INSPECTION TRENDS

FEBRUARY 2024

THE MAGAZINE FOR MATERIALS INSPECTION AND TESTING PERSONNEL

Achieving Quality Welding

CWI Ethics vs. Morals

IN THIS ISSUE: CWI CORNER ■ INSPECTION EXPO & CONFERENCE HIGHLIGHTS

[**FEBRUARY 2024** | VOLUME 27 | NUMBER 1]

CONTENTS

[FEATURES]

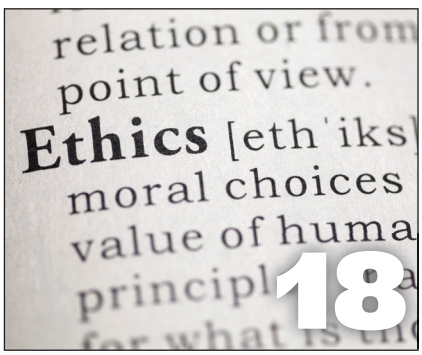
[DEPARTMENTS]

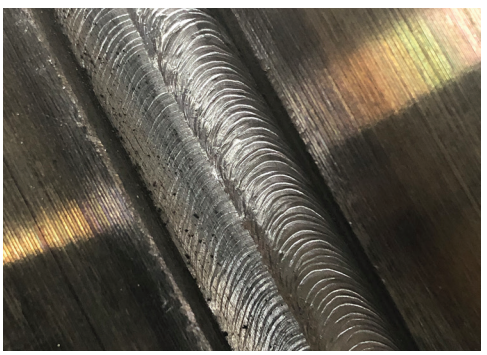
INSPECTION TRENDS (ISSN 1523-7168 Print) (ISSN 2689-0631 Online) is published quarterly by the American Welding Society. Editorial and advertising offices are located at 8669 NW 36 St., #130, Miami, FL 33166; telephone (305) 443-9353. Printed by LSC Communications, Liberty, Mo. Periodicals postage paid in Miami, Fla., and additional mailing offices. POSTMASTER: Send address changes to Inspection Trends c/o American Welding Society, 8669 NW 36 St., #130, Miami, FL 33166. Readers of *Inspection Trends* may make copies of articles for personal, archival, educational, or research purposes, and which are not for sale or resale. Permission is granted to quote from articles, provided customary acknowledgment of authors and sources is made. Starred (*) items excluded from copyright.

AWS MISSION STATEMENT: The mission of the American Welding Society is to advance the science, technology, and application of welding and allied joining processes worldwide, including brazing, soldering, and thermal spraying.

COVER PHOTO:

Orbital gas tungsten arc welding. (Credit: William C. LaPlante.)





PUBLISHER: Annette Alonso
aalonso@aws.org

EDITOR: Carlos Guzman
cguzman@aws.org

[EDITORIAL]

MANAGING EDITOR: Kristin Campbell
kcampbell@aws.org

SENIOR EDITOR: Cindy Weihl
cweihl@aws.org

ASSOCIATE EDITOR: Alexandra Quiñones
aquinones@aws.org

ASSOCIATE EDITOR: Brent Wiggins
bwiggins@aws.org

EDUCATION EDITOR: Roline Pascal
rpascal@aws.org

[DESIGN & PRODUCTION]

MANAGING EDITOR, DIGITAL & DESIGN:
Carlos Guzman
cguzman@aws.org

PRODUCTION MANAGER: Zaida Chavez
zaida@aws.org

ASSISTANT PRODUCTION MANAGER:
Brenda Flores
bflores@aws.org

[ADVERTISING]

MEDIA SALES EXECUTIVES:

Lea Owen
lea@aws.org

Scott Beller
sbeller@aws.org

SUBSCRIPTIONS REPRESENTATIVE:

Giovanni Valdes
gvaldes@aws.org

AMERICAN WELDING SOCIETY

8669 NW 36 St., #130, Miami, FL 33166-6672
(800/305) 443-9353

Integrity in the Face of Adversity

CURT GREEN

If you spend enough time working in quality assurance, you're eventually going to be the "bad guy" in someone's story, whether it be the foreman who's missing a deadline, the client who's over budget, or the welder who failed the qualification test. As inspectors, we must accept this fate, but how we deal with the adversity says a lot about our character and, in turn, our reputation and credibility. I've never been much of a people pleaser, and that has rendered me somewhat immune to the retribution associated with the villainy. This indifference to people's perception has allowed me to dig in and firmly plant feet on my side of the line. Those moments of willfulness have left me with a solid reputation for being an inspector of integrity.

Integrity is one of the most important characteristics we can have in this line of work. When you sign off on something, people need to be able to trust that you made the right decision. In many cases, lives literally depend on it. In a perfect world, when an inspector waves the red flag, production halts, minds converge, nonconformances are corrected, and life happily goes on. Unfortunately, many inspectors are hesitant to raise the red flag when they see quality issues. That hesitance can come from many angles. Sometimes guys are just under the gun to get work out of the shop. Maybe previous rework has blown the budget and people are pointing fingers at the "picky" inspector. Maybe the client has a contract with a rapidly approaching deadline date on it. Any number of things can put pressure on you to let certain things pass. I've heard it a million times: "It ain't pretty, but it'll hold." And sometimes, for certain applications, they may be right. But that doesn't mean we should lower our standards and approve subpar work. If an inspector approves subpar work to help speed production or qualifies a subpar welder to meet contract requirements, and it causes an accident or failure, it comes back on the inspector. Whatever the scenario may have been, the inspector's integrity was the last line of defense and whatever accident or failure occurred is their responsibility. That hurts one's credibility and hampers their ability to make a living. And if someone were to have been hurt or even worse, well, that's a whole other weight one must learn to live with. It's an awful lot to risk just to keep a little heat from management off one's back or to avoid slowing down work again.

On a closing note, I'll leave you with this jewel I was once told: "You've got to have three I's to be a good inspector: intelligence, integrity, and imperturbability. Intelligence, so you'll know what's right. Integrity, so you'll do what's right. Imperturbability, so you'll be able to handle the adversity the other two I's will bring you."

CURT GREEN (*curtis.green@kctcs.edu*), an AWS CWI, AWS CWE, and ASNT NDT Level II, is the associate professor of welding technology at West Kentucky Community & Technical College, Paducah, Ky., and owner and operator of Industrial Welding & Maintenance, Golconda, Ill.

ASNT 2023 Conference Connects NDE Professionals and Presents New Technologies

ASNT 2023: The Annual Conference was held at the Marriott Marquis Hotel and George R. Brown Convention Center in Houston, Tex., from October 23 to 26, 2023. The event brought together more than 2200 nondestructive examination (NDE) professionals to network with colleagues, learn about the latest research, view new NDE technology in action, and reconnect with the organization.

The Annual Meeting of the Members took place on October 23 before the official kickoff of the conference. The meeting was held in person and virtually for the third year. Chair of the Board Danny Keck presented the State of the Society, reviewing progress toward the organization's strategic plan for 2022–2026. ASNT CEO Neal J. Couture, certified association executive, reported on membership, certification, organization news, and financial reports for the fiscal year ending June 30, 2023.

Attendees and exhibitors connected in the exhibit hall at ASNT 2023: The Annual Conference to discuss the latest NDE tools and technologies.

The conference officially commenced with the opening keynote, "Amputate Fear and Embrace Your New Normal Mindset," delivered by John Register, a two-time Paralympian, Paralympic Games silver medalist, Persian Gulf War veteran, and TEDx motivational speaker. Register shared leadership lessons learned from his unexpected injury and how it led to him embracing his new normal and forging new pathways.

