



MEETING & SEMINAR

Update

Volume 6

Canadian Welding Association Hamilton Chapter

April 5, 2006

Please plan to attend our next seminar

Wednesday April 5, 2006

2020 Lakeshore Restaurant & Bar (2020 Lakeshore Rd.)

Burlington, Ontario (Corner of Brant Street)

Attitude adjustment: 5:30p.m. Dinner: 6:00 (Sharp)

Dinner Tickets for this meeting are \$30.00 per person

To reserve Dinner Tickets call Al Lundrigan at Dofasco (905) 548-7200 (ext. 6805) or (570-7854)

Please reserve your Dinner Tickets
by contacting
Al Lundrigan at Dofasco Inc.
905.548.7200 Ext. 6805 or 570.7854
by Monday April 03, 2006

Topic

Pipeline Welding

Presented By: Ken Lee of Lincoln Electric

Ken Lee is a Pipeline Welding Engineer at Lincoln Electric in Cleveland, Ohio. He has 15 years experience there as an AWS Certified Welding Engineer. He serves on the American Welding Society, American Petroleum Institute, Pipeline Research Councils. Ken is member of AWS, ASME, and NACE serving on committees for NACE, and Practical Welding Today magazine. Ken has a Bachelor of Science degree in Engineering Mechanics from the Johns Hopkins University and has completed graduate level Welding Engineering courses at the Ohio State University.

GTAW (or TIG) has been the traditional methods of welding a pipe root pass for critical applications. It offers high quality and results in a smooth back-bead. However, its

main drawback is slower welding speeds than other welding processes.

Surface Tension Transfer (STT) is a new welding process by Lincoln Electric, which can replace GTAW on many steel, stainless steel, and nickel alloy applications. STT is a modified current-controlled GMAW short-arc process. Unlike conventional GMAW, wire feed speed and welding current may be adjusted independently. Its unique output overcomes the shortcomings of conventional GMAW-S like lack of fusion and excessive spatter. STT's extremely precise output control allows welding at the lowest heat inputs with consistent fusion. Using STT, travel speeds up to four times faster than GMAW can be obtained.



Wednesday October 4, 2006

Topic: To be announced

**Contact any Hamilton Chapter Board Member
for Tickets**

Weld Quality

It may depend on your shielding gas

The main function of shielding gasses is well known by those that utilize the common welding processes such as GMAW, GTAW, or FCAW. Pure gasses are currently used as shielding gasses, but mixtures have also become popular. Being aware of the characteristics of the individual gases will help you understand the positive and potential negative effects of mixing pure gases.

In the gas shielded welding processes, the gas protects the molten weld pool from harmful atmospheric nitrogen and oxygen. In its ionized state, the shielding gas provides a current path from the electrode to the work piece. Typical shielding gases for the Gas Tungsten Arc Welding (TIG) process are inert gases such as argon and helium or mixtures of inert gases. For the Flux Cored Arc Welding process and Gas Metal Arc Welding (MIG) process, the gasses used are inert or mixtures of inert an oxidizing gas.

Argon, essentially a cold gas, is typically the base gas of mixes. It easily ionizes to provide a current path. Helium, with its higher heat content, is sometimes added to transfer additional heat to the weld

puddle; therefore improving puddle fluidity and welding speed. The addition of an oxidizing gas will also improve puddle fluidity and welding.

Oxygen is a gas that promotes the formation of oxides. It's mixed with inert gases, such as argon for the MIG welding of carbon steels, the oxygen combines with the iron and manganese to form iron and manganese oxides. These oxides provide beneficial wetting action to the weld puddle; however, they also increase fume levels and decrease the mechanical properties of the weld. Typical amounts of oxygen range from 1% to 5%. As the amount of oxygen in the mix increases, the amount of oxide formed goes up, as well as the fume emissions. If argon/oxygen mixtures are used to weld aluminum, which readily forms oxides, weld appearance tends to be dirty and a reduction of mechanical properties occurs.

Carbon Dioxide is used alone or in combination with inert gases, and is added to enlarge the internal penetration profile of the weld. Welds made with argon/oxygen tend to have a finger like penetration profile of the weld. Welds made with carbon dioxide tend to have wide acorn shaped penetration. In the arc, carbon dioxide breaks down to form carbon monoxide, and free oxygen. To see the effect of oxidation, compare the mechanical

test results of flux cored welds made with carbon dioxide to mixes of argon/carbon dioxide. Because there is less carbon dioxide in the mix, less manganese oxide is formed, resulting in higher weld metal chemistries, higher tensile strengths and toughness as compared to welds made with pure carbon dioxide.

Small quantities of carbon dioxide are added to MIG gases for welding stainless steels. In low carbon stainless grades, if too much carbon dioxide is present in the mixture, carbon dioxide will be transferred from the gas to the weld deposit, destroying its low carbon characteristics. In the same vein, hydrogen is added to MIG or TIG mixtures for austenitic stainless steels to improve colour match. As hydrogen is a powerful reducing gas, it eliminates oxides on the weld surface. However, if an argon/hydrogen mixture is used to weld carbon steels, or carbon steel to austenitic stainless steel, there is a risk that the hydrogen will induce cold cracking.

Pure gases have certain desirable and undesirable properties, and choosing a mixture should give you the best of both worlds. What is good for one application may not necessarily be good for another; therefore, be sure to look into the effects of the gas being used. The quality of your weld may depend on it.

Source: Joe Smith Senior Welding Applications Specialist, ALC

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