TIG welding

ALTERING PERCEPTIONS: TIG welding in the Oil and Gas industry

FROM CONCEPT TO REALITY:

Gas tungsten arc welding (GTAW) commonly known as, tungsten inert gas welding (TIG), has always been considered to be a particularly complicated joining process. The necessary equipment was expensive and subject to significant investments, shielding gas of the required purity was difficult to obtain and, above all, only specially trained individuals with specific skills were able to complete the complex procedures.

Now, after decades of development and progress, Polysoude has mastered this aspect of the market and with technological dexterity is producing innovative, customer-focused solutions for both mechanised and automated TIG welding.

PROBLEM-SOLVING:

In responding to the ambitious demands of the oil and gas industries, Polysoude has stepped into the world of increased productivity. A world, in which forward-thinking, excellent quality, competitive prices and the shortest of deadlines, can transform solutions into physical reality.

The field of offshore applications can be particularly problematic. The flow lines and export lines used to transport crude or processed oil or gas fluids, are subject to tremendously adverse forces, both external and internal. During the laying process, water pressure, strong currents and extremes of temperature must be contended with, whilst internally, piping can suffer from chemical attacks caused by aggressive production fluids. Polysoude has the power to weld pipelines capable of withstanding severe mechanical stress, absorbing high dynamic loads and providing corrosion resistance.

PREDICTABLE PRECISION:

Pipes can be welded manually, or by means of mechanised or automated welding. If no equipment for automated welding is available, the root pass and the hot pass can be produced by manual TIG welding with a filler material in the form of rods. However, the welding of the root pass is extremely delicate, deviations from the acceptable heat input can crucially alter the corrosion resistance of the pipe material. Hence, there are definite disadvantages to manual welding: the dependence on the skills and performance of the welders, a lack of sustained reproducibility, limited quality control and low productivity.

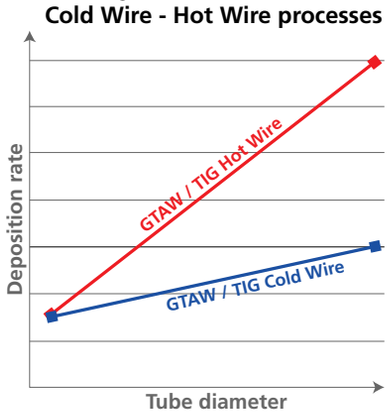
Polysoude Power Source P6-HW

Polysoude can create the seemingly impossible, by purely technological means. Using mechanised or automated TIG welding equipment, any desired quantity of welds can be produced, with each individual joint exceeding the requirements of the strictest production objectives - the 'Zero Risk/Zero Defects' approach. No longer dependent on the skills of the

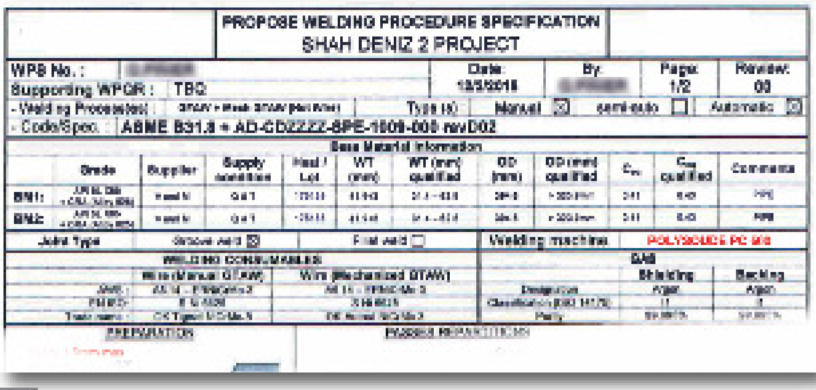
Welding set on a boom end

Oscillated passes appearance

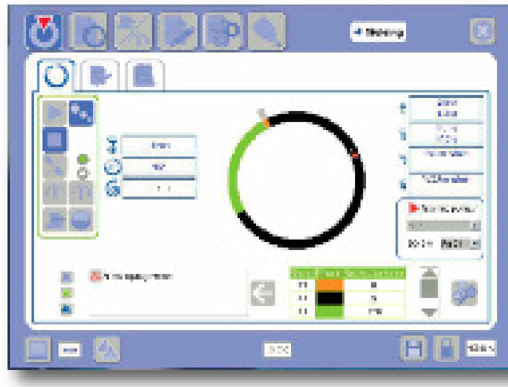
Productivity level between GTAW / TIG Cold Wire - Hot Wire processes



Hot wire process for increased productivity


PROPOSE WELDING PROCEDURE SPECIFICATION
SHAH DENIZ 2 PROJECT
WPS No.:
Supporting WPQR: TBQ
Code/Spec. ASME B31.3 + AD-CD2222-SPE-1008-000 revD02
Base Material Information
Joint Type
WELDING CONSUMABLES
Welding machine POLYSOUDE PC 600
PREPARATION

WPS


Intuitive graphic user interface GUI

staff entrusted with the operation of equipment, results are excellent, sustainable and furthermore, quality is predetermined.