The general session on October 24 featured Bader Busbait, director of the inspection department at Saudi Aramco. He spoke on the evolution of inspection technologies in the oil and gas industry. On October 25, Reza Zoughi, PhD, delivered the Lester/Mehl Honor Lecture titled "Microwave Real-Time and High-Resolution Imaging System Development for NDT Applications: A Chronology." In his presentation, Zoughi discussed the key works that laid the foundation for advancements in microwave imaging. The program ended on October 26 with a special closing keynote and luncheon. Brent Seales of the University of Kentucky presented "Computed Tomography and the Unwrapping of the Herculaneum Scroll," which featured recent updates on his research into digital unwrapping using nondestructive techniques.

In the exhibit hall, attendees enjoyed refreshments while visiting more than 200 booths staffed with representatives ready to demonstrate equipment and answer questions. Nine companies delivered 12 Innovation Forum presentations. These short presentations, ranging in length from 30 to 45 minutes, allowed exhibiting companies to share the science behind their products.

On October 24, seven ultrasonic testing (UT) Level IIIs competed in ASNT's second annual UT Competition. The local talent proved hard to beat, with Jeffery Lattea of Houston, Tex., taking home the $1000 grand prize, and Shane Walton of League City, Tex., winning the second place of $500. During the competition, inspectors had 30 minutes at each station to standardize the equipment, conduct the test, and evaluate the sample. They used ultrasonic straight beam corrosion

Participants of the second annual UT Competition competed to win cash prizes of $1000 and $500.

scanning and shear wave scanning equipment to look for weld defects.

The technical program featured more than 70 presentations, including several panel discussions, featured speakers, and short courses, during which attendees had the chance to learn from leading NDE experts about topics relevant to new technologies and emerging areas in NDE.

ASNT Celebrates!, a gala event to honor and celebrate the NDE industry as well as ASNT and its members, took place on the evening of October 25 with more than 300 people in attendance. The event featured a live auction to benefit the ASNT Foundation followed by an award ceremony.

Next year's Annual Conference will take place at Caesar's Forum in Las Vegas, Nev., from October 21 to 24, 2024. — *Contributed by ASNT*

AWS Hosts CWI Seminars

AWS has held a number of Certified Welding Inspector (CWI) seminars in recent months. The following events have all been hosted at AWS World Headquarters in Miami, Fla.

On October 1 to 6, 2023, Lynn Sturgill taught an AWS CWI seminar. Sturgill is an AWS Senior Certified Welding Inspector (SCWI), an ASNT NDT Level III Visual Testing (VT) inspector, a 3-A Certified Conformance Evaluator (CCE), and the owner of Sturgill Welding & Code Consulting, Ellettsville, Ind.

The eight seminar attendees included Byron Christopher Miller, Camden Jones, Daniel Prado, Fabian Guillen, Loyd Sibert, Mark H. Payne, Michael Jones, and Yannis Wallace.

Jim Greer led the CWI nine-year recertification seminar December 3–8, 2023. Greer is a Certified Welding Educator, an SCWI, and the president of Techno-Weld Consultants.

The attendees of the class included the following: Amanda J. Edwards, Brent K. Day, Brett Sparacello, Christopher Pipkin, Danny D. Francis, David E. Franco Cedron, Derek C. Stewart, Donald E. Furr, Donnie W. Higson, Eugene Corban, George A. Mondina, Glenn T. Buckhannon, Graham L. Scaife, Jeffrey E. Marsh, Jimmy D. Stokley, John Gasparrini, John H. Allison, Johnny J. Waddell, Jose Fernando Villarroel Velasco, Joseph F. Fisher, Justin M. Wilson, Michael J. Hinkle, Nikolay S. Georgiev, Paul R. Gohdes, Robert L. Basten, Robert W. Atkins, and Shawn Galyen.

From December 4 to 15, 2023, Rich Campbell instructed the two-week CWI seminar. Campbell is an SCWI, a Canadian Welding Bureau Level 2 welding inspector, an ASNT NDT Level III VT inspector, and a Bechtel Fellow with Bechtel Corp.'s construction welding and nondestructive examination (NDE) group. Attendees included Benjamin Rohrich, Bryan Rush, Cameron Fortinberry, Chandler Nunnemaker, Chatwell D. Jones, Christopher Leach, Devin M. Holden, Dylan J. Lennox, Elijah Stringfield, Emilee Johnson, Griffen T. Wagstaff, Isaac L. Atkinson, Jacob D. Davis, Jason H. Jackson, Jesse D. Price, John B. Featherston, Jonathan Gasparovich, Jonathan M. Holley, Jonathon Fish, Joseph R. Weitzel, Juliana L. Rowe, Justin Stallones, Keith Kelly, Richard J. Shields, Robert T. Trimble, Ronald A. Brugman Munera, Ryan Treece, and Travis M. Goetz.

Tim O'Neill taught the CWI Part B course that took place December 13 to 15, 2023. The attendees were Benjamin Beal, Dana C. Miller, David J. Uhl, David S. Singleton, Dion M. Nary, Frederick A. Reck, Guy W. Stutes, Logan B. Fries, Michael F. Guertin, Nathan A. McNeeley, Nedy Resic, Phillip W. Sauser, Robert B. Dail, and William A. Baker.

AWS held a CWI nine-year recertification at its headquarters in December 2023. The 27 attendees are pictured.

The attendees of the AWS CWI seminar in October 2023 gather for a photo at AWS World Headquarters in Miami, Fla.

Eddyfi Technologies Buys Sensor Networks Inc.

Eddyfi Technologies, Quebec, Canada, a provider of nondestructive examination (NDE) products, has acquired Sensor Networks Inc., State College, Pa. This integration expands Eddyfi's phased array ultrasonic testing (PAUT) offerings. The company now provides custom-designed, application-specific probes that are in stock and readily available as well as training and support services.

"I can confidently say that our integration with Sensor Networks Inc. has transformed us into the go-to destination for comprehensive phased array ultrasonic testing solutions," said Frédéric Laprise, vice president, Center of Excellence - PAUT, Eddyfi Technologies. "We're not just providing inspection equipment; we're offering expertise, support, and a game-changing approach to NDT."

Graycliff Partners Acquires XCEL NDT

Graycliff Partners, New York, N.Y., has acquired XCEL NDT, Longview, Tex., a provider of nondestructive examination services for critical infrastructure assets in the petrochemical, pipeline, and general industrial industries.

XCEL's testing and inspection services evaluate the integrity of critical infrastructure using noninvasive methods with little or no production downtime. Operating out of 17 facilities across the United States, the company's expansive team of experienced technicians utilize an array of conventional and advanced equipment to detect structural issues like corrosion and cracking as well as material composition and grade.

"We are impressed by the experience, passion, and enthusiasm of the team at XCEL," said Garrett Wentzell, principal at Graycliff. "We are excited to partner with the team to drive continued growth, both organically and through acquisition." Graycliff and management plan to pursue growth in new and existing markets, complementing XCEL's current offering with new services, geographies, and end markets.

Logan Industries Introduces In-House NDE Inspection Capabilities

Logan Industries, Hempstead, Tex., a hydraulic repair, manufacturing, and rental company, is now fully qualified to carry out its own in-house nondestructive examination (NDE) inspections.

The company has completed qualifications of its procedures, personnel, and equipment, enabling it to bring 90% of its NDE operations in-house instead of outsourcing. The NDE process will now be streamlined and more cost-effective, boosting reliability and environmental credentials for clients seeking to identify unseen defects in their materials and prevent failures in their equipment.

