New welding gas innovation

How to significantly reduce your welding costs while improving weld quality and reducing your carbon footprint

Over the years, electric arc welding has developed from the relatively simple electrode welder, to ever more complex processes, such as MIG and TIG welding, meeting precise engineering requirements whilst maintaining a high level of operator safety. There are ongoing demands for reduced production costs and in recent times pressure has also been exerted on industry to help protect the environment from carbon emissions.

To enable the welding industry to meet these demands, equipment suppliers and manufacturers have had to develop innovative processes and solutions. Steady progress has been made including the introduction of a.c. power sources with pulse frequency control, soft start, crater fill and TIG technologies including up slope and down slope. Various types of cutting, laser etc. and new and exotic gas mixtures for difficult-to-weld materials have also been developed.

However, one area that Loxton Industries felt had not been researched and addressed conclusively was the inefficiency and cost blowout resulting from incorrect control of shielding gases used in the gas metal arc welding process. Loxton Industries decided to investigate the issues affected by gas flow levels. Some of the findings were as follows.

Welding operators

After visiting a large number of welding workshops Loxton found that the majority of welding operators seem to be under the impression that 'more is better', increasing their gas regulator pressures and flow meters to levels that are well in excess of what is necessary to adequately shield the weld pool.

Generally, gas delivery systems fall into two basic categories; individually mounted gas cylinders and ring main or manifold systems with one central gas pack source.

Individual Gas Cylinder Systems

Flow rate creep

Loxton identified a phenomenon they coined 'flow-rate creep' which occurs when regulators *increase* the flow rate as the gas pressure in the cylinder *decreases*. This can amount to a factor of up to three times over the life of the cylinder, e.g. If the regulator is not readjusted, an initial setting of 15 L/min could easily end up 45 L/min by the time the cylinder is empty!

Gas surge

To a varying degree, gas surge is present in almost all MIG and TIG welding gas systems and for many years has been virtually ignored, even though excessive surge can create porosity and poor penetration. To make matters worse, these problems are compounded when flow rates are increased beyond what is necessary.

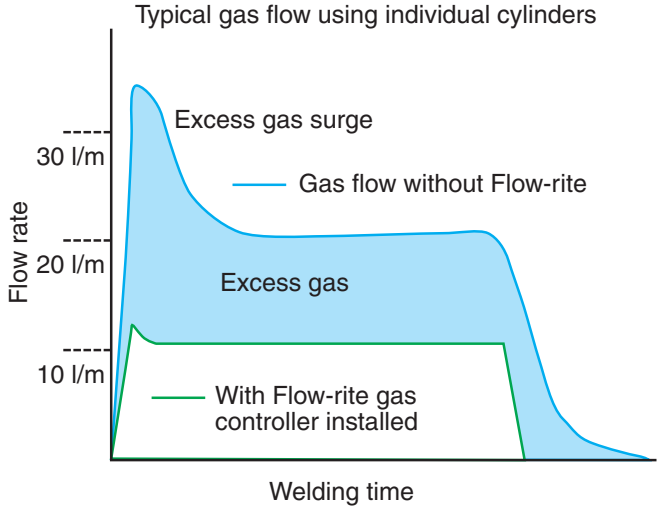
Bulk Pack and Ring Main Gas Source Systems

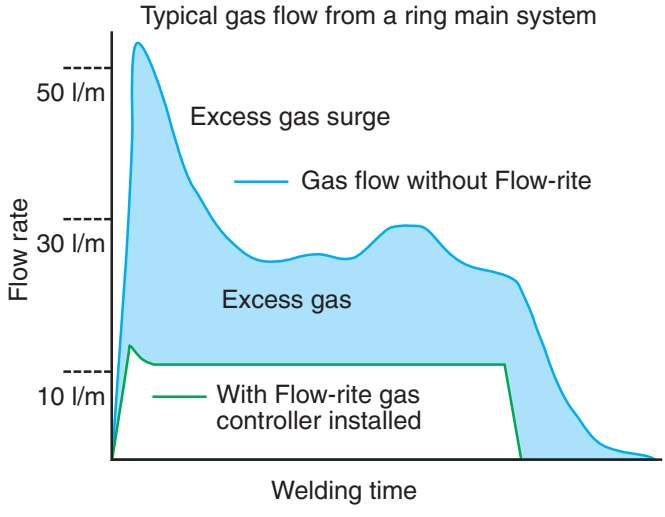
High flow regulator on the pack with no other gas flow control

