HyperFill: SAW deposition rates with GMAW flexibility

On the 22nd and 23rd of May 2019 at its Welding Technology Centre in Midrand, Lincoln Electric South Africa hosted a Structural Steel seminar at which it introduced HyperFill, an innovative twin-wire GMAW welding solution to maximise productivity from a single power source, wire feeder, welding torch, liner and contact tip. African Fusion reports.

HyperFill® is a patent-pending twin-wire gas metal arc welding (GMAW) solution that is set to revolutionise the way in which deposition rates are delivered. Developed for semi-automatic or robotic applications, HyperFill increases the usable deposition rate compared to traditional single-wire GMAW while delivering excellent penetration profiles, weld quality and puddle stability.

Due to its innovative twin-wire design, HyperFill is able to utilise two smaller diameter wires to produce a larger weld droplet and arc cone. In addition, the design results in a larger single-puddle that is easy to manage and control, allowing operators to increase deposition rates by an average of 50% over traditional single-wire processes.

The innovative design of HyperFill also redefines the use of multi-wire GMAW. Unlike traditional multi-wire processes, which typically require dual power sources or dual contact tips, Hyperfill uses a single power source, wire feeder, welding torch, liner and contact tip. This allows operations to improve weld deposition without the burden of a complex system set-up, allowing for maximum productivity with minimal implementation costs.

In the European welding industry, GMAW using single solid wires is the most popular welding process. More than 300 000 t of solid wire were used in the European Union in 2017 and roughly 80% of these were 1.20 mm in diameter. Of this total, welding using this semi-automatic process is estimated to account for around 65% of GMAW use, while the remaining 35% of the total was used for fully automatic and robotic welding.

To increase deposition rates and, therefore, productivity, multi-wire solutions have been introduced for automatic application such as the Tandum process, but such processes are unsuitable for use by a welder in semi-automatic mode.

HyperFill™ is a multi-wire pulsed gas metal arc (GMAW-P) solution that uses two electrically conductive wires, but unlike Tandum, needs only a single power source connected to a single welding gun, so it can be used for both semi-automatic and automatic/robotic applications.

While delivering high deposition rates at higher parameter settings, the process remains easy for a welder to manage and manipulate due to a wider arc, larger and wider molten puddle and easy system set-up. Using two wires with smaller diameters enables higher deposition rates than a single thicker wire. Between the two wires, a ‘liquid bridge’ is created which, thanks to the process-specific waveform generated by Lincoln Electric's Powersource power source, results in a one large molten droplet that is propelled through the welding arc into the weld pool.

The larger droplet also spreads the arc cone, leading to a larger diameter puddle. This, together with the larger droplet, makes for much easier puddle control by the welder. This is due to a more ideal ratio between the arc cone diameter at the workpiece and the puddle diameter. The ideal ratio between these diameters is 1:1. With single wire processes, this ratio is typically smaller due to a larger droplet size."

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HyperFill produces a larger and more robust root penetration profile. Less arc pressure from the larger arc-cone reduces the needle-like penetration profile associated with single wire GMAW."

Using thinner wires, the Hyperfill multi-wire process offers significantly higher deposition rates than single wire GMAW, with deposition improvements of up to 50% on semi-automatic and 80% on robotic applications being realisable.

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