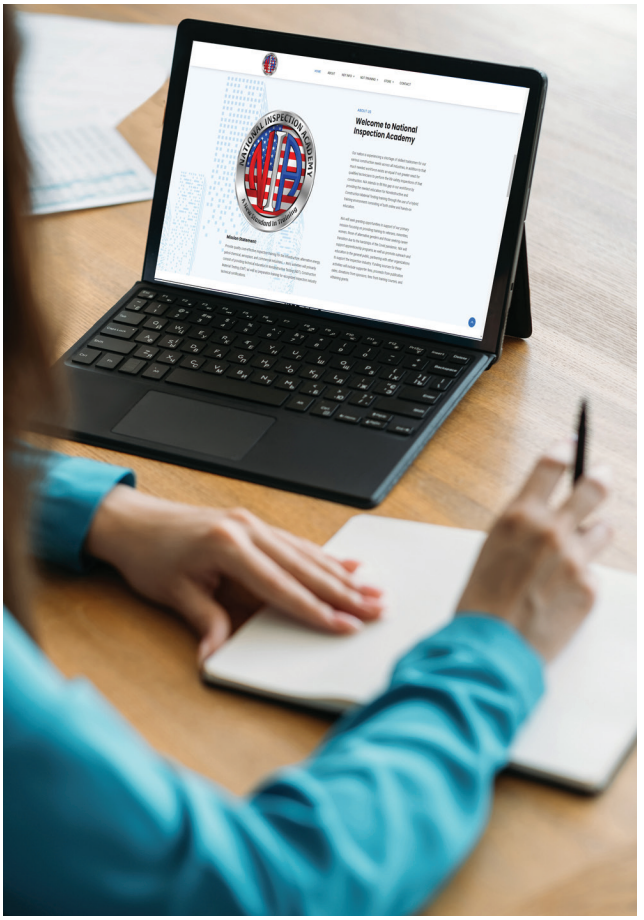
Greg Soape, QHSE director, Logan, said, "By eliminating the need for outsourcing, we can now remove the potential for third party subcontractor delays and unexpected costs and instead take full ownership of the process in-house. Logan can take sole responsibility for the schedule and be fully accountable for quality."

Soape added, "PMI [positive material identification] can be a costly service for clients and many repair shops will outsource it to a lab. PMI is especially important in repairs because it enables us to know what type of material a piece of equipment is made from in order to weld it appropriately. Many shops will just make assumptions. Our in-house PMI enables us to be sure about material composition and construct a targeted engineering solution that works the first time."

To date, Transocean Ltd. and Baker Hughes Co. have reviewed Logan's in-house NDE processes and deemed them to be acceptable. The company has also undergone several major technical assessments with TechnipFMC plc and successfully passed them all with no findings.

National Inspection Academy Offers NDE Training

The National Inspection Academy (NIA), Baxter, Minn., a provider of nondestructive examination (NDE) training programs, has recently opened its doors.



The National Inspection Academy offers NDE trainings in a hybrid format.

NIA provides essential education in nondestructive examination and construction material testing through a hybrid training environment encompassing both online and hands-on learning. The academy's NDT Career Program offers students Level I and Level II training in seven NDE methods, along with a comprehensive radiation safety training course.

The school is dedicated to fostering inclusivity and diversity within the inspection industry. Its focus is on providing training to veterans, minorities, women, and others who are seeking a high-paying skilled career. NIA will also collaborate with apprenticeship programs and other organizations to promote outreach and education to the general public. Funding sources for these initiatives will include supporter fees, proceeds from publication sales, sponsor donations, training course fees, and grant acquisition.

ASNT Foundation Established to Expand Research and Scholarship in NDE

ASNT, Columbus, Ohio, has created the ASNT Foundation and appointed the board of trustees. As a 501(c)(3) organization, the foundation serves as a vehicle for individuals and organizations to give back to the nondestructive examination (NDE) community by supporting its targeted priorities or by creating funds dedicated to fulfilling their specific interests in NDE.

The foundation will leverage resources to nurture future generations of NDE professionals. By engaging in outreach, conducting research, and providing financial support through scholarships and grants, the foundation aims to inspire, recruit, and cultivate a more extensive and skilled workforce for the NDE industry.

"The announcement is the culmination of more than two years of preparation and hard work, and I am pleased to have Heather Cowles, CAE [certified association executive], CVA [certified valuation analyst], serving as executive director of the ASNT Foundation," said Neal J. Couture, CAE, ASNT executive director. "Heather brings years of association management experience and passion for ASNT members and the NDT industry to this position. I am excited to see the ASNT Foundation grow and succeed under Heather's leadership."

ASNT has provided initial funding and support for the ASNT Foundation. The foundation will operate independently of ASNT. IT

An Ironworker's Journey Leads to MISSION IMPOSSIBLE Heights

Jeremy O. Wheeless, PE, CWI

Growing up with a father as an ironworker, Jeremy O. Wheeless believed he knew where his professional journey would lead him. But it was only a stepping stone to where he is now.

Wheeless began welding at a very young age. His father designated him as a "welder's helper" (amongst many other things) almost his entire childhood. So, upon graduating high school, the next logical step for Wheeless was joining the local ironworkers union and working his way toward becoming a journeyman and certified welder. He participated in a three-year ironworker apprenticeship program, receiving his journeyman ironworker license and 3G welding certification from Local Union No. 482 in Austin, Tex. As a journeyman, he worked on various construction types, including structural steel, architectural precast, tilt-wall, steel bridges, as well as crane and tower crane erection. His experience as an ironworker gives him unique insight into the built world.

After more than eight years of experience in the construction industry working as a journeyman ironworker, hearing many ironworkers' war stories, observing ironworkers dealing with on-the-job impairments and injuries, and knowing a fellow journeyman who passed away while working on a jobsite, Wheeless left the trade. He then met his wife, who encouraged him to pursue higher education. He obtained a bachelor of science degree in architectural engineering in 2016 and a master of science degree in civil engineering in 2018 from the University of Texas in Austin. Soon thereafter, he landed a job with Wiss, Janney, Elstner Associates (WJE), known in the industry as "the engineer's engineer." This has allowed him to follow his interests and passions in welding, bridges, and civil infrastructure. He often inspects and/or repairs welds of all kinds.

A day in the life for Wheeless generally consists of solving a problem for engineers that they can't quite figure out. He typically receives an assignment that requires travel. According to Wheeless, the most common inspection tools he uses involve his eyes, mind, and the guidance from his colleagues at WJE.

What is the highlight of your career?

I am grateful that I have a job I really enjoy. Most folks wouldn't say they enjoy their jobs. I feel it most days. I am lucky to have found a job and an industry that I have been training my whole life for. The highlight is my career.

Wheeless performed industrial rope access techniques to install structural supports to be used for new sound equipment at the Purdue University Mackey Arena in Indiana.

Wheeless performed corrosion assessment of weathering steel, coring, and bolt extraction at the Perrine Bridge in Idaho.

How did you hear about AWS?

A colleague of mine at WJE [Chuck Larosche, PE, who was involved with the AWS D1.7 Committee] encouraged me to earn Certified Welding Inspector [CWI] status and get involved with committees at AWS. And, every ironworker knows what the welding inspector does (makes you fix your mistakes).

When did you become an AWS CWI and why?

I became a CWI soon after joining WJE in the winter of 2018. Given my background as an ironworker and certified welder, it made sense for me to get the certification.

How has becoming an AWS CWI benefited your professional career?

It was the first professional certification I obtained as an engineer. It has brought value to many of my clients and helped me get involved with very interesting projects all over the United States. Additionally, it helped me see that gaining licensure of any kind was much like schooling. You make small steps toward a goal, and before long, you are standing at the finish line.

What words of encouragement do you have for individuals thinking about becoming an AWS CWI?

This industry needs you. I need you. If you want a job for life, become an AWS CWI. If I can progress from being a welder's helper to becoming a professional engineer andCWI, you can, too. Create a goal and be dogged about achieving it. If there is a setback, see it for what it is, get past it, and keep moving toward the goal. Believe me, I have had my fair share of setbacks, but I knew I was working toward something that would help me and my family have stability. America is being built all around you, one weld at a time. Let's do our part to help it get built as best as it can. IT

Manual Rotary-Axis Scanner Works for Range of Applications

The Gyro single-encoded, rotary-axis manual scanner enables C-scan inspection. Its design allows the rugged rotary scanning platform to attach to the ends of studs, bolts, pins, and pipes via interchangeable jaws. This allows the scanner to cover a wide range of applications. It can be supplied with a range of clamping jaws to securely fit to either the inside diameter or outside diameter of components of varying shapes and sizes or pipes for application-specific inspections. The scanning platform mounts to the scanner body and houses a phased array probe and up to two ultrasonic transducers on adjustable tool post rails. An integrated high-resolution, nonslip encoder allows the operator to accurately position the sensor bay on and around the end of the inspection site and rotate the platform with a smooth scanning motion to produce C-scan inspections. The scanner can be operated by just one inspection engineer and is compatible with any industry-standard instrumentation. Its versatility lends itself to the oil and gas, nuclear, and power generation industries.

