BOOK REVIEW

BY ROBERT MURRAY

Underwater Welding Book in Review

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David Keats's book, *Underwater Wet Welding*, is an excellent reference guide to welding. The majority of the book is about welding in general and not specifically underwater wet welding as the title suggests.

Credit must be given to Keats for taking the approach that a thorough understanding of the entire welding process is essential to becoming a proficient underwater wet welder. I found the layout of the book a bit confusing with the jumping back and forth between general shop welding and underwater wet welding. I would like to have seen the book made into two volumes: The first discussing metallurgy, welding, and weld inspection as it relates to surface welding in general; the second volume dealing with all aspects of underwater wet welding.

The section on "Health and Safety" also jumped back and forth between shop welding and underwater welding. Keats does give very sound guidance on electrical shock prevention, but does not offer an answer as to why underwater wet welding can be safe. It has to do with Ohm's law (I = E/R, where I = current, E = voltage, and R = resistance), and the 40 mA direct current (DC) safe body current established by the AODC referenced by Keats.

A diver will have a nominal limb-to-limb body resistance of 750 ohms; wet welding nominal closed circuit voltage is 29 VDC. Using Ohm's law, I = 29/750, the max current a welder/diver will be exposed to is 38 mA, which is within the safe body current limits. Being within the safe body current, along with following the safety guidelines outlined in Keats's book, is what makes underwater wet welding safe.

Another safety point Keats brings to light but does not elaborate on is ensuring all gases are free to escape. This is an extremely important safety concern since hydrogen and oxygen become disassociated from the water molecule in the form of gases during wet welding. By themselves, these gas molecules are harmless. However, if they are recombined they can become explosive, and if a substantial amount of gas has collected or significant amounts of hydrocarbons are present, the explosion could be lethal.

The section on "Basic Metallurgy" was very informative; however, a more in-depth explanation of the importance of carbon equivalency (CE) to underwater wet welding should have been given since CE is an essential variable for wet welding. I question Keats' statement that base metals with a high CE are not suitable for wet welding. Base metals with a high CE can be wet welded using austenitic electrodes, especially high-nickel electrodes.

Overall, I found the book to be well written. Keats did an excellent job with utilization of graphics in each section. I particularly liked the detail given in Sections 4 and 14 with electrode angles and manipulation.

The majority of the book is about welding in general. I found Sections 4 and 14 to be the only parts of the book that really got to the bare bones of underwater wet welding. With that said, this book will have a spot on my shelf with the rest of my welding reference books. ◆

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LETTERS TO THE EDITOR

Reader Offers Possible Solution to Skilled Welder Shortage

Industry needs to get serious about solving its problem, because no one else is going to do it for them. They need to ask themselves a few basic questions.

1. What is this problem costing the company? ($1000, $10,000, $100,000, or $500,000 a year, both in present and future business.) If they don't know what it is costing them, they have an unidentified problem; therefore, it will never get fixed.

2. What am I willing to pay for a workable solution? Since welding apprenticeships, in general, are a thing of the past and will probably stay there.

I have a workable solution. Solicit current American Welding Society Certified Welding Inspectors (CWIs) and Certified Welding Educators (CWEs) for a position to aid in your company's growth, expansion, and future. They would represent the company in quality, integrity, and reputation to its customer base and provide in-house welder training at any time. If this person can fix a $100,000-a-year problem forever, wouldn't it be worth a premium price?

If your problem has a significant price tag on it, you could reap double rewards by investing in your CWI/CWE portfolio by spending a very modest amount to get that person qualified to the Certified Welding Supervisor standard. Then stand back, throw out any company politics, and let that person do a job no one else was capable of doing. This person will be a functioning member of production, and take on responsibilities he or she is better qualified to do than those now performing those duties. The company now can plan on a welding future instead of worrying about one.

Companies that claim they couldn't afford this solution only have one other solution — give up welding as a means of fabrication or production. If not, workmanship, quality, and liability will eat up profits, and by the time the company identified the true problem/solution, it'll be too late. Pay a contract company to do your welding. (Then see what the price tag really is.) The time for action is now.

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Dear Readers:

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