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All in the Family:
The Gas-Shielded Arc Welding Conference
March 7-8, 2006, Las Vegas, NV

The conference sessions will cover advances in technologies and techniques for:

- Electrogas welding
- Flux cored arc welding
- Gas metal arc welding
- Gas tungsten arc welding
- Laser beam/arc hybrid welding
- Plasma arc welding

All in the Family:

The Gas-Shielded Arc Welding Conference

March 7-8, 2006, Las Vegas, NV

This insightful conference encompasses a family of related welding processes, all of which employ an arc and shielding gas. These processes – including electrogas welding, flux cored arc welding, gas metal arc welding, gas tungsten arc welding, laser beam/arc hybrid welding, and plasma arc welding – have a wide and growing range of applications, from storage tanks and pollution-control systems to armaments and space-based cosmic-ray detectors.

American Welding Society

All in the Family:

The Gas-Shielded Arc Welding Conference

March 7-8, 2006, Las Vegas, NV

The American Welding Society invites you to learn about advances in welding technologies and techniques that are making gas-shielded arc welding increasingly efficient and cost-effective. Expert speakers will discuss the current status and future potential of the various gas-shielded arc welding processes.

In addition to the formal session, conference attendees will have ample opportunity to network informally with the presenters and other participants, and to enjoy all the glitz and glamour that Las Vegas offers.

Conference Program

TUESDAY, MARCH 7, 2006

SESSION I: 9 AM – 11:45 AM

Welcome

Robert R. Irving, Conference Chairman
Kevin Lyttle, Conference Co-Chairman

1. KEYNOTE ADDRESS: THE AGING INFRASTRUCTURE AND WHAT CAN BE DONE ABOUT IT

Tom Siewert, Acting Chief, Material Reliability Division, National Institute of Standards and Technology, Boulder, CO

America's infrastructure is falling behind our demands on it, as our global competitors invest much more of their national economic products in infrastructure than we do. How can we catch up to meet the need in these tight economic times, and when new vulnerabilities have emerged? A recent National Research Council Report suggests that the solution is through "new scientific and engineering knowledge." We will look at how the government is readjusting to these challenges, and some areas where welding can help.

2. APPLICATION OF GAS-SHIELDED FLUX CORED ARC WELDING FOR FIELD-ERECTED STORAGE TANKS

Jon S. Lee, Senior Welding Engineer and Chief Metallurgist, CB&I (Chicago Bridge & Iron Company N.V.) Corporate Welding & QA Technology, The Woodlands, TX

This talk will focus on the practical use and application of the gas-shielded flux cored arc welding process in the welding of AWWA, API-620, and API-650 field-erected storage tanks of carbon steel and stainless steel construction. Key issues to be discussed include semiautomatic welding versus machine welding, and wind protection.

Morning Break

3. ADVANCED ARC WELDING PROCESS FOR JOINING LAP-PENETRATION JOINTS

Israel Stol, Senior Manufacturing Specialist, Joining and Assembly, and Kyle L. Williams, Senior Welding Specialist, Aluminum Company of America, Alcoa Center, PA

At present, lap-penetration joints can be welded with high power density (e.g. laser beam, electron beam, or plasma), resistance spot or seam welding, or friction stir welding processes. Most arc welding processes cannot weld these joints with consistently sound and structurally acceptable quality, but Alcoa has developed and patented an Advanced Arc Welding process that can do so. The underlying concept behind this process is geometric shaping of the arc through control of its operating mode and behavior. Significant cost reduction is an advantage of the process.

Lunch

SESSION II: 1 PM – 4:05 PM

4. GAS METAL ARC WALLPAPERING TECHNIQUES FOR NI-CR-MO CORROSION RESISTANT ALLOYS

Greg Hoback, Senior Welding Engineer, Haynes International, Kokomo, IN

Wallpapering has become the industry accepted standard for corrosion protection in many components of flue gas desulphurization systems. The technique employs thin-gauged nickel-base alloy sheet, welded to a variety of substrate base materials to form a leak-tight corrosion shield. Obviously, the success of any wallpaper application depends on the welding process selected for installation. Experience indicates that the gas metal arc weld (GMAW) process, employing various metal transfer modes and shielding gases, provides the best combination of efficient installation and quality product. The presentation will provide a brief overview of the nickel base alloys used for wallpapering, typical installation techniques, and a discussion of how GMAW parameter and shielding-gas selection have evolved through the years.

