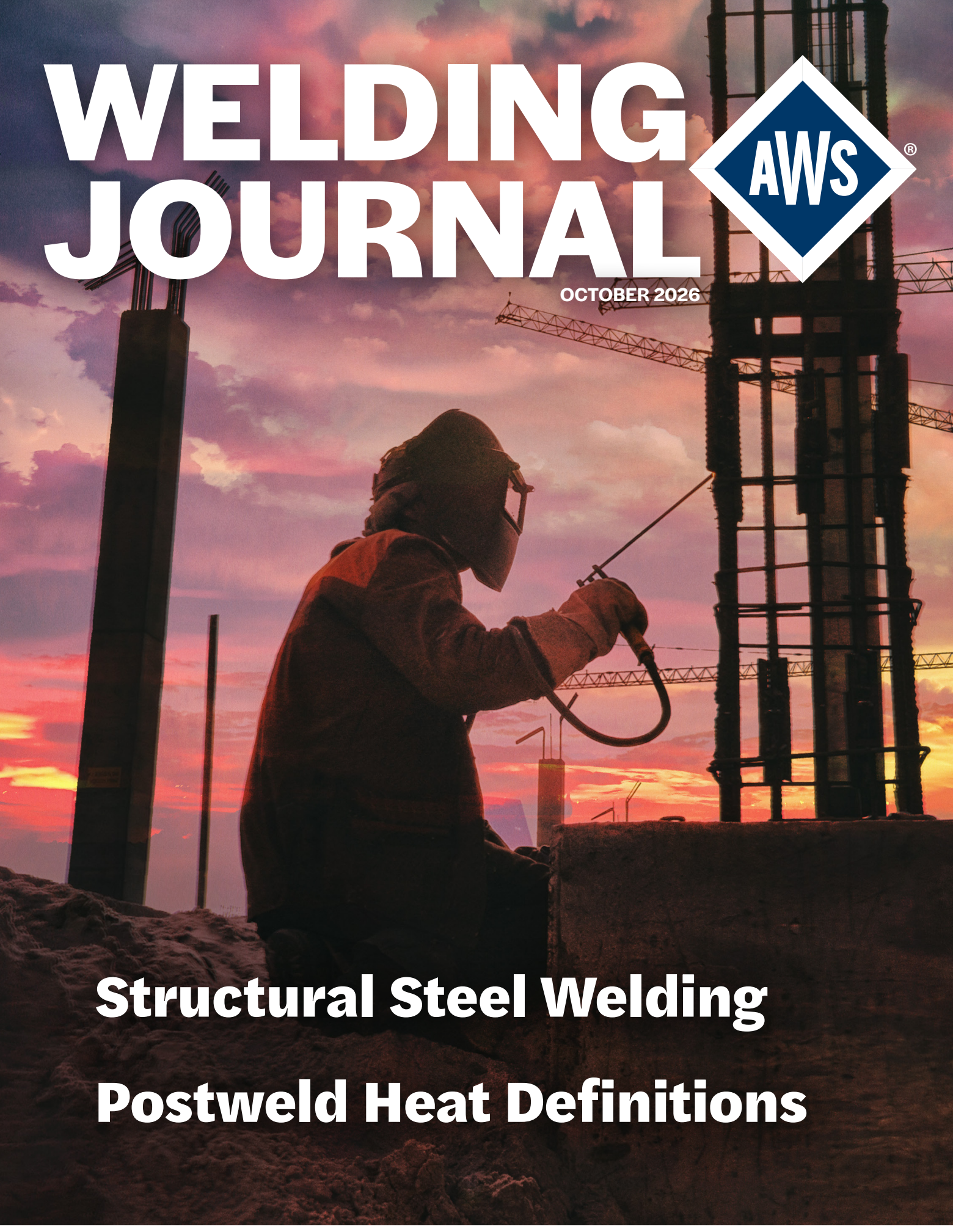
WELDING JOURNAL

OCTOBER 2026



Structural Steel Welding

Postweld Heat Definitions

PLUS: JOB SHOPS — PART 3 ■ AWS INSTRUCTORS INSTITUTE AND LEADERSHIP SYMPOSIUM ■ SECTION CONNECTIONS

OCTOBER 2026 | VOLUME 105 | NUMBER 10

CONTENTS

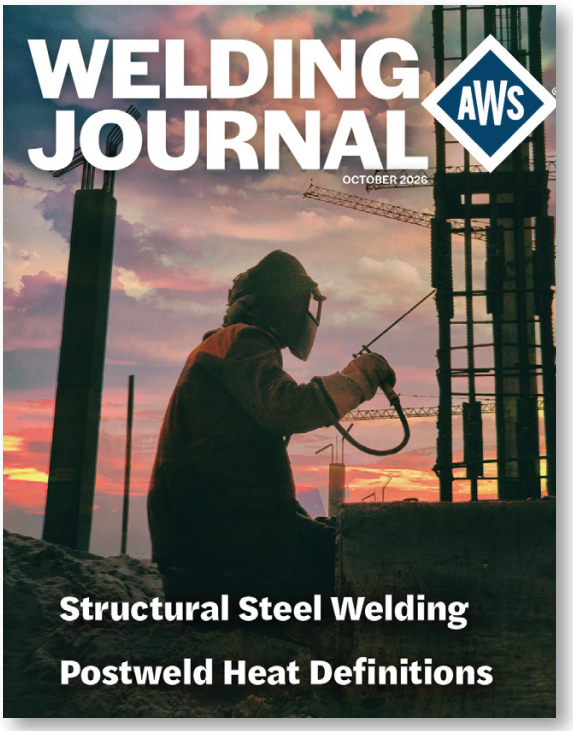
FEATURES

22 Defining Postweld Heat Treatment
The evolution of PWHT terminology and proposed changes to improve alignment between AWS standards
T. Green and H. Gilmer

26 Rethinking Steel Root Passes
A modified short-circuit welding technique is attracting attention for its precise control of metal transfer
M. Watts

30 Meeting the Challenges of Structural Steel Welding
From wind and moisture control to equipment selection and process optimization, discover how to overcome common jobsite obstacles while protecting weld quality and profitability
S. McKeen

34 Fillet vs. Groove Welds for Plate Girder Web-to-Flange Connections
When design requirements allow, fillet welds often provide a more efficient alternative to groove welds
R. Medlock



On the cover: A welder prepares to work on a construction site. (Credit: Shutterstock.)

38 THE AMERICAN WELDER
Job Shops — Part 3 — A Hybrid Approach to Welding Automation
Learn how cobots can be integrated into shop operations to increase welding productivity
M. Bush