Polysoude's mechanised or automated TIG welding ensures that the procedure and all related parameters are optimised and approved separately in advance. Results are finally documented as welding instructions and the related programs are implemented into the machines in the workshop or on site. Manual welding skills are no longer required as proficient operators take over by running the automated TIG welding equipment.

CUSTOMISED SOLUTIONS:

Polysoude's expertise in fulfilling the requirements of individual customers was evident in the Shah Deniz 2 Project. A contractor needed to weld a number of 16in. CRA line pipes, flanges and bends. The carrier pipes with a wall thickness of 41.9 mm were made of API 5L X65 with a 3.0 mm internal ERNICrMo-3 clad. In the workshop, the 12 m length pipes had to be joined into 24 m sections. The company decided, as is usually the case for onshore girth welds, to use a manual TIG welding of the root and hot pass in the 5G Up position and Submerged Arc Welding


Welding torch for narrow groove joint

(SMAW) for the filler passes. However, during approval they discovered that the filler welds did not comply with the technical requirements. Problems were caused at the start and stop zone of a welding pass, as well as lack of fusion and related repair work. Furthermore, the important heat input of the SMAW prevented the welds from reaching certain weld metal properties, such as toughness and yield strength.

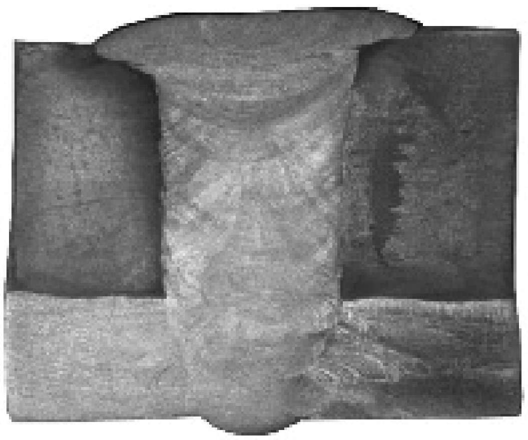
Polysoude was able to offer the perfect solution and facilitated the change to automated hot wire TIG welding of the filler passes. A Hot Wire GTAW station (pipe rotating 1G) was ordered. As the pipe ends were already machined for manual welding with a 30° V-preparation, root and hot passes continued to be produced by manual TIG welding.

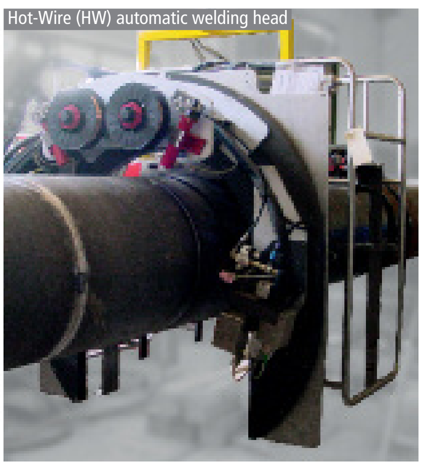
In the process of automated TIG welding, the filler passes are laid with the pipes in the 1G position. Adjustable supports allow fast and exact positioning and aligning of the CRA pipes, rotation of the pipes is ensured by a head stock, and the welding set is fixed in an optimised position at the end of a boom.

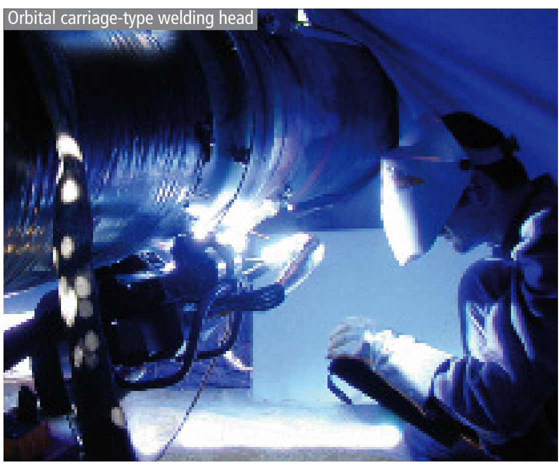
At the beginning of a weld cycle, before the ignition of the arc, the torch can be moved smoothly towards the workpiece. When the electrode touches the base of the groove preparation, it is retracted until the programmed distance to the workpiece is reached

The related device is called Arc Voltage Control (AVC). Once the arc is struck, it is used to keep the arc length constant, so that multipass-welding can be carried out without the need for further adjustments between passes.

Another useful and innovative feature of the installation is called Torch Oscillation Control (OSC), which allows the torch to move transversally to the direction of welding. The desired width of a welding pass is achieved by programmed periodical movements of the torch to both sides of the groove.


Macrographic section of a narrow groove TIG weld


Hot-Wire (HW) automatic welding head


Orbital carriage-type welding head