5. CSC-CONTROLLED SHORT CIRCUIT TRANSFER - A NEW GMAW PROCESS THAT SOLVES OLD WELD PROBLEMS

Tom Rankin, Vice President and General Manager, ITW Jetline Engineering, Irvine, CA

This talk will feature a new GMAW transfer process where both the wire feed and power source outputs are coordinated to deliver high travel speed welds on a variety of thin materials. Applications that support the benefits of the process will be presented along with the important process parameters.

6. THE APPLICATION OF GMAW-P TITANIUM WELDING IN ARMY ARMAMENT SYSTEMS

Stephen Luckowski, Chief, Prototype Manufacturing Team, US Army Armament Research, Development & Engineering Center, Picatinny Arsenal, NJ

The use of titanium in Army armament systems is rising steadily to meet rapid deployment requirements. Fabrication of these systems requires high-productivity GMAW welding to make the use of titanium affordable and compatible with traditional manufacturing methods. This paper discusses the development of GMAW-P welding of titanium and will cover a number of successful applications of the technology.

Afternoon Break

7. OVERVIEW OF LASER HYBRID WELDING AND ITS APPLICATIONS

Eric Stiles, Laser Division Manager, Fraunhofer USA Center for Coatings and Laser Applications, Plymouth, MI

Laser beam welding can be combined with arc welding to create a hybrid process with the advantages of both individual processes. Hybrid welding offers the high speeds and deeper penetration of laser welding, with the gap bridging and reduced fit-up requirements of arc welding. This presentation gives an overview of the available process combinations, and describes application examples.

8. THE WELDING OF ALUMINUM IN THE MARINE AND TRANSPORTATION INDUSTRIES

William Hamilton, Quality Assurance Manager, AlcoTec Wire Corporation, Traverse City, MI

Aluminum has long been associated with the aircraft and aerospace industries because of its strength-to-weight ratio and its excellent corrosion resistance. These same properties and advancements with alloys, welding, and manufacturing technology have provided the ability for aluminum to gain wider acceptance within the marine and automobile transportation industries today.

Adjournment

WEDNESDAY, MARCH 8, 2006

SESSION III: 9 AM – 11:45 AM

9. SOAR – SCIENCE BASED WELD SOFTWARE FOR OPTIMAL AUTOMATIC WELDING PROCEDURES

Phillip W. Fuerschbach, Principal Member Technical Staff, Sandia National Laboratories, Albuquerque, NM

Automatic welding today involves two important tasks: understanding and solving weld yield problems, and developing welding procedures for new products. Both tasks typically require making time-consuming and expensive welds on actual hardware to develop a high degree of confidence in a weld process set-up. The SOAR suite of PC welding software applications enables a user to obtain a more complete understanding of the effects of process variables on the resulting weldment in a fast and cost-effective way. By enabling a user to implement changes virtually, SOAR can optimize procedures and shorten weld development time. This state-of-the-art welding software will be described, with special emphasis on its user-friendly approach, heat flow determination, weld problem-solving, material selection, and several valuable figures of merit for weld quality.

10. ADJUSTMENTS THAT NEED TO BE MADE IN THE GAS-SHIELDED ARC WELDING OF GRADE 91 AND OTHER CREEP-STRENGTH ENHANCED FERRITIC STEELS

Jeffrey F. Henry, Director, Materials Technology Center, ALSTOM Power, Inc., Chattanooga, TN

A general realization has emerged that Grade 91 and the other CSEF steels, such as Grades 92, 23, 122, and 911, that have been adopted by the ASME Boiler & Pressure Vessel Code are sufficiently different in their technical requirements from the "traditional" boiler steels that more stringent rules must be implemented to insure

safe operation of components fabricated from these materials. A task group from Section II of the ASME Boiler & Pressure Vessel Code Committee has been assigned the responsibility for identifying key problem issues with these materials and formulating the appropriate rules to be placed in the Code. The presentation will review the basic metallurgy of the CSEF steels, discuss typical problems that have occurred in their use, describe the efforts of the task group to date, and report on progress of Code implementation of rules for these materials.

Morning Break

11. COLD METAL TRANSFER: THE REVOLUTION IN GAS METAL ARC WELDING

Franz Dietachmair, Managing Director, Fronius USA LLC, Brighton, MI

Cold Metal Transfer (CMT) breaks the rules and stretches the limits of gas metal arc welding as we knew it yesterday. CMT joins steel to aluminum, magnesium, and extremely thin sections of aluminum or stainless steel. Some say CMT is the process for today and into the future.