DEPARTMENTS

5 Editorial
8 News of the Industry
12 Aluminum Q&A
14 Brazing Q&A
16 Letters to the Editor
17 Education 411
18 Product & Print Spotlight
41 Coming Events
42 Seminar Schedule
43 Society News
46 Standards Development
52 Section News
61 Guide to AWS Services
62 Personnel
63 Classifieds
63 Advertiser Index

CONTENTS

OCTOBER 2026 | VOLUME 105 | NUMBER 10

WELDING JOURNAL RESEARCH SUPPLEMENT

269-s

Effect of Inhomogeneous Nugget on Weld Performance in Resistance Spot Welding of HPDC AlSi7MnMg — Part 1: Material Characterization

Part 1 of this research explores how material composition affects weldability and application in large-scale structural castings for automotive bodies

Y. Wang et al.

281-s

Composite Vision Method for Measurement of 3D Bead Profile — Part 2: Image Processing

Building upon previous work, this study considers improved image segmentation methods for multilayer, multipass welding

J. Jiao et al.

295-s

Few-Shot Welding Defect Detection via Graph Self-Attention Neural Network

Deep learning models are changing how data scarcity is addressed

Z. Zhang et al.

OFFICERS

President D. Joshua Burgess
Tennessee Valley Authority

Vice President Kerry E. Shatell
Consultant

Vice President J Jones
The Harris Products Group

Vice President Walter J. Sperko
Sperko Engineering Services Inc.