Phoenix ISL
phoenixisl.com

Miniature Handheld Videoscope Series Supports Remote Visual Inspection

The TVGM series of miniature, high-definition handheld industrial-grade videoscopes supports various nondestructive examination and remote visual inspection tasks. The family of videoscopes is offered in four unique models, with a choice of either a 3.9 mm (0.15 in.) or 6 mm (0.24 in.) camera and either a 1.5 m (4.9 ft) or 3 m (9.8 ft) videoscope probe length. The series features dual-key operation, a fully modular and ergonomic design, portability, one-handed operation, and end-user capability to quickly swap out probe lengths for increased application adaptability. The onboard controller delivers high-definition imaging, and a high-sensitivity onboard 720P complementary metal oxide semiconductor (CMOS) sensor supports continuous remote visualization, inspection, and observation tasks, even under low- or reduced-light conditions. A 4.3-in. high-definition LCD touch screen display with high-intensity LED illumination allows for clear viewing of the magnified images and videos captured remotely by the videoscope camera. The device also offers on-demand recording, easy file access, parameter setting, and real-time data storage of JPG or AVI files onto an onboard 32GB micro-SD card.

Titan Tool Supply
titantoolsupply.com

Ultra HD Borescope Offers Precise Articulation for Quick Navigation to Target Area

The Voyager C40 borescope camera features joystick-controlled omnidirectional articulation and HD image quality. It is ideal for bores from 1.5 mm (0.06 in.) and inspecting deep areas up to 32.8 ft. The borescope is equipped with a 3.5-in. daylight display and a 1-million-pixel HD camera. The insertion tube replacement technology allows users to replace insertion tubes with different specifications within 20 seconds. The borescope can be equipped with probes of different diameters, lengths, and depths of field to achieve multipurpose use. Its software comes with a picture and video list preview mode, 4× zoom, date watermark function, real-time 180-deg vertical image flip, and more. The insertion tube and probe are waterproof and oil and corrosion resistant. These features enable the tube and probe to work continuously in water or oil for 30 minutes.

Fiberscope
fiberscope.net

FEATURE

BY WILLIAM C. LAPLANTE

Achieving QUALITY WELDING

Quality management systems, in-process inspections, human performance attributes, and training contribute to quality welding

Quality welding is the bedrock of welding execution. Quality means satisfying a customer's requirements in terms of performance, appearance, and intended purpose. Businesses in well-regulated industries, such as aerospace and nuclear, understand that quality is not inspected into a weldment — Fig. 1. Strict engineering procedures exist where weld failure is not an option without placing undue risks on human life, the environment, and property. Substandard quality and unreliable welds cost lives (e.g., the gas pipeline explosion in San Bruno, Calif., 2010). In addition, substandard quality results in waste due to nonvalue-added expenses, such as lost revenue due to rework or repairs, liability lawsuits, warranty repairs, replacements and delay costs, liquidated damages, and penalties. Poor quality also has an adverse business marketing effect, such as lost opportunities due to a tarnished reputation for quality and customer dissatisfaction. Quality welding is a crucial component within global society in fabricating safe, reliable, and trustworthy weldments.

Quality Management System (QMS)

Various quality assurance (QA) systems are used in welding companies. For example, a QMS such as ISO 9001:2015, *Quality management systems – requirements*, is highly esteemed. A QMS exercises proactive and predictive methods compared to a reactive, corrective, after-the-fact approach. From the QMS standpoint, the most effective way to attain weld and weldment quality is to avoid having defects in the first place. Also, it is less costly to prevent defects than to correct them after they have occurred. Within ISO 9001:2015, welding is considered a special process because its quality cannot be readily verified. Consequently, a great deal of emphasis is

Fig. 1 — An American Society of Mechanical Engineers (ASME) Section III welding. Left — Orbital gas tungsten arc welding (GTAW), 6G interpass weld beads. Pipe material: P-No. 1. Center and right — Test weld joints in evaluating new weld filler metals using mechanized GTAW. Plate material: P-No. 43.

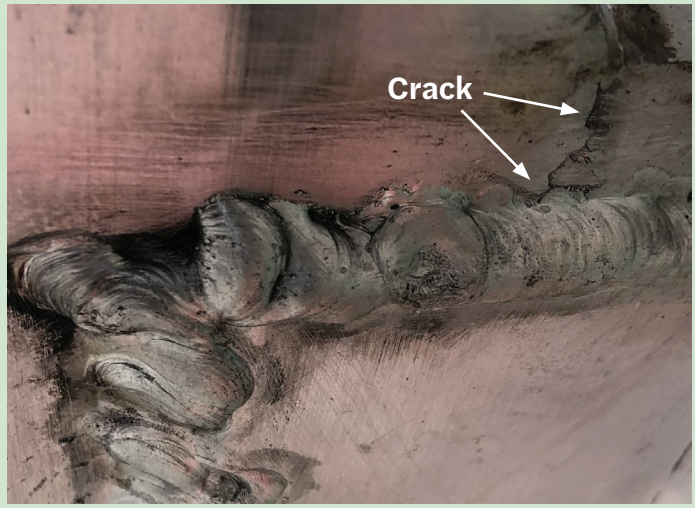


Fig. 2 — Poorly executed aluminum staircase welds.

placed on process controls to prevent the occurrence of weld defects.

A QMS, ASME and AWS weld codes, and the ISO 3834, *Quality requirements for fusion welding of metallic materials*, standard complement one another. A QMS outlines quality system criteria, and weld codes and ISO 3834 detail the requirements for procedure qualification records (PQRs), welding procedure specifications (WPSs), and welder qualifications.

Within a QMS, training and personnel qualification are key. Case in point, welder performance qualifications (WPQs) are conducted to confirm a welder's ability to deposit sound weld metal using a specific process, material, and weld position. Poor quality and unreliable welds are produced without requisite abilities and process knowledge, creating undue safety risks — Figs. 2, 3, and 7. To continuously improve weld and weldment quality, employ a well-executed QMS.

Continuous Improvements

Process controls within a QMS are the method by which quality is manufactured into a weld and weldment (e.g., weld process control and monitoring systems, mechanized technologies, statistical techniques, and qualified WPSs).

A fundamental aspect of a QMS is continuous improvements. Improving the production process via proactive and predictive methods can be done as follows:

1. Using a QMS drives proactivity, such as exercising design for welding (DFW) and design for manufacturability/design for assembly (DFM/DFA) concepts:
   - A. Confirming weldability, weld joint design, and weld joint accessibility;
   - B. Performing weld joint mock-up testing;
   - C. Minimizing the number of weld joints by forming or stamping parts; and
   - D. Performing in-process inspections throughout production. The objective is to catch and correct discrepancies, such as visual weld discontinuities or defects, early into production (Figs. 3 and 4), thereby mitigating rework and repair costs and lost production time and improving the weld and weldment quality and the production process.

2. Utilizing predictive methods, such as collecting welding inspection, welding parameters, and weld-bead geometry data, during welding to develop artificial intelligence (AI)-based algorithms to predict the weld parameters necessary to attain the optimal weld bead geometry and weld quality.

Fig. 3 — A poorly executed aluminum weld on a structural weldment.