Lunch

SESSION IV: 1 PM – 3:45 PM

12. SHIELDING GASES FOR CHALLENGING APPLICATIONS

Kevin Lyttle, Senior Development Associate, Praxair, Inc., Tonawanda, NY

In the search for new ways to increase welding productivity, we often overlook what the proper selection of shielding gas can contribute. This is especially true when joining materials such as stainless steels, nickel alloys, and titanium and other reactive metals. Understanding how components of the gas blend can affect the properties and quality of the weld, and the actual performance of the process, can lead to large gains in productivity. Balancing gas blend characteristics and cost versus application requirements will be an important part of this presentation.

13. AUTOMATION OF AEROSPACE TURBINE BLADE AND KNIFE EDGE SEAL REPAIRS UTILIZING THE PLASMA WELDING PROCESS

Robert Tollett, Marketing Director, Liburdi Engineering Limited, Dundas, ON, Canada

For many years, manual gas tungsten arc welding has been performed on seals and compressor blades. In the 1960s, "Dabber" welding evolved as one of the first specified automated welding techniques on knife edge seal welding. In the '80s and '90s, more complex parts began to emerge on systems welded with GTAW. A later progression to plasma arc welding occurred in the late '80s and early '90s and has evolved in the last few years into a sophisticated approach to welding turbine hardware. Now part flow and the ability to walk away from the machinery for extended periods of time are becoming a reality.

Afternoon Break

14. GTA WELDING OF THE VACUUM CASE FOR THE ALPHA MAGNETIC SPECTROMETER (AMS)

Daniel J. Rybicki, Senior Engineering Specialist – Materials Analysis, Jacobs Sverdrup Technology, Inc., Eagle Rock, CA; and Thomas D. Dosenberry, Senior Welding Engineer, STADCO, Eagle Rock, CA

The Alpha Magnetic Spectrometer (AMS) is a high energy cosmic ray detection experiment (the first acceptance particle detector designed to operate in space) slated for long term docking on the International Space Station (ISS) Alpha. It will fly in a low (about 400 km) Earth orbit where it will acquire data for at least three years. The primary structural support system for the experiment consists of the integration of a Unique Support Structure (USS) and a Vacuum Case (VC), both fabricated from high strength aerospace grade aluminum alloys. The VC houses the core elements of the experiment and must sustain a high vacuum and structural soundness during all launch and on-orbit operations to ensure maximum preservation of the super fluid helium cryogen contained within. To achieve extremely high grade welds to accomplish all mission requirements, pulsed gas tungsten arc welding was selected as the welding process to make the final closeout welds for the VC.

Adjournment

SPEAKERS' BIOGRAPHIES

Franz Dietachmair is managing director of Fronius USA, LLC, in Brighton, MI. He worked in the European welding industry for 20 years. He became the training manager in the Technology Center of Fronius International in 1990; was promoted to sales, responsible for overseas customers, in 1995; and became managing director in 2002. He studied electronics and holds a masters degree in international marketing from the University of Linz in Austria.

Thomas D. Dosenberry is in charge of all electron beam and aerospace GTAW processes at STADCO Inc. in Los Angeles, CA. He has over 30 years of experience in high-end electron beam and GTAW as a welder and engineer. He has designed seam welding and planishing equipment, inert gas welding chambers, airflow test benches, and inert-gas induction-brazing chambers. He has helped various companies establish automated GTAW or EBW capabilities. As a repair development engineer in the aviation-repair industry, he has created FAA-approved repairs for hot section turbine components that previously were discarded after replacement. His background also includes induction brazing, vacuum furnace brazing, and heat-treating of all aerospace materials. He earned a B.S. degree in welding engineering from Arizona State University, and certificates from Sciaky EBW Operators, Programming and Maintenance Schools, and Wall-Colmonoy Vacuum Brazing School.

Phillip W. Fuerschbach is a principal member of the technical staff at Sandia National Laboratories in Albuquerque, NM. He uses calorimetry to characterize automated arc and laser welding processes in terms of several fundamental dimensionless parameters, including melting efficiency and energy transfer efficiency. He also has developed measurement methods to characterize laser beam propagation in materials processing lasers, and has established the importance of focused laser spotsize in determining beam absorption and weld pool formation. Mr. Fuerschbach has received the 1992 William Spraragen Award and the 1997 and 1999 James F. Lincoln Gold Medals from AWS, and the 2001 Arch T. Colwell Merit Award from SAE. He serves as a principal reviewer for the *Welding Journal*, and on three AWS committees: R&D, and the C7 and C7C Committees on Laser Beam Welding and Cutting. He has authored over 50 technical publications, and has developed welding optimization and analysis software that is licensed to many industrial, university, and government laboratories. He received a B.Sci. degree in mechanical engineering from the University of New Mexico.