Treasurer Mary Bihrle
Consultant

Executive Director & CEO Carey Chen
American Welding Society

DIRECTORS

A. Blakeney (Dist. 9), Southeastern Louisiana University
B. Brandmeir (Dist. 3), Lehigh Career & Technical Institute
C. Brown (Dist. 18), Madskills Certified Welding Services
D. E. Clark (Dist. 20), DEClark Welding Engineering PLLC
W. Doneth (Dist. 11), Fronius
R. M. Dull (Dist. 7), Welding Engineering Consultant
R. Emery (Dist. 22), Consultant
K. Gilgenbach (At Large), Matheson Gas
H. Graham Jr. (Dist. 2), Benjamin Franklin High School and Community College of Philadelphia
J. W. Jones (Dist. 16), Herzog Railroad Services Inc.
T. Jumper (Dist. 14), Southwestern Illinois College
T. Kinnaman (Dist. 1), T. C. Kinnaman Welding Solutions
T. Kostreba (Dist. 10), Erie High School
M. A. Krupnicki (Past President), Rochester Arc + Flame Center
V. Kuruvilla (Dist. 17), Lexicon Inc.
D. Lange (At Large), Northeast Wisconsin Technical College
N. Martinez (Dist. 21), Salt River Project
B. Newcomb (Dist. 12), Madison College
W. F. Newell (At Large), Euroweld Ltd.
D. Peterson (Dist. 5), Central Maintenance and Welding
N. Peterson (At Large), Miller Electric Mfg. LLC
R. L. Holdren (Past President), ARC Specialties Technical Services/Welding Consultants LLC
M. E. Sapp (Dist. 4), Consultant
L. E. Showalter (At Large), Newport News Shipbuilding
R. H. Stahura (Dist. 6), Consultant
D. Szabla (Dist. 15), nVent—Hoffman Enclosures
J. Thompson (Dist. 8), Consultant
B. Towell (Dist. 19), Industrial Inspection & Services LLC
D. G. Viar (Dist. 13), Moraine Valley Community College
H. J. Wolf (At Large), Madison Area Technical College

WELDING JOURNAL

Publisher Annette Alonso

Editorial

Editor-in-Chief Cindy Weihl
Managing Editor Kristin Campbell
Associate Editor Roline Pascal
Associate Editor Alexandra Quiñones
Assistant Editor Rachel Bheecham
Peer Review Coord. Brenda Flores
Peer Review Assistant Editor Tiffany Herrera
Peer Review Editor Thomas J. Lienert
Publisher Emeritus Jeff Weber

Design and Production

Managing Editor, Digital and Design Carlos Guzman
Production Manager Zaida Chavez
Assistant Production Manager Brenda Flores

Advertising

Senior Sales Executive Scott Beller
Senior Sales Executive, Expo & Media Cara Collins
Manager, Sales Operations Lea Owen

SUBSCRIPTIONS

Subscriptions Representative Tatiana Soler
tsoler@aws.org

aws.org

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

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.

Welding Journal (ISSN 0043-2296 Print) (ISSN 2689-0445 Online) is published monthly by the American Welding Society for $150.00 per year in the United States and possessions, $195.00 per year in foreign countries: $15.00 per single issue. Not available for resale in either print or electronic form. American Welding Society is located at 8669 NW 36 St., # 130, Miami, FL 33166-6672; telephone (305) 443-9353. Periodicals postage paid in Miami, Fla., and additional mailing offices. POSTMASTER: Send address changes to *Welding Journal*, 8669 NW 36 St., # 130, Miami, FL 33166-6672. Canada Post: Publications Mail Agreement #40612608 Canada returns to be sent to Bleuchip International, P.O. Box 25542, London, ON N6C 6B2, Canada.