This system operates on the premise that various sized orifices in the main will deliver accurate gas flow. Unfortunately this is far from the facts. It tends to deliver wild flow fluctuations. The level of gas flow is largely determined by where the welding machine is positioned on the main and fluctuations occur as the other welding operators start and stop. This type of supposed gas control system cannot possibly deliver any level of accuracy or consistency and results in excessive gas usage and in most cases inconsistent weld quality.

High flow regulator on the pack with inline flow meters

Most operators believe that the shielding gas is being regulated by the flow meters on their ring main but unfortunately this is not so as the meters do not regulate the gas. They will not work correctly with multiple users on a ring main system. As other welding operators start welding, the gas flow decreases, only to increase again when they stop. To compensate for the downward fluctuation and to ensure that the flow of shielding gas does not get below the minimum flow necessary to shield the welding pool, all flow meters on the main must be set well above what is required. This type of attempted gas control cannot deliver consistent non-fluctuating gas flow and will result in excessive gas usage and, once again, inconsistent weld quality.





High flow regulator on the pack with inline regulators

This system delivers shielding gas more efficiently and accurately than the two systems above, however complete gas control is still inadequate. The excessive gas surge that occurs when the welding operator commences welding cannot be eliminated, even with inline regulators and will result in excessive gas usage, possibly creating turbulence and defective weld quality.

As a result of their research, Loxton found that regulators and flow meters, even operating together, cannot accurately control welding gas flows. Weld quality is often unwittingly compromised, resulting in high reject rates and costly corrective measures. Porosity, poor penetration, excessive heat affected zone (HAZ) and high spatter deposition are some of the problems that are affected by inconsistent and/or excessive gas flow. Excessive gas use is also an unnecessary cost to the business operator that can amount to thousands of dollars per year.

Innovative Technology

To resolve all of these deficiencies, Loxton developed a specialised gas controller that they called the 'Flow-rite'. The Flow-rite has a unique proprietary control mechanism that is at the cutting edge of gas control technology. This control mechanism monitors the amount of shielding gas being used throughout the welding process from the start to the finish, maintaining the set flow levels regardless of any supply fluctuations. The Flow-rite does not replace the existing regulator and works in conjunction with it, operating efficiently at low flow rates and creating only a very small surge. It also comes with a tamper resistant security key, allowing management to keep control of the gas flow rate settings. It is already saving some Australian businesses thousands of dollars in welding costs per annum.

The Flow-rite is designed to accurately deliver the set litres per minute regardless of all other supply factors and is a set and forget controller that takes the guess-work out of shielding gas flows. Loxton Industries recommends that, to obtain the best possible results from their new technology, the gas flow rate setting in litres per minute should be no more than 10 to 12 times the wire thickness in millimetres. Example: 12 x 0.9 mm wire = 10.8 litres per minute.

There are a growing number of companies which have taken advantage of the improved efficiency that total welding gas control offers and are very satisfied with the improved weld quality and the shielding gas savings they are achieving. However gas savings and improved weld quality are not all; other benefits that may be gained from total gas control are:

- Lower reject rate and less rework
- Reduced downtime due to lower turnover of cylinders or bulk packs
- Reduced inventory of cylinders required which equates to less rental
- Improved OH&S issues due to less handling
- Lower carbon emissions due to reduced gas usage
- Increased bottom line as a result of all of the above

The graphs shown on page 10 illustrate the difference between gas flows often found at the welding torch and the complete flow control possible using the Flow-rite.

For further information on Flow-rite gas controllers please contact Loxton Industries Pty Ltd Tel. (03) 9744 3030 Email info@loxtonindustries.com.au or visit their website at www.loxtonindustries.com.au