Camo™ and Foose Impostor™ Welding Helmets – The latest design, with the latest technology! Both helmets feature 4C™ technology for the best color and clarity available on the market. From $312

11. HydroGuard™ Portable Rod Oven – Available in models for both 115V and 230V, these – rod ovens will keep your stick electrode high and dry. Starting at $187

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14. Tomahawk® 375 Air Plasma Cutter with Hand Torch – Perfect for hobby or hard work, the Tomahawk 375 is everything you need for fast and precise cutting. Price: $1,199

15. Roll Cage® Welding Rigging Gloves – Form meets function with these multipurpose gloves. And they also happen to be great for your snowmobile when the temperature drops! Starting at $49

16. Growth Series™ 2x2™ – Does someone you know yearn to burn? Make their holiday with a CNC plasma cutter from Torchmate. Visit torchmate.com to get a quote. Starting at around $3,000

17. *Full-Bore Welding* and *Full-Bore Sheet Metal* – Whether you are just starting out or sharpening your skills, the *Full-Bore* series belongs in every shop. Available from fullermoto.com. From $24.99

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17.

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An artist finds beauty in metal

By Ken Krizner

To Stephen Manka, a public space is the ultimate canvas, and metal the ultimate medium. "Public spaces are public living rooms that deserve to be beautiful," he asserts.

Manka, owner of Manka Design Studio in Cleveland, Ohio, conceives and designs large-scale public art projects, then brings them to life as a way to amplify the sense of place of a neighborhood. His creations are site-specific and attempt to capture the rhythms of daily activity.

Outdoor art wasn't originally his career choice. After earning a master's degree in architecture, Manka entered and won three public art competitions. "I decided this is what I wanted to do with my life," he says.

One of his latest projects is the installation of a top hat, cane and scarf motif across the street from a nearly century-old historic Cleveland theater. The design represents the diversity of entertainment the shuttered theater once hosted – from silent films to heavy metal rock concerts – both during and after its glory days. Manka invites the curious to walk into the hat, which is positioned on its side, and have a good time. "It represents a party," he says. He encourages interaction between the public and his work.

This interaction is why Manka prefers metal for many of his projects (the top hat was created out of mild steel). He describes metal as the perfect material for outdoor public art, given its strength and durability, allowing an object to withstand the elements and rigors of daily life. "It has to feel like it's going to be here forever," he points out.

Moreover, Manka sees metal as a rich medium. Sure, it's not the lightest or easiest to work with, but Manka enjoys exploring how metal can be fabricated. "The luster and finish of metal are often just so beautiful," he says. "I love its structural quality."

It is a great responsibility to take an otherwise ordinary public space and transform it into an area that provokes reflection, conversation and appreciation, Manka believes. "I take pride in the thought that I get to do something with a public space where people interact with each other," he emphasizes. He encourages local residents to take pride in the art as well, as it becomes a part of the cultural fabric of the neighborhood. **ARC**

To see additional photos of this project, download the tablet edition of *ARC Magazine*™. DOWNLOAD IT FOR FREE.

Watch exclusive footage in the *ARC Magazine*™ tablet edition.
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TIG Welding 4130 Chrome-Moly Tubing