AWS Claims Policy: All hardcopy editions are shipped FOB Origin. Publisher reserves the right to investigate and make a determination on all claims submitted for missing editions not received by a subscribing member or institution. Any claim request determined to be valid will be fulfilled with a digital copy of the edition. Publisher will NOT send any hardcopy replacement issues for any reason.

Readers of the *Welding Journal* 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.

Copyright © 2026 by American Welding Society in both printed and electronic formats. The Society is not responsible for any statement made or opinion expressed herein. Data and information developed by the authors of specific articles are for informational purposes only and are not intended for use without independent, substantiating investigation on the part of potential users.

A913 Gr50: An Underutilized Grade of Structural Steel



Christopher Urtz, P.E.
Senior technical sales engineer, ArcelorMittal International North America

Steel is thermally conductive, but that does not always make preheating easy. With the largest steel sections now exceeding 6 in. in flange thickness, a significant amount of energy is required to reach and maintain the minimum preheat of 225°F (110°C) for prequalified welding of A992 steels. While efforts are underway to evaluate the safe use of lower preheats for A992, prequalified methods already exist in AWS D1.1, *Structural Welding Code — Steel*, to lower the required preheat for heavy structural steel sections. This is possible by substituting or dual certifying A992 with A913 Gr50 steel.

ASTM A913, *Standard Specification for High-Strength Low-Alloy Steel Shapes of Structural Quality, Produced by Quenching and Self-Tempering Process (QST)*, covers wide flange beams that gain added strength through a quenching and self-tempering process. As a result of this process, A913 steels require less carbon and fewer micro-alloys, thereby improving their resistance to cold cracking. A913 is available in four grades classified by yield strength: Gr50, Gr65, Gr70, and Gr80. Engineers generally specify Gr65, Gr70, and Gr80 to reduce the size of gravity columns, trusses, or other strength-controlled elements in a structure. Engineers generally do not specify A913 Gr50, as its mechanical properties are identical to those of the more commonly used A992 steel. However, fabricators can easily request a substitution or a dual certification of A913 Gr50 with A992 to capture the welding benefits of A913 steel.

In D1.1, A913 Gr50 is prequalified for welding without preheat, provided that the filler metal has a diffusible hydrogen content of 8 mL/100 g (H8) and the ambient temperature exceeds 32°F (0°C). This not only removes the preheating requirement for splicing A913 beams but also lowers the required preheats for welding A913 to other base metals. For instance, consider welding a 1-in.-thick A572 Gr50 plate to the 3.5-in.-thick flange of a W14 × 500. The A572 plate requires a 50°F (10°C) preheat, and the W14 × 500 requires a 225°F preheat for A992 but no preheat for A913 Gr50. When a joint has two dissimilar preheating requirements, D1.1 requires using the higher of the two minimum temperatures. So, by switching from A992 to A913 Gr50, the required preheat for this connection drops from 225° to 50°F.

Here are some other factors to consider when implementing A913 Gr50 on a project:

Beam Size/Availability. To realize the preheating benefits, A913 Gr50 should only be considered for members with a flange thickness greater than 1.5 in. (3.8 mm). Below this thickness, D1.1 only requires a 50°F preheat for prequalified welding of A992. Some shapes below this thickness may also not be available in A913 Gr50. Switching from A992 to A913 does not increase lead time, as producers with A913 capabilities can easily transition between rolling the two grades.

Mechanical Properties. Unlike A992, the standard A913 specification does not impose a maximum yield strength or require a maximum yield-to-tensile strength ratio. So, if a project requires these properties, A913 Gr50 should be ordered with the supplemental specification S75. Dual certifying the steel as both A992 and A913 Gr50 also eliminates this concern, as the more restrictive requirement always applies.

Heat Treatment. Due to the self-tempering process used to produce A913 Gr50, the temperature for heat treating this steel should not exceed 1100°F (600°C), compared to the 1200°F (650°C) limit for A992. Dual certifying would not eliminate this requirement, as the more restrictive heating limit of A913 Gr50 still applies.

