Accelerated Deposition Rates With AC High Deposition Tubular Wire

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Advancements in welding power sources have created new possibilities in welding consumable development. By using variable balance squarewave Alternating Current (AC) and a specially designed tubular wire, a new high deposition flux-free process has been created. This new process has deposition rates equal to or greater than Submerged Arc Welding (SAW).

The AC High deposition process uses a tubular wire composition designed to reduce the ionization potential, allowing quick re-ignition and arc stability as the current alternates polarity. The power source is a 1000A squarewave AC machine with adjustable polarity balance and frequency. With the ability to adjust the balance of the AC waveform and frequency, the amount of I^2R wire preheating and work piece heating can be tailored to exploit these advantages simultaneously. A water-cooled torch rated at 1000A delivers the wire, while a 90% Argon - 10% Carbon Dioxide (CO_2) shielding gas protects the molten weld pool. The result is a smooth continuous arc, much like that of classical Gas Metal Arc Welding (GMAW) or Metal Cored Arc Welding (MCAW).

Practical use of this new process will deposit between 30-50 lbs. per hour using a single wire. Weld deposits were found to have excellent mechanical properties and radiographic quality similar to GMAW and MCAW. Welding engineers are able to reduce joint angles, the amount of consumables, and time needed to complete a weld joint, because this process uses AC and no slag. Housekeeping issues and landfill expenses can be reduced and eliminated, by not having to deal with flux. For many high deposition applications, this new process will be a very effective tool to improve productivity and significantly reduce costs.