William Hamilton is quality assurance manager for AlcoTec Wire Corporation, a manufacturer of aluminum welding wire in Traverse City, MI. Mr. Hamilton earned his B.S. degree in metallurgical engineering from Michigan Technological University and his M.S. degree in industrial management from Clarkson College of Technology. Before joining AlcoTec, he held various quality-assurance, purchasing, and manufacturing positions during 30 years with the Aluminum Company of America. Mr. Hamilton received ALCOA'S Arthur Vining Davis Award in 1990 for his contributions to continuous rod caster technology development, and the ALCOA Environmental Excellence Award for his contributions to elimination of caustic etching at Alcoa's Massena, NY, operations.

Jeffrey F. Henry is director of the Materials Technology Center at ALSTOM Power, Inc., in Chattanooga, TN. His technical activities have been centered on materials evaluation and failure analysis, with particular emphasis on metallographic examination and microstructural interpretation of materials used in the power industry and the pulp and paper industry. He has been involved in shop fabrication problems, process management, laboratory research and development projects, and problems related to operation of critical boiler and turbine components. His experience has been particularly concentrated in welding, high temperature behavior, diffusion processes, heat treatment, and fatigue. He has been with ALSTOM Power, Inc. since 1973, and has been an ASM International instructor for materials-related courses since 1988. He serves on several technical committees of the ASME Boiler & Pressure Vessel Code, and chairs the special SCII Task Group on Creep Strength Enhanced Ferritic Steels. He earned a B.A. degree in English and physics from the University of Virginia in Charlottesville, and an M.S. degree in metallurgical engineering from the University of Tennessee at Knoxville.

Greg Hoback is senior welding engineer at Haynes International in Kokomo, IN. He joined the firm in 1973 as a welder in the fabrication shop. In 1976 he transferred to the Engineering & Technology Welding Group, where he enhanced his welding skills while developing a better appreciation of the metallurgical aspects associated with welding of nickel base materials. He became supervisor of the E&T weld lab in 1985 and was promoted to welding engineer in 1995. A hands-on welding engineer, Mr. Hoback has traveled worldwide to instruct and consult with customers on practical and technical welding issues. He earned a B.S. degree in business from Indiana Central College.

Robert R. Irving is a contributing editor for the *Welding Journal*. During a long career in the industry, he has been materials editor for *Iron Age* and *Metalworking News*. He has won the AWS Silver Quill Editorial Achievement Award twice.

Jon S. Lee is a senior welding engineer and the chief metallurgist for the Corporate Welding and QA Technology Group of CB&I (Chicago Bridge & Iron Company N.V.), based in The Woodlands, TX. Mr. Lee has more than three decades of welding and metallurgical engineering experience in fabricating and erecting pressure vessels, piping systems, large field-erected ambient/cryogenic storage tanks, and unique special structures. Mr. Lee is first vice chair of the AWS A5 Committee on Filler Metals and Allied Processes, and he has chaired the Memphis, TN, and Houston, TX, Sections. He is a member of ASME's Subcommittee on Welding (ASME Section IX). He earned a B.S. degree in agriculture (engineering technology) from the University of Delaware, and pursued postgraduate studies in mechanical engineering at Memphis State University and in metallurgical engineering at the University of Houston.

Stephen Luckowski is a supervisory mechanical engineer at the US Army Armament Research, Development & Engineering Center, Picatinny Arsenal, NJ. He serves as chief of the Prototype Manufacturing Team and program manager of the Army Manufacturing Technology Program. He is responsible for organizational strategic planning, establishing of work methods, and process improvement in the prototype assembly of advanced weapons and weapon systems for the U.S. Army, Marine Corps, and Navy. Within AWS, he chairs the D1.9 Structural Titanium Committee, and serves on the G2D Welding Titanium Committee, the A5K Titanium Filler Metal Committee, and the National Executive Subcommittee, Structural Welding. He earned a B.S. degree in materials engineering from Drexel University.