In structural systems where higher strength alternatives do not reduce weight, A913 Gr50 serves as a more weldable alternative to A992. While the higher-strength A913 grades also offer favorable welding properties, they often require more effort by the engineer of record to redesign the structure to accommodate the higher-grade steel. This exercise greatly benefits the project if the steel weight can be reduced, but the same level of analysis is not required to substitute A913 Gr50. For this reason, a fabricator can request a substitution or have the producer dual-certify A913 Gr50 with A992 to easily capture these welding benefits. WJ

For more information on welding high-strength A913 steel, read the author's article, "AWS D1.1 2025 Introduces a New Grade of Structural Steel for Prequalified Welding," in the May 2025 Welding Journal.

"While efforts are underway to evaluate the safe use of lower preheats for A992, prequalified methods already exist in AWS D1.1, *Structural Welding Code — Steel*, to lower the required preheat for heavy structural steel sections. This is possible by substituting or dual certifying A992 with A913 Gr50 steel."

DEFINING POSTWELD HEAT TREATMENT

BY TRAVIS GREEN AND HEATHER GILMER



Fig. 1 — Induction heating for stress relief.

An examination of how AWS standards interpret PWHT and related terms, along with recommendations for greater consistency in future editions

Terminology related to postweld heat treatment (PWHT) is inconsistent across AWS standards. In this article, we examine the use of PWHT and related terms in AWS D1.1/D1.1M, *Structural Welding Code — Steel*; AASHTO/AWS D1.5M/D1.5, *Bridge Welding Code*; and AWS A3.0M/A3.0, *Standard Welding Terms and Definitions*, and make recommendations for future code editions.

The Definitions

Both D1.1 and D1.5 have undergone a series of revisions to differentiate PWHT, stress relief, and hydrogen diffusion postheat.

In 2025, A3.0 added a definition of PWHT: "Any heat treatment applied to a weldment subsequent to welding. See also hydrogen bakeout and stress relief heat treatment." This definition is similar to the PWHT definition in the 2025 edition of D1.1: "Any heat treatment after welding."

D1.5 was revised in 2025 to define PWHT as the following: "Any heat treatment after welding for the purpose of stress relief or for modifying the metallurgical structure or mechanical properties of the metal. Hydrogen diffusion postheat (see 12.15) and heat-assisted geometry modifications (straightening, cambering, curving) are not considered postweld heat treatment."

The Processes

In this section, we review processes that potentially fall under the A3.0 definition of PWHT.

Stress Relief Heat Treatment

Stress relief is typically used to reduce residual stresses and improve dimensional stability. A3.0 was revised in 2025 to define stress relief heat treatment as "A type of postweld heat treatment used primarily for the reduction of residual stresses." This process involves controlled heating of the weldment to a specific temperature and exposure duration, allowing the metallurgical structure to reorganize internally before the weldment is cooled slowly. The stress relief temperature for structural steels is typically around 1100° to 1200°F (590° to 650°C), warm enough to suppress yield strength and permit stress reduction while remaining comfortably below the lower transformation temperature of the base and filler metals. Heating can be accomplished using a furnace, induction heating equipment (Fig. 1), resistance heating equipment, or other local methods. D1.1 and D1.5 each specify holding temperatures, durations, and heating and cooling rates.

PWHT is often used synonymously with stress relief heat treatment, and stress relief is the most common form of PWHT used on structural welds. However, there are other forms of PWHT, and the two terms should not be used interchangeably.

Hydrogen Bakeout or Hydrogen Diffusion Postheat

In 2025, A3.0 added a definition of hydrogen bakeout as "Heating a base metal or weldment at elevated temperature to release residual hydrogen." Also in 2025, D1.5 added a definition of hydrogen diffusion postheat as "A thermal treatment applied to an assembly after welding for the purpose of releasing diffusible hydrogen." The two definitions are similar but not the same; one references residual hydrogen, while the other references diffusible hydrogen.