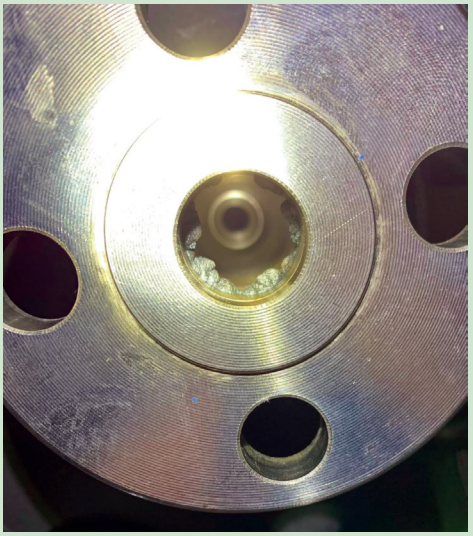


Fig. 4 — Pipe melt-through that resulted from the outside diameter fillet welding of the socket weld.

Human Performance Attributes

The following are pivotal human performance attributes that contribute to accomplishing quality welding. Ultimately, for a company, the core values, viewpoints, and prevailing paradigms are such that craftsmanship represents a culture, a behavior, and a way of thinking.

1. ATTITUDE

- Taking pride in performance (i.e., pride of workmanship).
- Being self-motivated to provide solutions to tasks.

2. ACCOUNTABILITY

- Taking ownership of work and performance.
- Producing and delivering a superior product because the quality of workmanship is a reflection of the welder, fitter, inspector, and supervisor.

3. WORKMANSHIP

- Employing skill and proficiency with which a task is performed — focusing upon the task and applying garnered training and lessons learned from experience.
- Having zero tolerance for rework and repairs due to poor work practices, shortcuts, or cutting corners.

4. TEAMWORK

- Collaborating with and supporting others to improve first-time quality production performance.
- Encouraging an environment of inclusion and constructive brainstorming to improve the overall work plan.

5. KNOWLEDGE AND TRAINING

- Seeking opportunities to train and mentor others in areas of your expertise.
- Seeking self-development through continuous education and training to become an expert.

6. PROFESSIONALISM AND INTEGRITY

- Being honest, trustworthy, and doing what is right in the absence of oversight.
- Wanting to do top-of-the-line work the right way the first time — Fig. 5.

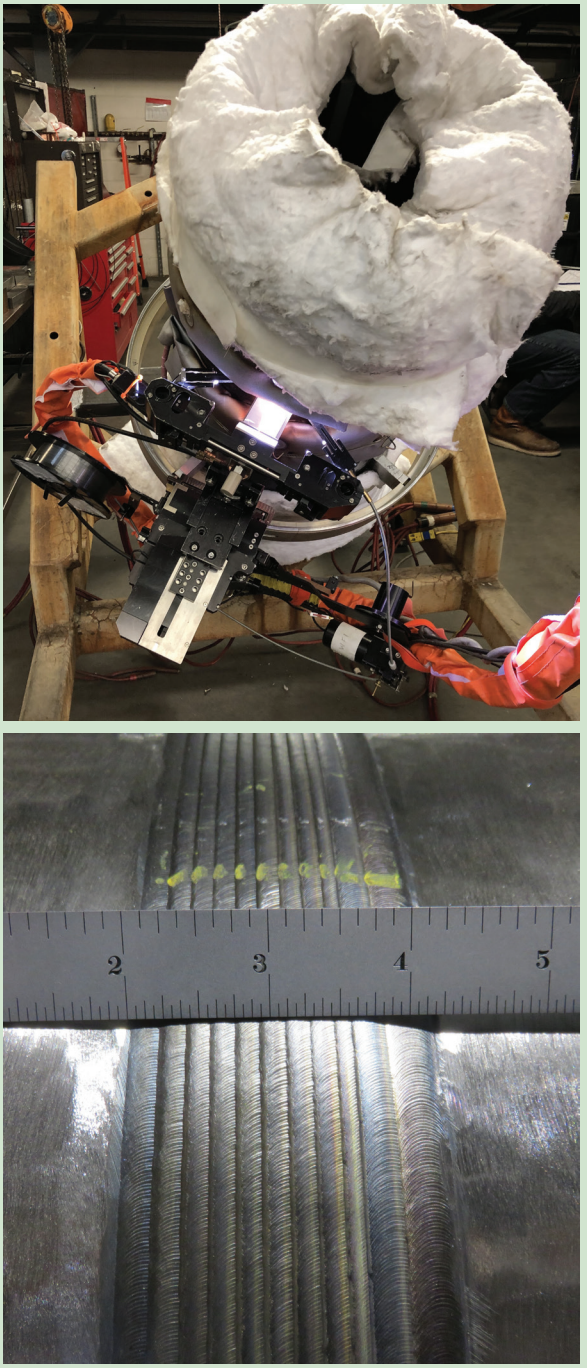


Fig. 5 — Top — Orbital GTAW narrow groove welding for a nuclear project. Pipe material: P-No. 1. Bottom — Orbital GTAW, 5G cap passes for a seismic oilfield project. Pipe material: P-No. 5A.

Training Makes a Difference

There is no substitution for knowledge and having a well-trained workforce. Expert training is vital to improving individual competencies in occupational skills, subject knowledge, and work practices to attain quality welding. A quote from Henry Ford echoes this philosophy: "The only thing worse than training your employees and then having them leave is not training them and having them stay."

Figures 2, 3, 4, and 7 illustrate the adverse consequences of not having personnel possessing the required occupational skills and knowledge to facilitate the prevention of errors, quality issues, nonvalue-added expenses, and undue safety risks, which, if uncorrected, could seriously affect safety and operability. To produce quality welds, welders require training to achieve requisite proficiencies and process knowledge.

To produce accurate work, fitters require fitup, layouts, and shop mathematics training. The AWS Certified Welding Inspector (CWI) program and the Hobart Institute of Welding Technology offer CWI training and certification for weld inspection. Online CWI preparatory studies are also available through various training schools and businesses. For nondestructive examination (NDE), the American Society of Nondestructive Testing (ASNT) offers online and classroom classes for continuing education and preparation courses for their certification programs. NDE training is also available via an array of training schools and businesses. The American Society for Quality (ASQ) offers quality engineering training and certification. The AWS Certified Welding Supervisor (CWS) program provides training and certification for welding supervision. A fundamental principle is that training pertains to everyone engaged in activities that affect quality. Train as you work and work as you train.

Achieving Quality Welding

Pertinent methods to achieve quality welding are as follows:

1. TRAINING
For example, qualifying welders (WPQ) per code criteria with the required skills and process knowledge, such as understanding weld filler metals, WPSs, and welding symbols.

2. WELDABILITY
Confirming weldability. Employing DFW and DFM/DFA concepts (e.g., minimizing the number of weld joints). Ensuring weld joint accessibility to the welder. Designing dissimilar metal weld joints with compatible physical, chemical, and metallurgical properties. Performing weld joint mock-up testing.

3. QUALIFYING PQRs AND WPSs
Documenting variables, weld joint geometry, weld bead sequence, and test results during PQR qualification. Accurately writing WPSs with correct variable ranges, including abundant process details. It is crucial that welders receive a copy of WPSs for production.

4. TOOLING
Using welding positioners to perform welding in the 1G, 2G, or 1F, 2F position. Employing fixturing and tooling to attain weld joint fit-up accuracy and repeatability.

5. POKA-YOKE
Applying Poka-Yoke (mistake-proofing) practices during production.

6. FIT-UPS
Ensuring proper weld joint preparation, fitup, and alignment.

7. MATERIALS
Utilizing certified materials with certified material test reports (CMTRs).

8. QMS
Using a QMS as the foundation in the application of pertinent methods to achieve quality welding.

9. PROCESSES
Utilizing the optimum welding process, such as mechanized, orbital, cobotic, robotic, and solid-state technologies.

