2012 Health & Safety in the Welding Environment Conference

Robotic Arc Welding Safety

The purpose of this presentation is to introduce the requirements for safeguarding a robotic arc welding cell. Any industrial machine must comply with the applicable regulations and consensus standards of the country where it is installed. Risk assessment is the tool to identify the hazards present in welding cell and a means to properly select the protective measures that will reduce the risk level. A robotic arc welding cell must safeguard personnel from the hazards generated by the robot, welding equipment and positioning/fixturing equipment. At the same time, these protective measures must not hinder the productivity of the cell while being fully compliant with the regulations and standards. Basic cell guarding features perimeter barriers, ventilation, interlocked access, presence sensing devices and control of hazardous energy. This is supplemented by emergency stop, awareness means and safe procedures. Specific arc welding examples will be discussed. New technology for protective measures such as safety rated software limits, safe motion control, and collaborative operation will be introduced.

Gil Dominguez, Pilz Automation Safety

Considerations for Reducing Fume generation in the GMAW Process: Filler Metals, Welding Variables and More

As companies seek to establish safer work environments and also comply with regulatory guidelines, addressing variables in the welding application that affect fume generation is key. Selecting the proper filler metal, as well as managing material conditions appropriately can impact the overall fume generation rates for the GMAW process. Experts from Hobart Brothers and Miller Electric Mfg. Co. will discuss these factors, along with the manner in which welding variables, such as voltage, amperage and shielding gas selection can additionally affect fume generation.

Aaron Bischoff, Hobart Brothers Co

Environmentally Friendly Cutting Solutions

This project sought to develop alternative environmentally friendly cutting methods and explore new methods of reducing emissions in order to comply with air operating and water discharge permit requirements at Puget Sound Naval Shipyard Intermediate Maintenance Facility (PSNS IMF). Alternate oxyfuel gas cutting gasses and equipment were investigated as well as alternate cutting processes, such as plasma arc cutting (PAC) and laser cutting. Specially designed equipment and procedures were developed for monitoring opacity during simulated demolition cutting of large plates. Submarine hull samples were obtained from PSNS IMF in both ½-in. and 2-in. thicknesses. Several plate surface conditions were evaluated, namely, clean, rusted, painted, and painted with Special Hull Treatment (SHT) tile. Most of the work was focused on OFC. Each process was evaluated using design of experiment (DOE) techniques. Evaluation of the opacity data obtained in this program included

corrections for the normality of the measured data, followed by regression curve fitting, and presentation of the curve fit data in “robustness plot” format. The predicted values from the regression equations from these DOEs were then compared in the analysis. Overall, the primary finding was that opacity was strongly correlated to the amount of organic matter (e.g., paint, SHT tile residue, rust) burned. The laser cutting process was found to produce the least opacity, followed by the OFC and PAC processes. However, judgments regarding safety, cutting speed, and kerf width considerations were used to recommend a modified version of OFC in the near-term for ship dismantling at PSNS IMF.

Nick Kapustka, Edison Welding Institute

Plasma Arc Cutting of Stainless Steel

Plasma cutting is arguably the largest producer of pollution in any facility. Laser cutting can also be of concern. In the case of lasers, the machines need a clean environment to operate at optimal levels. Whereas a plasma cutting machine can run endlessly in a heavily saturated environment, the operator running the equipment cannot; fumes will overwhelm the operator in a matter of minutes. The fumes need to be ventilated at the source of production before they can migrate elsewhere.If you are now thinking about your thermal cutting operations and the accompanying ventilation needs, that’s good. Proper ventilation is an often-overlooked aspect of metal fabricating.

Patrick Gilmour, RoboVent Products Group, Inc

Process Optimization Can Reduce Welding Cost and Improve the Work Environment

Understanding the interaction between the welding consumable, the shielding gas, and the output characteristics of the power supply used for GMAW, can result in a higher quality, lower cost weld while improving the work environment. Controlling the droplet transfer mechanism of the consumable by selecting the best shielding gas composition, matched with an optimized power supply wave form, can reduce weld spatter and better control weld bead shape. This minimizes post-weld grinding and surface treatments which generate high levels of noise, dust, and sometimes require the use of hazardous chemicals. Welding fume levels may also be reduced.

Kevin A . Lyttle and Philip Miller, Praxair, Inc

Source Capture and PPE Solutions for Weld Fume Management

While process and behavioral changes are the prescribed first step in weld fume management, weld requirements and the processes involved may not allow for changes to be made. In these cases, companies must look at ways to capture weld fumes and to protect operators from exposure. Miller fume extraction and PPE experts will discuss source capture and Powered Air Purifying Respirator (PAPR) technologies designed to minimize or eliminate exposure to these fumes, and specific considerations companies should make when selecting a solution.

Eric Sommers and Al Hilbert, Miller Electric Mfg . Co . An ITW Co.

Welding Fumes - Practical Steps in Controlling Exposures to Hexavalent Chromium and Manganese

This talk will present data from more than 1000 air samples collected during a wide variety of welding tasks with a focus on exposures to hexavalent chromium, manganese and other metals of potential health significance. These data have been analyzed to evaluate the effect of welding process (e.g. SMAW, GMAW, GTAW, FCAW, etc.), consumables and environmental conditions to determine the circumstances that could give rise to elevated fume exposures, with a comparison to current and proposed occupational exposure limits. Studies on the efficacy and optimization of fume extractors in controlling exposures is also examined and presented. A discussion on practical steps to keep fume exposures below exposure limits while maintaining efficient productivity levels is provided.

Jeffrey Hicks, Exponent, Inc