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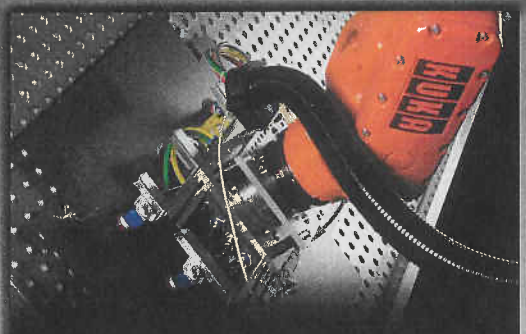

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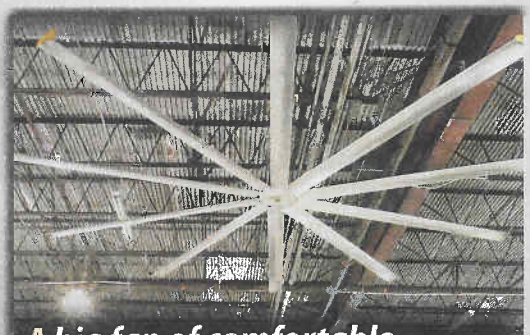

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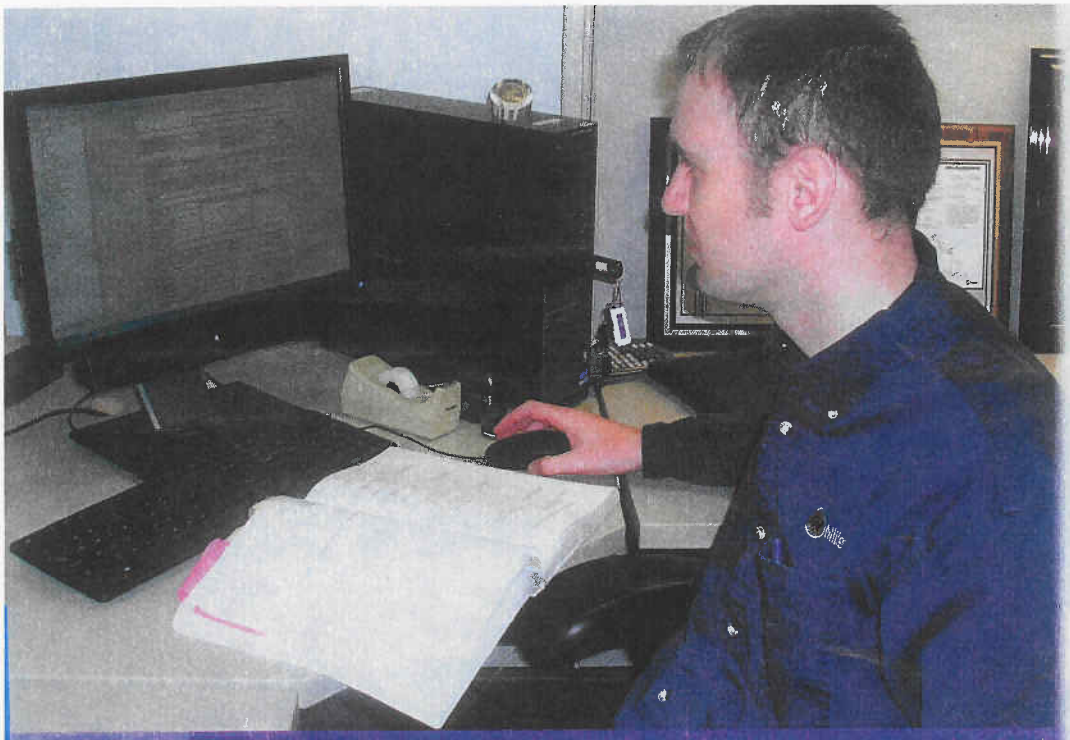


A character sketch of the code welder

Quality work and communication skills are core to good welding, code or no code

By Tim Heston, Senior Editor

Earlier this year a pipe welding team quietly accomplished a rare feat. Over two months, after thousands of welds and 847 radiographic examinations, the team did not produce a single reject.

