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SHIELDING GAS

LOWER YOUR COSTS BY ELIMINATING INEFFICIENCIES

BY DAVID GAILEY

Shielding gas is typically one of the largest expenditures that companies make to support their welding operations.

In an industry where every penny counts, finding ways to reduce costs is essential. One of the areas with the most opportunities involves the use of shielding gas, which is typically one of the largest expenditures that companies make to support their welding operations. Fortunately, there are low-cost solutions through equipment that maximizes the value these companies get out of their gas purchases.

While it may seem counterintuitive on the surface, a small investment into the proper gas equipment can easily provide significant gas savings. The following article presents simple up-grades to consider, if gas savings could benefit your organization.

WHERE DO THE INEFFICIENCIES OCCUR?

As a first step, take an analytical look at each specific welding process and determine benchmarks. Determine the precise amount of gas needed to provide an adequate weld. This is crucial to determining where gas is wasted in your operations, and many will be surprised to find out that they are wasting an enormous amount of gas in their shielding flow rates.

When searching for areas for cost savings, those who have set benchmarks in gas usage will most likely discover that their processes are extremely wasteful when it comes to shielding gas. Then, after determining that there is waste within the process, the next step is pinpointing where this waste is so that it can be eliminated.

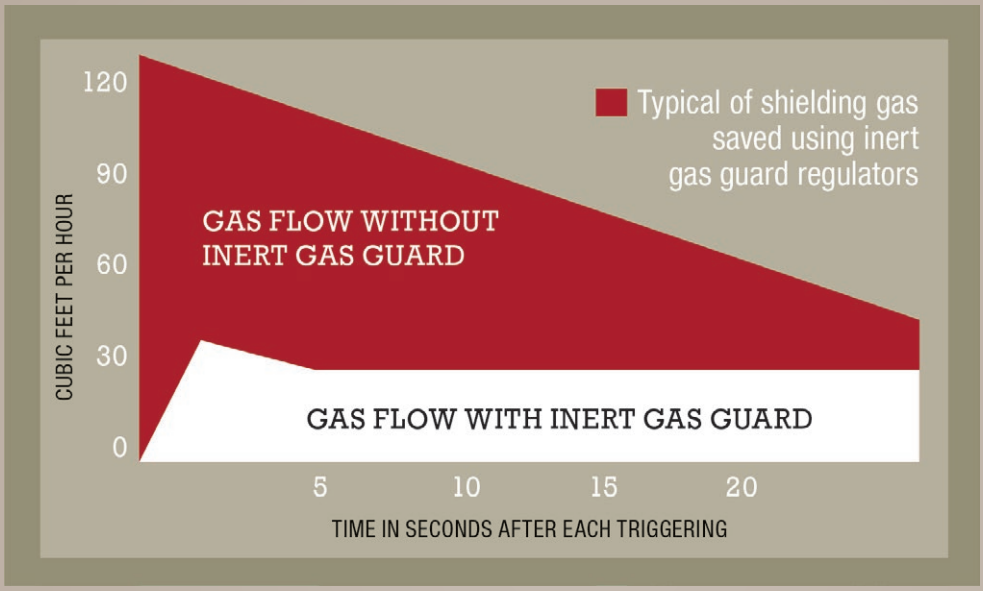

Fig. 1 *Inert gas guard regulators reduce gas surge when a gas metal arc gun or gas tungsten arc torch is activated.*

REDUCING GAS SURGE CAN LEAD TO SIGNIFICANT COST SAVINGS.

FINDING SAVINGS IN THE SURGE

These surges occur every time the solenoid is activated, more precisely, at every trigger pull on the welding torch. Most flow control equipment used with shielding gas, whether from a cylinder or a pipeline, is designed to operate at pressures of about 20 to 30 pounds per square inch gauge (psig), while applications using pure carbon dioxide may operate at pressures up to 50 psig. This means that every time a welder squeezes the torch trigger, the upstream pressure of 20 to 30 or even 50 psig exits the welding nozzle, wasting a large amount of gas when the trigger is pulled.

WHAT CAN WELDERS DO TO KEEP FROM USING HIGHER FLOWS THAN NECESSARY OR THAT EXCEED THE RECOMMENDED RATES?