10. INTERNAL AUDITS
Ensuring code books, NDE manuals and procedures, WPSs, and WPQs are up-to-date.

11. PROCESS CONTROLS
Using weld process control and monitoring systems, performing statistical techniques, and providing workmanship criteria (e.g., written standards, representative samples, and illustrations).

12. CALIBRATION
Calibrating welding, testing, and metrology equipment and inspection tools on an annual basis. Adopting a preventive maintenance (PM) program.

13. PERSONNEL
Recruiting and retaining qualified personnel.

14. INSPECTIONS
Performing in-process welding inspections throughout production to ensure strict technical compliance to codes, WPSs, and drawings. Also, verifying process and quality performance and collecting process data.

15. LEADERSHIP
Making certain principal personnel are available on the shop floor and on the jobsite to provide direction and problem-solving expertise and support.

QUALITY WELDING

QMS ISO 9001 for Fabricators

FUNDAMENTAL WELDING KNOWLEDGE

ISO Standards
CSA Standards
CEN Standards
British Standards
JIS/WES Standards

QUALITY WORK BEGINS

- Acting, working, and thinking safety.
- Driving continuous improvement actions — Kaizen Philosophy.
- Building quality into a weldment via process controls (e.g., qualified procedures, statistical techniques, and weld monitoring).
- Fostering pride of workmanship, accountability, and honesty.
- Calibrating instruments, tools, and equipment. Adopting a preventive maintenance program.
- Training for all personnel engaged in activities that affect quality. Quality is each person's responsibility.
- Ensuring strict technical compliance to codes, WPSs, and drawings.
- Utilizing welding positioners, tooling, and fixturing for the job.
- Applying poka-yoke practices during production to mitigate mistakes.
- Identifying visual testing (VT) weld discontinuities — stopping when they occur, determining the root cause, and correcting them.
- Using certified materials — base metals and weld filler metals.
- Providing leadership on the shop floor and on the jobsite.
- Understanding welding symbols — critical for welders and inspectors.
- Performing internal auditing, in-process inspections, and testing.
- Verifying WPSs and weld joint fitups prior to welding.
- Qualifying Welders (WPQs), PQRs, and WPSs per code.
- Employing the optimum welding process for the job.
- Exercising DFW and DFM/DFA concepts. Confirming weldability.
- Recruiting and retaining qualified personnel – key for a business.

Constructors and Manufacturers

WORKMANSHIP QUALITY PRINCIPLES

U.S. Weld Codes, Standards, Regulations, Specifications

WITH QUALITY THINKING

FOUNDATION of QUALITY WELDING – a QMS

Quality Manual – Process Controls – Craftsmanship – Training – Leadership – Calibration
In-Process Inspections – Human Performance Attributes – Continuous Improvement

Fig. 6 — The House of Quality Welding symbolizes philosophies, principles, and actions essential to attaining safe, reliable, trustworthy weldments. The house embodies quality, where a weld and a weldment failure may result in severe consequences, placing undue risks on human life, the environment, and property.

Fig. 7 — Poorly executed welds on a 10-ft-high chain link fence frame.

The House of Quality Welding

The House of Quality Welding is likened to a house of cards, where each structural member contributes to achieving quality welding — Fig. 6. The objective is to uphold the house's structural integrity by not compromising weld quality. The house is constructed upon the foundation of quality welding: a QMS, such as ISO 9001:2015. Within a culture of a quality environment, a QMS serves as the house's foundation, where the pillars of fundamental welding knowledge and workmanship quality principles arise. Compared to other quality systems, the House of Quality Welding is predicated upon a well-executed QMS that is robust, proactive, and vigilant in continuously improving production effectiveness and efficiency by means of preventing, correcting, and eliminating opportunities for errors, deficiencies, and nonconformances that transpire throughout production. As noted previously, the most effective way to attain weld and weldment quality is to avoid having defects in the first place. Inscribed on the house's walls are examples of quality welding and fabrication tenets.

What Does Quality Mean to You?

Consider the welds in Figs. 1 and 7. The welds are at the opposite ends of the quality spectrum. Figure 1 shows welds pertaining to an ASME Section III power plant project. Figure 7 shows welds that are of poor quality, unreliable, and pose undue safety risks. The point is that all welds require some level of quality to adequately serve their intended purpose. For example, in Fig. 7, if the weld of the fence frame fails and the frame collapses, there would be a real problem. To improve weld and weldment quality, you must improve the fabrication and welding processes that produce the quality. Thus, if you want a quality weld and weldment, they must be manufactured with quality processes, quality materials, and by quality-minded people; quality must be manufactured into the weld and weldment. Achieving a corporate-wide commitment to quality takes time, resources, and a determined effort — and it begins in the boardroom.

Conclusion

A strong quality welding reputation is a decisive differentiator when vetting businesses to perform consequential fabrication and welding work. A well-executed QMS, in-process inspections, human performance attributes, and training contribute to achieving quality welding. IT

WILLIAM C. LAPLANTE (*wlaplante.scwi@gmail.com*) is a welding engineer as well as an AWS CWI, SCWI, and CWE in Manchester, N.H.

FEATURE

BY ERIC LICHTFUSZ

Are Ethics Based on Morals?

A discussion on how these related principles concern CWIs

When you look to the *Merriam-Webster* dictionary for the definition of ethics, you'll discover that ethics "is a set of moral principles; a theory or system of moral values." That helps if you know what morals are. Just in case you don't, *Merriam-Webster* further explains, "morals often describes one's particular values concerning what is right and what is wrong." According to the dictionary, ethics "tends to suggest aspects of universal fairness and the question of whether or not an action is responsible." So, I understood that ethics are moral principles in which each person can decide right or wrong. That's not what I believe, but someone could draw a fair conclusion from those definitions.

I cherry-picked only a few things from these definitions to arrive at what I believe is a false conclusion. But I'm sure some people believe that their perceived morals give them the ability to define right and wrong. Kind of along the lines of the famous phrase, "I reject your reality and substitute my own." *Dictionary.com* tells us in one definition that ethics are "the rules of conduct recognized in respect to a particular class of human actions or a particular group, culture, etc." This topic and discussion could go on for a long time and in many directions. However, because we are looking at this from an AWS welding inspector's viewpoint, we are a particular group, and, therefore, we should be looking in a specific place for our answer. As a Senior Certified Welding Inspector (SCWI), Certified Welding Inspector (CWI), or Certified Associate Welding Inspector (CAWI), you should look to AWS for answers on your professional ethical conduct.

AWS QC1

AWS QC1:2016-AMD1, *Specification for AWS Certification of Welding Inspectors*, is the current source for those answers. The scope of this specification establishes the requirements for certification of AWS welding inspection personnel. It also describes the principles of conduct and practice by which certification may be maintained. In Clause 11, the specification explicitly addresses the Code of Ethics, Rules of Conduct, and Practice. So, to the question of whether ethics are based on the individual CWI's morals, no, they're not. Our professional ethics are established within the standard by which we are governed.

We know there's a mandate and how it's established, but why? Let's answer that; then, we can understand how AWS defines ethics. The AWS QC1 specification mandates welding inspectors maintain integrity and high standards in skill and practice while conducting welding inspections to safeguard the health and well-being of the public. In doing so, inspectors are to be aware of principles, which we will discuss shortly, along with the scope to which they apply. When you think about it, that's a heavy burden. AWS takes this so seriously that any unauthorized practice is subject to The Certification Committee of the AWS's review. If you are found to be in violation, you could face suspension, reprimand, or revocation of your certification.

In my mind, even more severe than that is this: When welds break, people die. I have often said that to engineers, designers, and anyone who seems to take a flippant approach to welding. You know the type who comment: "The welds look good to me. Let's ship it." Most of the time, the statement "when welds break, people die" gets their attention. It sounds a little dramatic, but that's the mindset welding inspectors should have, because it's true. Not always, but even if it only happens once, it's one time too many. As an inspector, you should consider your ultimate responsibility to safeguard the public's health and well-being, not to stamp off a report and ship the product for the highest profit. Ultimately, public safety is why welding inspectors exist and must perform their duties with a Code of Ethics. Let's look at Clause 11 from AWS QC1.