Atomic hydrogen can migrate into the metal matrix during welding and diffuse outward into the heat-affected zone and atmosphere at room temperature. The diffusion process is accelerated at elevated temperatures. Per the *Welding Handbook*, Ninth Edition, Volume 4, Materials and Applications — Volume 1, sources of hydrogen include "the filler metal, moisture in the electrode covering, welding flux, shielding gas, or surface contaminants." Elevated hydrogen levels, combined with material susceptibility and stress, can result in hydrogen-assisted cracking.

Both D1.1 and D1.5 contain many provisions intended to reduce hydrogen in the weld without the need for either hydrogen diffusion postheat or hydrogen bakeout as defined in A3.0. D1.5 also includes requirements for hydrogen diffusion postheat under certain circumstances.

In hydrogen diffusion postheat, the weld is raised to a temperature higher than typical preheat and interpass temperatures immediately after the weld is completed, without allowing it to cool first, and is held at that temperature for a prescribed duration. D1.5 specifies postheat at 450° to 550°F (230° to 290°C) for one hour per inch (25 mm) of weld thickness. Postheat is typically accomplished with a rosebud torch, similar to preheating (Fig. 2), although other methods used for stress relief, such as induction or resistance heating, can also be employed.

Hydrogen bakeout (A3.0) is often used synonymously with hydrogen diffusion postheat, although there is some confusion about whether they're the same. For hydrogen bakeout (to address residual hydrogen), the temperatures are relatively high (above 1100°F [590°C]). Where D1.5 mentions "hydrogen diffusion postheat" (to address diffusible hydrogen), the temperatures are relatively low (450° to 550°F [230° to 290°C]).

Earlier editions of D1.5 used PWHT synonymously with both hydrogen



Fig. 2 — Postheating on a welded component.

diffusion postheat and stress relief, which was confusing.

Heat-Assisted Forming

Heat-assisted forming, although not defined in A3.0, encompasses straightening, curving, and cambering. The controlled application of heat, sometimes in conjunction with loading or restraint, is used to achieve the desired geometry. Specified or recommended maximum temperatures for carbon and low-alloy steels in the AWS D1 codes range from 1000° to 1200°F (540° to 650°C). D1.5 includes more detail about heat-assisted forming than D1.1, which mentions these processes only in the context of strengthening and repair. Many of the heat application provisions of D1.5 now appear in AASHTO *LRFD Steel Bridge Fabrication Specifications* and will not be included in the 2030 edition of D1.5.

Other Heat Treatments

Other heat treatments include annealing, normalizing, and quenching and tempering. These alter the metallurgical structure and affect strength, ductility, and toughness. None are typically used on structural welds, and neither D1.1 nor D1.5 has provisions for performing these treatments.

Subsequent Welding

Because heat treatment is not defined, any application of heat after welding could be considered PWHT, including heat from repair welding.

What Is Considered PWHT?

The scope of PWHT is relevant to AWS codes because its use is an essential variable for welding procedure specification (WPS) qualification in several codes, including D1.1 and D1.5. The D1.5 definition was written to distinguish between heating applications that affect WPS qualification and those that do not.

Stress relief heat treatment is addressed in both codes as PWHT.

Annealing, normalizing, and quenching and tempering are not mentioned in D1.1 but are discussed in the D1.5 commentary and fall under the D1.5 definition of PWHT.

Heat-assisted forming typically does not affect WPS qualification and is excluded by the D1.5 definition. D1.1 and A3.0 are silent, but D1.1 users generally do not treat this as PWHT.

Arguably, the A3.0 definition of PWHT is not intended to include heat from subsequent welding. By this logic, even the heat from subsequent passes would fall under the definition. Nonetheless, A3.0 does not rule it out. D1.5 does not exclude it explicitly, but it is excluded by the purpose statement in that definition.

