Mechanised and automated TIG welding

The zero risk, zero defects approach

Polysoude presents its innovative, customer-focused solutions with its mechanised and automated TIG welding technology – a technology which has the power to weld tube, pipe and tube sheet applications, capable of withstanding severe mechanical stress, absorbing high dynamic loads and providing corrosion resistance.

Figure 1: Zero risk/zero defects with Polysoude's mechanised and automated TIG welding technology.

TIG welding offers the flexibility of welding with or without filler wire. Using mechanised or automated TIG welding equipment, any desired number of welds can be produced with sustained reproducibility and with each individual joint exceeding the requirements of the strictest production objectives – the 'Zero Risk/Zero Defects' approach.

Manual welding is not required, as operators take over by running the automated TIG welding equipment. Results, therefore, are excellent, sustainable and quality is predetermined.

Pre-programming

Before mechanised or automated TIG welding takes place, the particular procedure and all related parameters are developed and approved customer-specific welding sequences and instructions are stored and transferred to the designated welding equipment by means of a PC or a USB flash drive – and this can be done in the workshop or on site.

Moreover, in the case of the most sophisticated equipment, such as Polysoude's P6 welding system, programming is even further developed. This technology incorporates a touchpad, which has an easy-to-understand, intuitive graphical user interface (GUI). The virtual synoptic of the GUI (Figure 2) is presented on the touchscreen, not only allowing for complete weld data management, but also offering numerous auxiliary functions to support the development and finish of any TIG welding sequence.

The operator must ensure that the work-pieces are correctly positioned. However, after the welding cycle has started, the equipment is completely controlled and monitored by the uniquely designed power source, which initiates and controls all functions and movements of the power source and the welding head.

The TIG welding cycle begins without the addition of filler wire. Wire feeding speeds and pulsed wire feeding are programmed and managed by the power source. The welding current starts with a relatively low intensity, and without any movement between the electrode and the work piece, a pool of molten metal forms. Only then, is the current raised to the programmed final level, the movement of the torch or the rotation of the work piece starts and the filler wire is added.

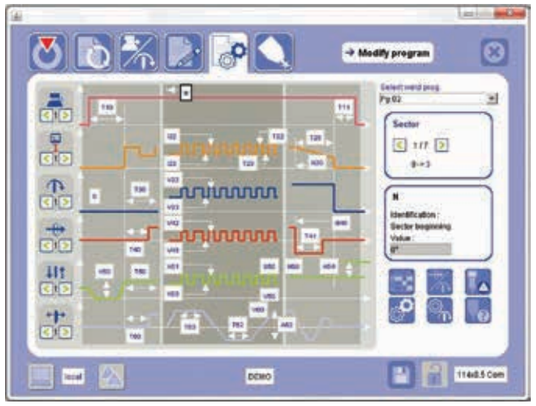

Figure2: The GUI of the Polysoude P6 welding system is presented on a touchscreen to enable users to easily manage all welding parameters and data and to access auxiliary functions.

The filler wire comes from a spool fitted inside the motorised wire feeder; this particular innovative arrangement means that wire feeding can be started or stopped at any moment and, if necessary, the wire end can be retracted. With this procedure, any occurrence of weld defects is excluded. A similar procedure at the end of the TIG welding cycle avoids crater formation. The wire is retracted slightly, the welding current intensity lowers continuously, the movement is brought to an end and the arc diminishes progressively.

Hot wire TIG welding (Figure 3) substantially increases both melting rate and welding speed. The hot wire current, which preheats the filler wire before it enters the weld pool, is supplied by an additional, separate power source and transferred to the wire via a contact nozzle in the wire guide. The wire is heated by electrical resistance within the wire nozzle, on entering the weld pool, so that less energy is necessary for its final melting. Significantly, the hot wire TIG process does not reduce the achievable quality of the welds in any way. Generally, TIG welds are characterised by zero defects, fine grain structure, small HAZ, absence of pores, and a smooth and even surface.

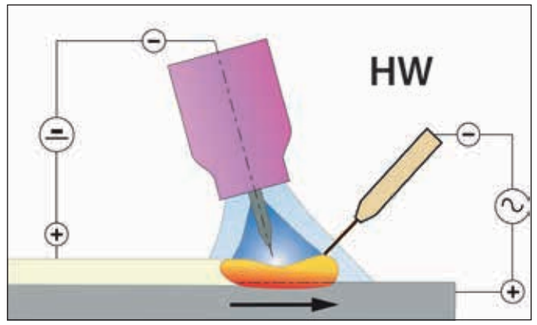

Figure 3: The hot wire TIG welding principle, which enables higher deposition rates without compromising weld quality.

The power source also controls the shielding gas. Due to the shielding behaviour of the inert gas, TIG welding seams show a blank metallic surface, so grinding or brushing is not necessary and multi-layer welds can be carried out continuously without interruptions for cleaning purposes.

An effective option developed by Polysoude in the area of hot wire technology is narrow-gap weld preparation of pipe ends. This design improves overall productivity of the joining operations of line pipes. The mechanical characteristics of the pipe material and behaviour in terms of welding shrinkage are considered in order to keep the angle of the weld groove as small as possible. This preparation of the pipe ends requires the removal of less material, so that machining becomes easier and faster. Also, since less material is required to be replaced by the weld, welding time becomes shorter, and filler material consumption decreases.

Figure 4: Orbital welding equipment is suitable for use on-site for pipe laying, in harsh environmental conditions.

The benefits to the customer are obvious. The number of required welders can be reduced drastically. This equipment is extremely well suited to harsh environmental conditions on site (Figure 4), where sustainable quality can be achieved and the time needed for filling and capping is reduced.

The resulting sound, defect- free joints bring about an immense increase in productivity, as time-consuming repair work is no longer necessary and the controlled heat input of the process guarantees that the required mechanical properties of the welds are achieved, without additional treatment.

Polysoude mechanised and automated TIG welding technology offers excellent results in industrial application and is a serious incentive to industries striving for a zero risk, zero defects' approach to joining technology.