AWS QC1 establishes the requirements for certification of AWS welding inspection personnel. It also describes the principles of conduct and practice by which certification may be maintained.

Clause 11 Summary

The following is paraphrased and summarized from the original text. Please refer to the AWS standard for the whole language and intent, which may be downloaded for free at *aws.org* (type in QC1 in the search window).

INTEGRITY

AWS mandates that welding inspectors certified by AWS act with complete integrity in professional matters. Inspectors are to be forthright and candid with their employer, the employer's customer or regulator, and the Standards Committee on matters pertaining to AWS QC1.

RESPONSIBILITY TO THE PUBLIC

This subclause reinforces the inspector's responsibility to the public to act to preserve public health and well-being by performing the duties of the inspector conscientiously and impartially. This will be done to the extent of the inspector's moral and civic responsibility and qualification as follows:

- Take on and perform only assignments for which you're qualified.
- Present credentials when requested by persons authorized to examine them.
- Must not falsely represent your certification status in any form.
- Must be completely objective, thorough, and factual in all statements, written or otherwise.
- Sign only for work the inspector has inspected or has knowledge of through active supervision.
- The inspector is neither to associate with or participate in fraudulent or dishonest activities.

PUBLIC STATEMENTS

- An inspector must identify any interested parties and disclose any financial interest before issuing statements, criticisms, or arguments on weld inspection matters related to public policy.
- An inspector may only publicly express an opinion on welding inspection subjects if the inspector has full knowledge of all facts in the matter, is competent in the subject technical matter, and has made an honest evaluation of the subject.

CONFLICT OF INTEREST

- An inspector must avoid any situation where there is a conflict of interest with an employer or client and disclose any situation where it may be perceived as such.
- An inspector may only accept compensation from one party for the same project if authorized or approved by all interested parties.
- An inspector may never ask for or accept gratuities from any party related to any project the inspector is involved with.
- An inspector serving in any capacity as a public official may not inspect, review, or approve any project associated with the inspector's position unless all related parties are aware of it and approve.

SOLICITATION OF EMPLOYMENT

- Except for usual commission licensing fees, an inspector may not bribe or offer pay in any form for employment.
- An inspector may not exaggerate or falsely claim academic or professional qualifications of themselves or their associates.
- An inspector may only claim their credentials are suitable within the scope of the endorsements.
- An inspector may only disclose proprietary information from information gained while conducting inspection duties from current or past business contacts with written consent except as necessary to complete inspection duties.

It is also noted under this subclause that even though an inspector may be properly certified, those credentials may not carry the legal authority to provide inspection services to the public.

UNAUTHORIZED PRACTICE

Any violation of the standard of conduct or the Code of Ethics contained in the standard, in part or in whole, as it relates to the AWS inspector's duties constitutes unauthorized practice and is subject to sanctions.

Conclusion

Regardless of your moral convictions or your ideology on ethics, as an inspector certified by AWS, you will be held to the standard of conduct and ethics established by AWS. It is hard to believe that anyone would read any of these standards and think they are too restrictive or overbearing. Some out there feel these standards don't or shouldn't apply to them. But these standards seem reasonable, and I would question why someone feels that way. Some people are in violation of these standards and have faced sanctions by AWS accordingly. Some may have even encountered legal ramifications as a result. What could someone believe they could gain when there is so much more to lose? This all ties back to a person's integrity. Integrity is doing the right thing even when no one is looking. You don't have integrity if you're willing to cut corners when you think no one is watching. And if you don't have integrity, in what do you place your value? Something to ponder. IT

ERIC LICHTFUSZ (*eric.lichtfusz@roush.com*) is a CWI-manager at Roush Industries, Livonia, Mich. He is also an AWS Detroit Section executive committee senior past chair and ASNT Level II inspector.

2024
IRON WORKERS/IMPACT CONFERENCE

SHAPE YOUR FUTURE

FEBRUARY 18-21, 2024

HILTON ORLANDO BUENA VISTA PALACE

Register here: bit.ly/2024IMPACTConference

PROMINENT KEYNOTE SPEAKERS | VALUE-ADDED BREAKOUTS EXPLORING CONSTRUCTION INDUSTRY HOT TOPICS | TWO DAYS OF NETWORKING OPPORTUNITIES TO CONNECT WITH END USERS, CONTRACTORS & IRONWORKERS

www.impact-net.org
info@impact-net.org

(202) 393-1147
(800) 545-4921

I.M.P.A.C.T. REINFORCE OUR FUTURE

FEATURE

BY CARLOS GUZMAN

IEC 2023: Inspection Expo & Conference Highlights

The three-day event featured keynotes, expert panel presentations, and breakout sessions focused on four related inspection fields

After a two-year break because of the pandemic and other factors, four organizations at last came together to present at the Inspection Expo & Conference (IEC) at the Renaissance Austin Hotel in Austin, Tex., from November 8 to 10, 2023. The Association for Materials Protection and Performance (AMPP), the American Institute of Steel Construction (AISC), the Nondestructive Testing Management Association (NDTMA), and the American Welding Society (AWS) offered a staggering 62 sessions that catered to the wide diversity of the attendee's backgrounds and expertise. The exhibit hall provided sponsors, exhibitors, panelists, and attendees ample opportunities to network.

Presentations focused on welding inspection, nondestructive examination (NDE), coating inspection, and structural steel inspection, and some of the topics covered were auditing, phased array ultrasonic testing (PAUT) applications, inspection of complex coatings, metallurgy, mechanical testing, bridge infrastructure, digital transformation, remote visual inspection, advances in robotic NDE, offshore corrosion, changes in welding codes, and the business of inspection, to name a few.

Richard Polanin, AWS past president, introduced opening keynote speaker Greg "Boss" Wooldridge, a former pilot and commanding officer of the Blue Angels flight demonstration squadron of the United States Navy.

Keynote

After the Presentation of Colors by the award-winning Area 18 Distinguished Unit Navy JROTC from Stony Point High School, Round Rock, Tex., AWS Past President Richard Polanin introduced the opening keynote speaker. Greg "Boss" Wooldridge is the only commanding officer to lead the Blue Angels for three separate tours. Using his experiences as examples, Wooldridge discussed how teams should build on communication, trust, and collaboration rather than rank and status. Wooldridge explained his approach to the dynamics of debriefing: a safe environment, humility, openness, accountability, and gratitude. His "Glad to Be Here" philosophy is based on concepts such as making continuous improvement a habit, alignment, team oneness, an honest and engaged environment, and a high-performance culture of excellence. It was interesting to draw parallels between his leadership concepts as a pilot and commander and the situations inspectors frequently encounter.

AWS Sessions

The conference not only provided a mix of topics related to inspection specialties that cater to specific professionals, but it also offered a cross-reference hub for attendees to learn about the advances and challenges of the other inspection areas. An ongoing theme of the IEC is that many inspection areas are related, and different industries as well as individual inspectors or companies can benefit from collaborating and learning from each other. Many sessions touched on the benefits (and challenges) of inspectors holding multiple certifications.

The following are summaries of a few AWS breakout sessions at the conference.

Welder Qualification – What a CWI Needs to Know

By Scott Witkowski, vice president of Republic Testing Laboratories and IEC organizing committee member

To maintain a low reject rate on production welding activities in the shop, field, or manufacturing floor, there are many factors AWS Certified Welding Inspectors (CWIs) must understand when testing welders and before starting welder qualifications. Witkowski pointed out the importance of not only having *certified* personnel but also *qualified* personnel. He explained that because technology, techniques, and codes change constantly, continuous education is essential to address the gap in learning and experience. A takeaway from this session was the importance of welders knowing the code they are welding to. Code requirements differ; therefore, each project, job, or application requires the appropriate qualification. Witkowski also spoke about the benefits of mockups (which may be costly but can be the best insurance policy), proper training, and allowing the welders to practice and become proficient in the skills necessary for the specific weld requirements. All these components have a significant impact on a job's success.