Hydrogen diffusion postheat does not affect WPS qualification in D1.5 and is explicitly excluded from the definition. D1.1 does not mention postheat. Neither code mentions hydrogen bakeout as defined in A3.0, but A3.0 includes "See also hydrogen bakeout" in its PWHT definition. Considering the high temperature typically associated with hydrogen bakeout as defined in A3.0, and the purposes for which it is used, it could be included within the purpose statement in the D1.5 definition.

Recommendations for Future Editions

1. The A3.0 PWHT definition should be refined to reflect the practical implications of what should be considered PWHT. If not, D1.1 should adopt its own definition, similar to the definition in D1.5.

2. A3.0 should either add a definition of hydrogen diffusion postheat similar to the definition in D1.5 or clarify its hydrogen bakeout definition. If not, D1.1 and D1.5 may need to clarify hydrogen bakeout and hydrogen diffusion postheat.

3. Because heat-assisted forming can be a fabrication process (including correction of welding distortion) as well as a repair process, D1.1 should include relevant provisions in its Fabrication clause. WJ

TRAVIS GREEN (*tgreen@wje.com*), SE, PE, is a principal at Wiss, Janney, Elstner Associates Inc., Falls Church, Va. **HEATHER GILMER** (*hgilmer@pennoni.com*), PE, is a senior engineer at Pennoni, Pittsburgh, Pa.

The AWS D1 Committee on Structural Welding is seeking educators.
Please contact Program Manager Jennifer Rosario at *jrosario@aws.org*.

The AWS A2 Committee on Definitions and Symbols is seeking producers.
Please contact Program Manager Stephen Borrero at *sborrero@aws.org*.

BY SEAN McKEEN

MEETING THE CHALLENGES OF **STRUCTURAL STEEL WELDING**



Practical strategies to improve quality and efficiency on structural jobs

Structural steel repair welding can be a rewarding and profitable specialty, but success requires more than strong welding skills alone. Welders must understand how environmental conditions, jobsite challenges, and equipment selection affect weld quality, productivity, and profitability. From power availability to access constraints, numerous factors can affect project outcomes, hence the right preparation can make the difference between a successful project and a costly setback. Are you up for the challenge of structural steel welding?

Environmental Conditions

Environmental conditions are often the first consideration when performing structural steel repairs. Much of this work takes place outdoors during building erection, shipbuilding, or equipment repair. Whether ironworking and connecting I-beams, welding fish plates on excavators, or straightening trailer bogie sections, welders must contend with conditions far less controlled than those found in a fabrication shop.

Among these challenges, wind and moisture are two environmental factors that most directly impact weld quality and productivity.

Beating the Breeze

Wind is a familiar concern for most welders. On many jobsites, a repair truck equipped with portable shelters, umbrellas, or welding curtains shields the work area from strong gusts. A weld pool needs shielding, which is why you may notice seemingly strange setups to ensure quality welds are being laid. When wind protection is not practical, welders often switch to processes that provide their own shielding, such as self-shielded flux cored arc welding (FCAW-S) or shielded metal arc welding (SMAW).

SMAW and FCAW-S are still the go-to for structural applications. Their ability to shield the weld pool in high wind environments while still providing deep penetration and robust weld characteristics makes them a staple. The main caveat for these processes is storage. Electrodes should be kept in rod ovens or in sealed packages away from the elements. Precautions prevent whole batches of filler from being scrapped and control an additional variable that can lead to poor quality.

Controlling Moisture

Moisture is the next significant environmental factor affecting weld quality and profitability. Moisture must be controlled in the environment, on the base material, and in the filler material. Beyond obvious concerns such as rain, welders must monitor humidity and dew point levels as well as properly store materials to prevent moisture contamination. While you can hear and see rain, humidity and dew point can silently destroy weld quality while you are none the wiser. Elevated humidity and unfavorable dew point conditions can quietly compromise weld quality by allowing condensation to form on the workpiece, introducing hydrogen into the weld and increasing the risk of porosity and cracking. As every welder knows, water and molten metal are a poor combination. To avoid moisture-related discontinuities, ensure that the materials are dry and comply with Clause 5.15 of AWS D1.1, *Structural Welding Code — Steel*. When the base metal or ambient temperature is within 15°–20°F of the dew point, consult AWS D1.1 Table 3.2 for guidance. The consequences of inadequate moisture control can be significant. For example, one steel silo manufacturer reported weld rejection rates increasing from 2 to 12% during periods of high humidity (Ref. 1).