The welders work for Port Arthur, Texas-based Team Fabricators LLC, a subsidiary of Team Industries, a pipe and vessel fabricator based in Oconto Falls, Wis. These were full-penetration, V-groove pipe welds, all of which required random radiographic examination per the ASME code.

Under normal circumstances, an X-ray occasionally reveals a discontinuity, such as incomplete fusion or porosity, severe enough to reject a weld. But for eight solid weeks at Team Fabricators, QA personnel took X-ray after X-ray and saw nothing severe enough to warrant a reject. Groove weld after groove weld, everything passed muster. The welders were batting a thousand.

"We had zero failures and zero weld defects over all that time," said Tim Monday, vice president of technical operations at Team Industries. "That's exceptionally good."

At Moraine Park Technical College in Fond du Lac, Wis., Larry Clark often can point out a student welder who may one day bat a thousand. Students at Moraine must pass two code-level qualification tests to graduate. They may not all go on to work at jobs involving those specific codes, but passing those exams at least tells potential employers that they can pass professional-level tests and produce high-quality welds.

But along with this, Clark said, certain personality traits are harbingers of great welding to come. For instance, the instructor recently noticed one student completing a 6G pipe weld. The bead shape was nearly perfect. After visual examination, Clark said that weld probably would pass muster for most if not all code-level work. For a proud teacher, the weld bead was a thing of beauty. But the student continued to examine it. Something wasn't right. He noticed some small features at the weld toe that weren't perfect. He could do better. And after more practice, he actually did.

Some code-level welders are the metal fabrication industry's star athletes, and like athletes, their personalities really can't be pigeonholed. Some can be loud extroverts who get the most attention, but others can be quiet introverts. Many share a dedication to the welding craft, and the best strive to do the job right the first time.

Hands-on Work Meets Legalese

A career in code-level welding involves an odd concoction of hands-on work, excellent hand-eye coordination, on-the-job focus, and a dash of lawyerlike thinking. That lawyer side comes from the world of welding codes, be they from the American Society of Mechanical Engineers (ASME), American Welding Society (AWS), the American Petroleum Institute (API), the National Board of Boiler and Pressure Vessel Inspectors, or elsewhere.

Consider the ASME Boiler and Pressure Vessel Code. Section IX has a trinity of criteria: the welding procedure specification (WPS), the procedure qualification record (PQR), and the welder performance qualification (WPQ). WPS sits atop the pyramid, supported by the PQR and that WPQ. The PQR qualifies the WPS; then any welder who performs work to that WPS must be qualified with a WPQ.

Adam Laabs of Fox Valley Tech's Business and Industry Services division conducts research while developing a welding procedure specification.

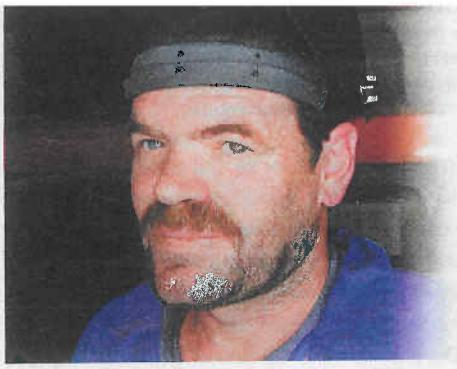
Here's the legal disclaimer: Technically, the previous paragraph isn't actual code verbiage or an official code interpretation—and so isn't valid.

In fact, legalities lie at the heart of any welding code. That's according to Adam Laabs, a welding and metal fabrication instructor at Fox Valley Technical College in Appleton, Wis. Besides teaching, Laabs works with Fox Valley Tech's Business and Industry Services division, which (among many other services) helps develop welding procedures and qualification tests for companies looking to do work conforming to codes published by organizations like ASME and AWS. Working by such welding codes, he said, acts as a legal paper trail that ideally should prove the welds and welding operators passed per a specific industry standard.

Code fabricators work in a world where weld failure can cause major inconveniences at best and, at worst, actually kill people. As Clark explained, some of the best welders and supervisors do the research to ensure the WPS in front of them makes sense and spells out essential information for the job at hand. Ideally, an incomplete or incorrect WPS shouldn't reach the welder at all, but real life isn't predictable. Things happen, and the best code welders should be ready for the unexpected.

