

WORLD PIPELINES®

Volume 14 Number 1 - January 2014

WORLD PIPELINES

JANUARY 2014



Greene's
Energy Group™



www.energyglobal.com



MAJOR ADVANCES
IN WELD
PURGE TECHNOLOGY



Michael Fletcher, Delta Consultants, UK, discusses recent advancements in weld purge technology.

Few would disagree with the fact that making high quality welds demands skill. Most metallurgical obstacles have been overcome through progressive development of filler materials. Contemporary equipment for use in GTAW and GMAW is probably as good as it is likely to get. Of the few difficulties remaining, the production of sound and oxide-free weld underbeads is arguably the most underestimated.

One of the principle requirements of the pipeline industry is a weld underbead that is physically positive, i.e., no undercut, smooth and free of oxidation and debris such as 'grapes' or 'sugaring'. These defects can usually be removed by post weld grinding and polishing but this practice can be expensive.

Far better to address the problem through the use of dedicated inert gas weld purging techniques. They provide a stable, oxygen-free environment throughout the welding cycle and thus eliminate oxidation.

The purging solution has been recognised for many years but only recently have the welding accessory manufacturers developed dedicated equipment.

The last few months have seen the launch of several innovative improvements to the range of internationally approved weld purge systems, manufactured by Huntingdon Fusion Techniques Ltd. (HFT). Exploiting current engineering developments in materials, electronics, and specialist products such as gas valves, HFT's designers, encouraged by customer feedback, have been able to make significant improvements to

its range of purge equipment and instrumentation.

Three principle products form the thrust of HFT's Argweld® purge range; QuickPurge®, PurgElite® and PurgEye™.

The Argweld product range was developed to help speed up the welding process for engineers involved in the fabrication of pipes and tubes. This was realised by using a design which allows for easy and positive insertion into position, and by limiting the purge volume. The product range has been used extensively and internationally during the welding of stainless steel gas and oil transmission pipework.

The QuickPurge body employs synthetic fabrics throughout, incorporating an integral protective lining below the weld zone to resist thermal damage. Hoses used to transmit inert gas to and from the purge cavity, and to provide inflation pressure, are made from engineering grade nylon. Brass gas fittings are located well outside the weld zone, post weld radiography and ultrasonic inspection can thus take place with the purge system left in place.

It is impractical to be specific across the entire spectrum of diameters and welding procedures, other than to say that savings are significant. As an example, users report that a 900 mm diameter pipe can be fully purged to less than 0.1% oxygen in under 10 mins. There are reported savings in excess of 80% on purge time, compared with alternative purging systems, so that gas usage can be dramatically reduced.

PurgElite systems have been developed to help speed up the

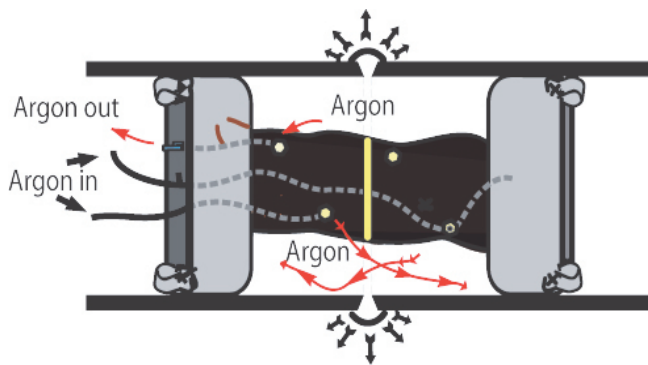


Figure 1. Effective gas seals need to be provided on either side of the joint. They need to be far enough away to be unaffected by the temperature rise during welding. This schematic section illustrates how QuickPurge equipment works.



Figure 2. Engineers prepare to fabricate large diameter pipework on the Isle of Grain natural gas installation using QuickPurge.



Figure 3. PurgEye monitors have been specifically designed for indicating oxygen levels in inert gas during weld purging. These rugged instruments have a measuring range down to 1 ppm on an alpha-numeric display.

welding process for engineers involved in the fabrication of pipes, tube lines, and assemblies, up to 300 mm in dia.

The revolutionary product range replaces an earlier one that has been manufactured and marketed successfully by HFT worldwide for many years, and is widely recognised as a robust welding ancillary that offers considerable savings in time and inert gas.

The 'Elite' development incorporates many advances in engineering technology, and extends the size range to include purge systems as small as 25 mm diameter.

The inflatable components employ low vapour pressure synthetic fabrics, with low outgassing rates, throughout and incorporate a connecting hose with a protection sleeve to resist



Figure 4. PurgElite inflatable purge system designed to accommodate tube and pipe sized between 25 - 300 mm diameter.

thermal damage. Hoses used to transmit inert gas to and from the purge cavity, and to provide inflation pressure, are made from engineering grade nylon.

PurgEye monitors were developed by HFT to provide sensitive oxygen measuring instrumentation for the weld purge industry. Most fabricators, especially stainless steel fabricators, need to ensure that the weld root is protected against oxidation. If the root becomes oxidised, the affected metal may need to be cleaned and this can be an expensive operation. Protection is best effected by providing inert gas purging. The purge gas itself needs to be free of oxygen, and a measure of the oxygen content of the purged volume is thus a crucial need for the welder.

For routine welding of the majority of stainless steels, there is a requirement for the purge gas to contain less than 0.1% oxygen or 1000 ppm. For these applications, the HFT PurgEye monitors are more than adequate. More sensitive materials, such as titanium alloys and some special stainless steels, may require oxygen levels to be below 0.01% or 100 ppm.

Case histories

UK case study

In the late 1990s, Babcock UK was bidding for the installation of a stainless steel pipeline across the south of the UK, for the transportation of LNG.

Because of the critical nature of joint quality for such a project, Babcock approached Huntingdon Fusion Techniques, to discuss the design of a special weld purging system that would provide quality joints and that would allow weld purging to take place faster than with available systems.

This special system led to the launch of the QuickPurge II series, which is now in widespread use around the world for pipe welding.

Recently, a contractor on the original site, the Isle of Grain in the UK, approached HFT to assist with some welding problems after the purging systems had burst and the original manufacturer was unable to help.

An HFT engineer took an example of the new QuickPurge II system, fitted with PurgeGate, to prevent their systems from bursting due to excessive pressure.

The new system inflated perfectly in the 42 in. pipe and allowed a weld purge to be completed in less than 15 mins.

Pennecon Energy

Pennecon Energy in Newfoundland selected Argweld purge systems for a large piping project.

Pennecon was awarded a contract that required hundreds of welds on titanium and stainless steel piping, with sizes up to