Kevin Lyttle is senior development associate at Praxair, Inc., in Tonawanda, NY. For over 30 years, he has developed and optimized welding consumables, especially for GMAW. He holds several patents dealing with GMAW shielding gases and consumable wires. He has presented papers and led seminars on understanding and selection of shielding gases to optimize welding performance, and on fume generation, measurement, and reduction technologies. Mr. Lyttle has been active in the American Welding Society at the local and national levels. He served as chairman of the Safety and Health Committee and the Sub-Committee on Fumes and Gases, and participated in other committee assignments. In 2002, he received the AWS Safety and Health Award. He earned B.S. and M.S. degrees in metallurgical engineering from the Polytechnic Institute of New York, and an M.B.A. degree from Cleveland State University.

Tom Rankin is vice president and general manager of ITW Jetline Engineering in Irvine, CA. He began his career as a welding apprentice with Newport News Shipbuilding (now

Northrop Grumman). He has worked as an engineer, product manager, trainer, and international sales manager for such companies as Brown & Root Construction, Powcon, and Miller Electric Manufacturing Company. He earned an undergraduate degree from Christopher Newport University and an M.S. degree in welding engineering technology from Arizona State University.

Tom Siewert works in welding procedure development, mechanical property measurement, and nondestructive evaluation. He is acting chief of the Materials Reliability Division of the National Institute of Standards and Technology in Boulder, CO, where he also supervises research on pipeline safety. Previously, he was manager of research and development at Alloy Rods. Dr. Siewert has published over 200 papers, edited several books and conference proceedings, and received seven patents. He is active on a number of AWS and ASTM Committees. He earned his Ph.D. degree in metallurgical engineering from the University of Wisconsin in 1976.

Eric Stiles is the laser division manager of the Fraunhofer USA Center for Coatings and Laser Applications (CCL) in Plymouth, MI. CCL does research and development for high power laser applications such as welding, cladding, and heat treating. Mr. Stiles has worked at Fraunhofer USA since 2003, and previously worked for Fraunhofer IWS in Dresden, Germany. He earned an M.S.M.E. degree from the University of Michigan.

Israel Stol is a senior manufacturing specialist with the Alcoa Product Manufacturing group at Aluminum Company of America in Alcoa Center, PA. He has 28 years of experience as a welding engineer in applied research and development, and implementation of relevant technologies to production. His current responsibilities include consultation with automotive, aerospace, and defense customers on joining and design for manufacturability. His experience encompasses the GMAW, GTAW, laser-beam welding, GMA/laser hybrid welding, plasma/laser hybrid EBW, FW, submerged arc welding, electroslag, and FSW processes. Mr. Stoll holds 29 U.S. and international patents. He is a member of an AWS aluminum arc welding subcommittee, a former SME advisory board member, and a recipient of the AWS A.F. Davis Award and two Lincoln Electric Company awards. He earned B.S. and M.S. degrees in welding engineering from The Ohio State University.

Robert Tollett is marketing director at Liburdi Engineering Limited in Dundas, ON, Canada, a supplier of advanced joining, repairs, and coatings technology to the aerospace industry. Liburdi is a registered Aircraft Maintenance Organization in Canada, and holds ISO certification, many OEM approvals, and patents in joining technologies in powder metallurgy and welding. Before joining Liburdi, Mr. Tollett worked for Sermatech International in Montreal as quality assurance manager, operations manager, and general manager. He graduated from the aircraft maintenance engineering program at Edward Mompetite College in Montreal, attended McGill University in business administration, and earned a metallurgy of iron and steel diploma from McMaster University.

Kyle L. Williams is a welding technologist within the Product Manufacturing Division of the Alcoa Technical Center, providing domestic and international joining support to Alcoa's customers and business units. He joined Alcoa, Inc., in 1987. He received an Associate of Science degree in welding engineering technology from Westmoreland County Community College in Youngwood, PA. Mr. Williams is an AWS Certified Welding Inspector and serves as a member on the Aluminum Association's Technical Committee on Welding & Joining and the AWS D1.2 Structural Welding Code—Aluminum Committee.

CONFERENCE REGISTRATION FEES

Code: COGSAW
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Nonmember: $680

Each nonmember attendee will receive a two-year membership in AWS. Registration includes all conference sessions, two lunches, and all refreshment breaks. The registration fee does not include hotel accommodations. Hotel accommodations are subject to hotel regulations and are the responsibility of the attendee.

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Please fill out registration form, tear off and either fax or mail back to us.

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13 ❑ Research & Development
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18 ❑ Customer Service
19 ❑ Other

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G ___Arc Welding
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