CWI's Role and Considerations in Reviewing Prequalfied/Qualified WPSs and WPQs for the AWS D1.1 Code

By Richard Holdren, AWS vice president and future AWS president (2025)

Among the tasks a CWI performs per AWS D1.1, *Structural Welding Code — Steel*, are verifying welding procedure specifications (WPSs) and welder performance qualifications (WPQs). These documents ensure the soundness of the weld and welding by detailing the procedure's essential variables, which include the materials and processes used and the manner in which the processes are applied. Holdren remarked how *position* is also a very important essential variable of the procedure qualification. The session offered an overview of the requirements for writing prequalified and qualified WPSs, WPQs, and welder procedure qualification records (PQRs). The presenter encouraged attendees to investigate the Welding Performance Qualification (WPQ1) and Welding Procedure Qualification (WPQ2) endorsements for proficiency in these tasks.

Changes in Welding Codes and Standards Relating to Inspection and Certifications

By Richard Campbell, a Bechtel fellow and welding technical specialist at Bechtel Corp.

This presentation discussed recent changes in AWS D1.1 and other AWS welding codes and standards relating to inspection requirements. The 2020 D1.1 edition now contains five options for visual inspector certifications, requirements for assistant inspectors, revisions to

Scott Witkowski spoke about the importance of welders knowing the code they are welding to. Requirements are not the same between codes — each project, job, or application requires the appropriate qualification.

The IEC promotes learning and collaboration between coating, NDE, welding, and structural steel inspections. The benefits of inspectors holding multiple certifications was a trendy topic.

visual acuity requirements to align more closely with the American Society for Nondestructive Testing (ASNT), and advanced NDE techniques. Current requirements in the American Society of Mechanical Engineers (ASME) B31 piping codes and *Boiler and Pressure Vessel Code* regarding visual and NDE inspections and certifications were reviewed, along with American Petroleum Institute (API) 1104, *Welding of Pipelines and Related Facilities*, and other standards.

Campbell explained how each welding code and standard has its requirements for inspection and examination (and inspectors/examiners), and each has different requirements based on loading condition, fluid service category, and joint category that must be communicated to the welder and inspector. Various editions of the same code may have differences regarding inspection/examination and the acceptance criteria. He emphasized the importance of knowing what codes or standards (and the appropriate editions) apply to the contract or project.

Weld Cracking – Why Did It Crack?

By William F. Newell Jr., AWS director-at-large; president and welding consultant of W. F. Newell & Associates Inc.; and cofounder, co-owner, and vice president of engineering at EUROWELD Ltd.

Newell explained how the cause of cracking is usually attributed to design, base metal, welding consumable, or welding technique issues. He also mentioned that management could contribute indirectly to cracking because of the restrictions on time and hiring they may impose. Typical cracking mechanisms include hot cracking (welding and solidification), cold cracking (service or stress), corrosion induced (process fluid or environment), and others, such as processing or heat treatment. He discussed how groove geometry and bead shape matter, and how preheat, welding, and postweld heat treatment are only sometimes predictable.

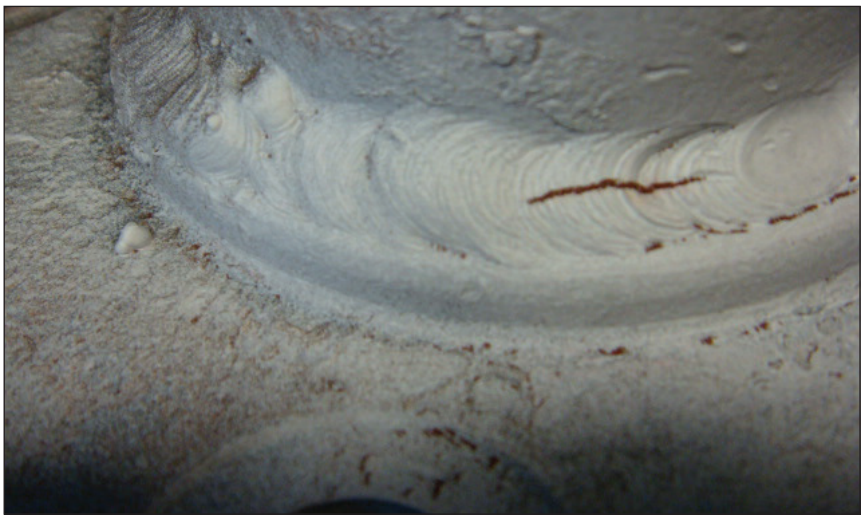
Radiographic Image Quality Compliance and the Role of the CWI

By Amanda L. Young, ASNT Level III, AWS CWI, and vice president of McNDT Pipeline Ltd.

The role of the CWI is changing, requiring a wider scope of skills that cover different welding-related responsibilities. It is progressively common for clients to require CWIs to manage a broad set of operations related to welding, including oversight of NDE and quality. Participants weighed in on how clients often need clarification on what CWIs are qualified to do. For example, although CWIs might have the pertinent skills, they are only officially qualified to interpret radiographic images if they possess the appropriate certification. Also, it's essential that if a CWI oversees the NDE, they work with the onsite representative to ensure the expectations are aligned with the contract and that the CWI is clear on the deliverables (i.e., reports and images). Furthermore, CWIs should not be working in the capacity of an ASNT Level III auditor. Young closed by stating that CWIs must ensure efficiency and quality, and they are uniquely positioned to bridge trust between the client and other NDE contractors on-site. She recommended CWIs seek an AWS Certified Radiographic Interpreter (CRI) credential to expand their knowledge of this method, which may aid them in overseeing NDE. IT

CARLOS GUZMAN (*cguzman@aws.org*) is managing editor, digital and design, and *Inspection Trends* editor, AWS, Miami, Fla.

Q I'm hoping you can give me a pointer or two on how to take a photograph of a dry powder magnetic particle indication for inclusion in a report.



A Taking a photograph of a dry powder magnetic particle indication that shows sufficient detail is often a question of contrast. The dry magnetic particles come in a couple of different colors, so they naturally provide enough contrast against the background of the test piece. The idea is to enhance the contrast to make the indication more easily seen with the unaided eye. However, the indication can still be difficult to see in the photograph. You need a way to enhance the contrast between the magnetic particle indication and the surface of the test piece.

I typically perform a dry magnetic particle testing using an alternating current (AC) magnetic yoke. I reorient the legs of the yoke to produce the strongest indication. The indication is easily seen, but it may not produce the best image once photographed. I then spray a light coating of the nonaqueous developer on the surface of the test piece. The developer should not be applied too thick but just enough to obscure the surface of the test piece. Once the nonaqueous developer is completely dry, the magnetic particle test is performed with the legs of the yoke positioned to produce a clear indication.

I also find black dry magnetic particles on the white developer provide great contrast. Red magnetic particles work, but the contrast is slightly reduced.

You can also buy white lacquer paint from the supplier you purchase your magnetic particle test materials from, but it is another consumable you have to carry with you. My experience is the nonaqueous developer dries faster than the lacquer and is easier to remove once the test is complete. IT

The Society is not responsible for any statements made or opinions expressed herein. Data and information developed by the authors are for specific informational purposes only and are not intended for use without independent, substantiating investigation on the part of potential users.

ALBERT J. MOORE JR. (*amoore999@comcast.net*) is president and owner of NAVSEA Solutions/Marion Testing & Inspection, Burlington, Conn. He is an AWS Senior Certified Welding Inspector and an ASNT NDT Level III. He is also a member of the AWS Qualification & Certification Committee on Methods of Inspection.

CLASSIFIEDS / ADVERTISER INDEX