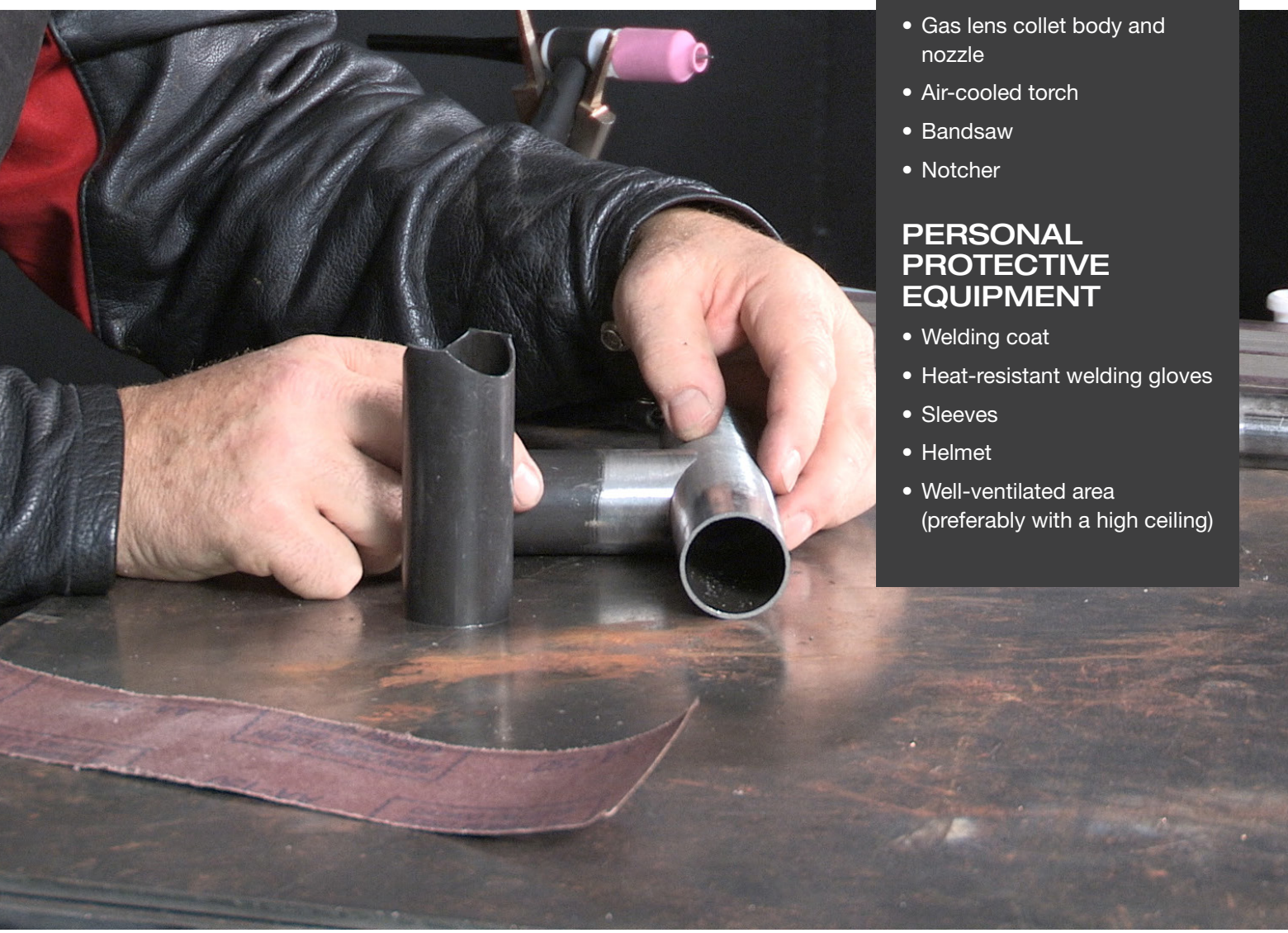
By Karl Hoes, Welding School Instructor, The Lincoln Electric Company

TOOLS

- 4130 chrome-moly steel tubing, 0.065-inch wall thickness
- Lincoln Electric Square Wave TIG® 200, 230V, 65 amps
- Lincoln® ER80S-D2 filler rod, 0.0625 inches
- Argon gas
- Gas lens collet body and nozzle
- Air-cooled torch
- Bandsaw
- Notcher

PERSONAL PROTECTIVE EQUIPMENT

- Welding coat
- Heat-resistant welding gloves
- Sleeves
- Helmet
- Well-ventilated area (preferably with a high ceiling)



4130 chrome-moly (chromium-molybdenum) tubing, a heat-treatable, low-alloy steel, is used in applications where high strength and low weight are necessities.

Chrome-moly is stronger than normal steel (almost double the strength of 1018 steel), meaning fabricators can use less material without compromising strength. There are several types of chrome-moly steel, although 4130 is widely used for fabrication in aerospace, experimental aircraft and motorsports applications.

4130 chrome-moly tubing is produced with scale on the outside surface. Bandsaw cuts generate oils, coolants and hydrocarbons on the inside. Prepare the tubing for welding by cleaning with a solvent or hot, soapy water and using an abrasive cleaner to take the surface down to bright, shiny metal. Vehicle safety depends in part on the best possible weld, and the proper preparation of 4130 chrome-moly tubing will help ensure that type of weld.

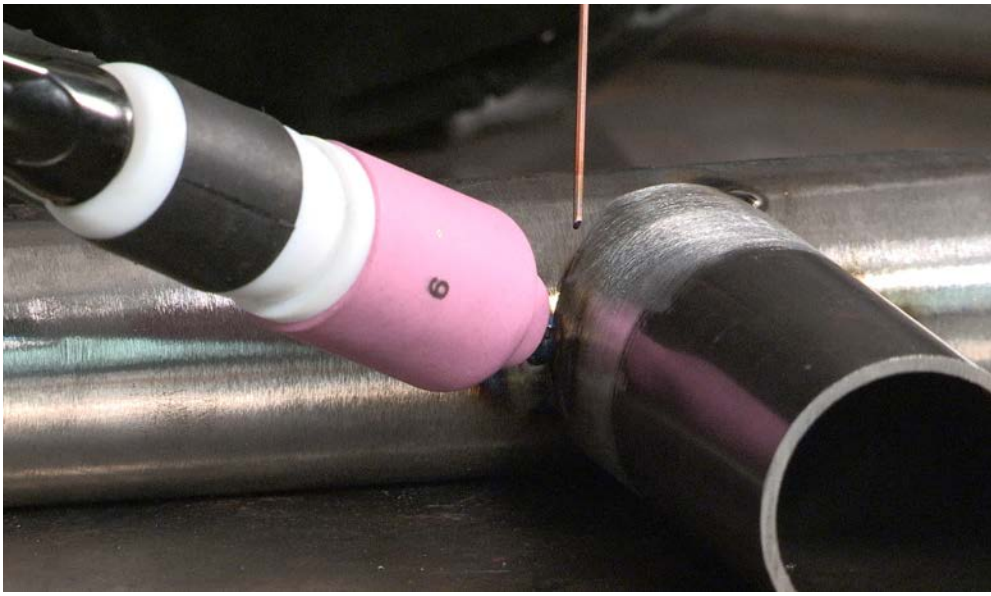
Thin wall tubing (less than 0.120 inches) typically doesn't require preheat because it cools slowly. The tubing should be at room temperature (70° F) or above before welding. Thicker pieces of 4130 chrome-moly tubing should be preheated to protect against excess hardening, which could lead to cracking.