A battery-powered welding machine is used at height to avoid long leads and provide maximum portability.

Preparing for Jobsite Challenges

Jobsite conditions can significantly affect your ability to weld structural components, as demands can vary widely. Challenges can range from locations more than 200 ft from an outlet to coordinating work around other contractors. Many structural welding projects begin before electrical service is available, making equipment portability and power generation critical considerations. The reach and range of a welding setup can determine where work can be performed and how efficiently it progresses. As a result, equipment selection can significantly influence productivity and project timelines.

One of the most significant advancements in remote structural welding is the introduction of battery-powered SMAW machines. For elevated work and locations where long leads were once required, these lightweight units allow welders to carry the power source directly to the work area, reducing setup time and improving mobility. They also eliminate the need for oversized power sources used to compensate for voltage drop and reduce reliance on forklifts or other equipment for relocation. Many systems weigh less than 50 lb, including leads and accessories, and some can operate while plugged in or through extension cords up to 300 ft long. As battery technology continues to improve, these welding machines are becoming an increasingly practical option for structural fabrication and erection.



A welder performs a hardfacing repair in the field using a 120/230 V welding machine.

Selecting the Right Welding Process

Weld process selection can be either a driver of production or a hard cap. When combined with the right filler metal, the process can significantly improve deposition rates and weld quality and increase overall profitability.

For SMAW applications, some machines offer pulse capabilities that can increase welding speeds by reducing the manipulation and skill needed for vertical welding. SMAW is a robust and proven process but generally very slow compared to other methods.

Modified standard gas metal arc welding (GMAW) waveforms can be used with cored wires to access additional parameter controls, such as wire feed speed regulation that varies with stickout length. These controls can help maintain penetration as stickout changes due to joint access limitations, restricted reach, or operator skill. Some machines even have pulse programs for cored wires to reduce spatter when used with the correct gas (pulsing is generally not possible or stable with less than 80% Ar mixtures). Both are considered high-productivity methods. Combining wire choice with process selection can maximize speeds in certain applications, such as out-of-position welding, because cored wires have a faster-freezing weld pool. For example, even in a shop environment, a cored wire may be a better choice than a solid wire if enough welding speed can be achieved to offset postweld cleaning procedures. Being aware of both filler metal and process options for your application can make you incredibly efficient.

Conclusion

At the end of the day, structural steel welding rewards the welder who plans for the fight before showing up to it. Wind and moisture don't care about your deadline, so control what you can — block the wind, watch your dew point, and keep your rod ovens and sealed packages doing their job. Jobsite conditions will throw curveballs at you too, whether that's being 300 ft from the nearest outlet or waiting on a lift. But the right equipment, like a battery-operated welding machine that shrinks your footprint and cuts your setup time, turns those curveballs into home runs. Once you've got the environment and logistics handled, process and filler selection are where you hone in. Choosing cored wire over solid or dialing in a pulse program instead of using SMAW can be the difference between slugging through a job and flying through it.

None of these tips are a secret. They're just easy to overlook when you're focused on getting weld metal in the joint. Structural steel doesn't have to wreck your margins. In fact, if you show it the respect it deserves, it won't feel like you've accepted a challenge at all. WJ

Reference

1. Man Xing. "How Weather Conditions Affect Steel Silo Construction Schedules." Retrieved August 11, 2026, from *manxingsilos.com/a/how-weather-conditions-affect-steel-silo-construction-schedules.html*.

SEAN McKEEN (*mckeen.sean@fronius.com*) is an application engineer for Perfect Welding at Fronius USA, Portage, Ind.