Consider a WPS that calls out a filler metal and a certain amperage range. The welder finds that the welding wire's manufacturer recommends a narrower amperage range than the WPS specifies. What next? The welding company, the job at hand, customer requirements, the specific welding code, and official interpretations of that code determine how a welder should proceed.

Regardless, here's where some communication skill comes into play. As Laabs explained, the best welders not only have the technical expertise, but know how to communicate it. "It's often about knowing the difference between *should* and *shall*," he said. *Should* implies something that is best practice; if it isn't followed, the company may lose work and workers could lose their jobs as a result. *Shall* implies something much more decisive, and not following it could lead to a blatant violation. If someone gets hurt, people or companies could be in legal trouble due to negligence.



Words Matter

Code-level welding involves all sorts of nomenclature. AWS D1.1 has its *prequalified* welding procedures. The ASME boiler code has its *essential* and *nonessential* variables that are part of every WPS.

Jim Bridgeman, site welding representative for Xcel Energy, a utility based in Minneapolis, said welders and managers should use terminology carefully. For instance, if someone says a job needs "P1 material," that's different from saying a job requires carbon steel. Under the ASME system, just because a metal is carbon steel doesn't mean it automatically qualifies as P1 material. "Before a steel product is classified as P1, there are thousands of hours of testing associated with that. It's not something that just fell off the truck."

In this arena, words matter, and managers, including QA personnel, must know and work with the code and its terminology. Although welders may not need all that knowledge to perform the job, they work within a code-welding world all the same, and in this line of work, ignorance isn't bliss.

Always Being Tested

The quality of a code welder's work is continually tested, thanks to random radiography and other nondestructive examinations some codes require. The inspection frequency depends on customer requirements and the code being used. A QA person may pull, say, one out of every 20 joints a welder performs and radiograph it. If that weld passes, all is well.

If it doesn't, a code may call for some progressive testing. If one weld fails and must be repaired, the QA person must pull a few more made by that welder and test them. If all those pass inspection, the operation moves forward. But if one of those welds doesn't pass, the inspector may be required to pull still more welds until, finally, every workpiece in the entire lot must be inspected. As always, the inspection frequency and procedure depend on customer requirements and the specific code.

All this work isn't cheap, either. As Team Industries' Monday explained, "It's a huge cost, because every time we find a failure, we grind the weld out and repair the weld and then reshoot it again."

"Trust me, every welder in our company does not want to fail an X-ray," said Dean Renard, Team's corporate quality control manager. "They always try to be the best they can be. We run a good shop. If you have problems, you're not here long. We just can't afford that in today's world."

Every time a code welder completes a bead, he has to be ready for scrutiny. This environment fosters on-the-job excellence and, truth be told, some unique personalities. "They tend to be a different breed," Clark said. "They're very good at what they do, and they know it. In many cases, there are lives that hang in the balance, and it depends on the quality of their work."

Making Code Work Pay

Is a code welder always a good welder? Laabs put such work in perspective for a fabricator's hiring manager.

A welder who works to a code and goes for long stretches without a single weld reject is doing a very good job for the work at hand. But just because a welder is certified to a specific code doesn't mean he or she would be an excellent welder for every application and situation. By the same token, a welder qualified for certain code work doesn't mean he or she is the cream of the crop, nor does that person necessarily need to be. "You may have a welder that perhaps isn't quite as skilled, but he could still qualify for everything your company will do," Laabs said.

He added that a company with workers certified to one code but performing something entirely different makes that code certification irrelevant, and sometimes a costly waste. Testing procedures and certifying people to codes require an investment. Companies that have all the pieces of the puzzle—qualified welders, procedures, and work that falls under that code—can make that investment pay off.

For the Team

No one would argue that Team Fabricators' welders in Port Arthur are in fact the *crème de la crème*. Passing 847 X-rays over two months is no small accomplishment for any company. Most significant, perhaps, is that no source at the company named a specific welder by name. If one welder works months without a defect, that's great, but if other welders aren't doing the same, the success isn't as significant. Team Industries has an apt name.

No fabricator is an island, no matter how talented he is or what code he's certified to. The ability to communicate and work with others may be the most important skill of all. **FAB**

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