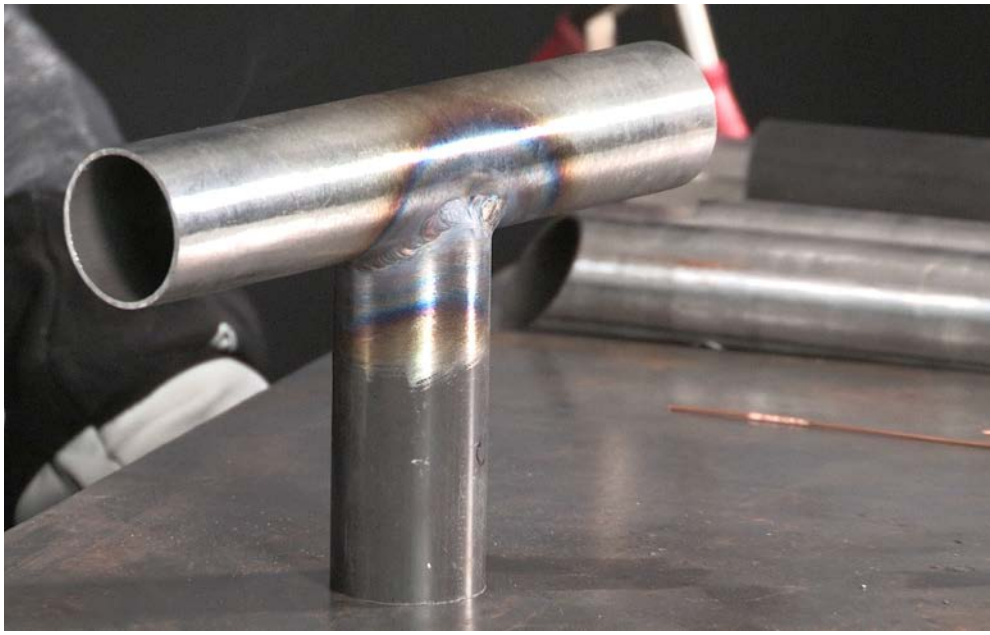
Fit-up on 4130 chrome-moly tubing is important. A good fit-up will minimize heat input, thereby preserving the mechanical properties of the base metal. There are a number of ways to notch the tubing to achieve the correct fit-up.

4130 chrome-moly tubing demands quality welds. That's why sanctioning bodies and industry codes often mandate that the tubing be TIG welded. TIG welding also will allow users to stop and start, while minimizing discontinuities on restarts.

Tack weld the tubing in four places, followed by the finishing weld. There should be a smooth transition in the interface between the weld and base metal with no undercuts or overlaps, which could lead to fatigue cracks.

Always allow the weld to slow cool and never attempt rapid quenching. Rapid quenching will create structural problems in the metal. **ARC**





TAXI!

September, 1940 — For most of the 20th century, Checker Taxi Cabs serviced commuters and travelers in cities all over America. This view of the main assembly line at the Checker Cab Manufacturing Corp. in Kalamazoo, Michigan, shows the cab bodies in production and the welding operator fabricating a wheel house extension. This portion of the assembly included a 9-inch vertical weld using a 1/8-inch SMAW electrode, which took approximately 37 seconds per weld. One operator took care of the entire production, making two of these welds as well as several other small welds in various places on the body.

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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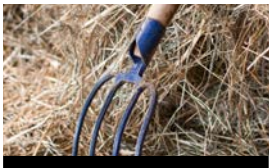
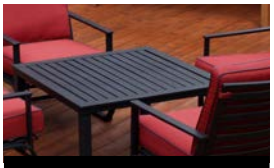


STRAIGHTEN A BENT PITCHFORK



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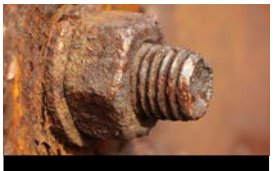

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