

INNOVATIVE WELDING PROCESS FOR THIN SHEET METAL

Recently introduced to the Canadian market, the TOPTIG welding process features unique properties that combine the quality of TIG welding with the productivity of MIG welding.

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Tungsten inert gas (TIG) welding is used extensively for high quality welds. However, TIG welding also presents some major drawbacks. In comparison with metal inert gas (MIG) welding, TIG welding speed and penetration are lower. While MIG welding can be easily robotized, upto now, high- volume robotic TIG production trials have produced disappointing results.

Innovation in the TIG process design now offers new hope!. The new TOPTIG process combines the strengths of both MIG & TIG processes. This new robotic TIG process produces high speed and high quality welds. TOPTIG was originally designed to improve robotic TIG cold-wire brazing of thin sheet metal (up to 3 mm or 1/8") where using the standard robotic MIG process presented challenges. Galvanized steel is frequently used in the automotive industry and TOPTIG offers exceptional performance for brazing applications.

The TOPTIG process is similar to the TIG process, but the welding speed is comparable to what can be obtained using the MIG process. In addition, TOPTIG produces high-quality results, which reduces post-welding operations like grinding and significantly increases productivity.

State-of-the-art engineering

The cornerstone of the TOPTIG technology is a patented welding torch that is equipped with an integrated wire-feed system. The wire passes through the gas nozzle at a relatively narrow angle to the axis of the tungsten electrode. The filler wire is fed close to the tip of the electrode, which is the hottest area of the arc. This causes it to melt faster, which increases the deposition rate and welding speed.

The advantage of this configuration is that it reduces the size of the torch, which improves accessibility when robotic welding is used on workpieces with complex geometries, and avoids the necessity of maintaining the alignment angle between the wire and the joint. As a result, tool orientation is no longer a crucial factor for TOPTIG , liberating the use of sixth robotic axis, facilitating programming and optimization of robotic movement.

The innovative design of TOPTIG fosters optimization of robotic welding, while removing programming constraints and producing spatter free welds of high quality.

Meeting a need

TOPTIG meets an important industrial need of today's market. The automotive industry has enabled the production of new generation sheet metal for auto car bodies. These steels possess high strength with great formability to produce lighter car bodies. Although the steel making technology has evolved, welding processes have not kept pace with this evolution. TOPTIG fills an important gap in the joining of these new materials.

Joining thin sheet metal of high strength using the traditional Gas Metal Arc welding (GMAW) or MIG can cause a number of quality problems namely: burn through, unstable welding arc, unacceptable weld profiles resulting in more down time and inefficient welding operation. Robotic welding of these new thin steels imposes new welding energy constraints: independence of process heat input and quantity of filler metal addition, maintenance of high welding speed with improved robotic cycle times with minimal interruptions.

By combining the advantages of the TIG and MIG processes, TOPTIG meets all of these needs. In fact, TOPTIG has been used successfully for a variety of applications, from thin galvanized steel brazing with silicon bronze wire with no spatter to stainless steel welding in the food processing, metal furniture, and bicycle manufacturing industries.

Turnkey solutions

TOPTIG has been sold in Europe since 2004, but has only been marketed in Canada since the beginning of 2006. It is delivered as a turnkey system, and is available through Air Liquide's robotic integration partners. The solution usually includes the following components: robot and controller, welding power source, TOPTIG torch, and all necessary safety and electrical power accessories. Several peripheral devices are also incorporated, including a push-pull feeder and an optional automatic tungsten electrode changing system.

Thanks to its many advantages, including enhanced accessibility, increased productivity, and better speed and quality, TOPTIG stands out as an alternative robotic welding solution for thin sheet metal joining.