DIFFERENT GAS-SAVING DEVICES

There are many gas-saving devices on the market that can greatly reduce the amount of gas surge associated with every trigger pull. These devices include, but are not limited to, gas guard regulators, point of use orifices, lower pressure flowmeters and even surge reducing hoses – Figs. 1, 2. These flow-control accessories set a limit so excessive flow rates that make the gas turbulent, drawing oxides and nitrides into the weld, cannot be used. While these devices have been around for over two decades, they rarely receive sufficient attention until market

Fig. 2 *A typical flowmeter regulator is a fixed pressure/variable orifice device. Pressure is set at the factory to a compensated or calibrated pressure, depending on the flow range desired and the gases being used.*

conditions create the need for companies to seek out cost-saving measures. Therefore, there is a great deal of misunderstanding surrounding these products.

Some of the more popular devices that can be added to the wire feeder to control gas surge include gas-saving regulators and point of use orifice fittings. Welding professionals should be wary of in-line restricted orifices as shielding gas savers, as these devices, if not installed at the correct point in the gas stream, will not have any effect in eliminating gas surge. The most effective way to eliminate shielding gas surge is to introduce a pressure-regulating device into the gas system.

Point of use orifice fittings can work well and are generally a low-cost solution. However, to work properly, the orifice fittings must be installed precisely in front of the solenoid valve. Anywhere else in the gas stream, like back at the regulator or the flow meter, will not work and the surge problem will remain.

In contrast, an inert gas guard can be placed anywhere in the stream and work effectively, taking that high upstream pressure and regulating it down to eliminate the surge. When the solenoid valve opens, there will not be the usual high pressure upstream, so instead of 50 psig there is only roughly 10 psig. That type of change can easily result in significant annual gas savings when added to a welding machine.

The reason we have this issue in the welding industry is because welding equipment is typically designed to operate at relatively high line pressures, such as 20, 30, or 50 lb/in.2, and that creates the high surge at the welding nozzle. Also, the typical welding lead that has been in use for a while may be twisted, have a kink, or the gas diffuser can become partially clogged due to a build-up of spatter. This results in flow restrictions at the welding tip which can only be overcome with more shielding gas pressure. And the older they get, the more imperfect these welding leads become. This need to clear out any imperfections or potential clogs that would restrict flow is why many welding flow meters are designed to deliver 20, 30 or 50 psig of pressure to the solenoid valve to be released when the valve opens.

There are other types of shielding gas flowmeters offered in the industry that are calibrated at atmospheric pressure, or, zero psig. These are typically called “Zero-Comp” flowmeters as they release the flow of shielding gas at atmospheric pressure with no back pressure whatsoever. So when the solenoid opens, there is no wasteful back pressure to create the surge.

These lower pressure compensated devices work better with newer welding leads rather than older leads. Older leads may have imperfections and kinks due to wear. This may require a higher back pressure. However, a new installation or an application like a technical trade school with many welding booths and students would be an ideal choice for a lower pressure compensated device. Other applications, such as in a construction site, fab shop or where equipment could be handled roughly and not well maintained, a lower pressure compensated device may not be ideal and will cause other issues.

In addition to reducing costs through waste optimized shielding gas systems, another option to consider is blending gases on site.

ADD FLEXIBILITY AND CUSTOMIZATION BY BLENDING GASES ON-SITE

Traditionally, MIG welding is done with pure argon or with a mixture of argon and CO2. Whatever combination a company used, they would usually order the mixture to be delivered pre-blended in a cylinder. As welding has evolved, the techniques used in different applications have become more and more specialized, with specific blends of argon and CO2.

Keeping in mind that many applications may require a different blend every time they start a new job, many welders seek the flexibility to change their mixture on the fly best suit different applications, projects and materials.

Using a gas blender, gas mixtures can be changed easily. Because this will prevent companies from having to purchase many different cylinders with pre-blended mixtures, they can minimize their costs and streamline their gas purchasing.

But because gas blenders can cost anywhere from $1,000 up to $10,000, a company should consider how much gas it uses to determine the return on investment (ROI) of buying a gas blender. For just a handful of stations, a minimal investment of around $1,200 would likely suit their blending needs. However, for 28 welding stations, then the blender investment would be closer to $7,000. But consider the cost benefit not only to the streamlined supply chain, but also the reduction of downtime switching between jobs.

Going back to our welding school example, in a situation where every welding booth will likely be using, for instance, a 75/25 blend, an expensive gas blender might not be a good investment. In cases like these, it may actually be beneficial to continue to use packaged gas in pre-mixed cylinders.

There is no hard and fast rule, but it would be beneficial for many companies to examine their processes, workflow and supply chain to determine whether a gas blender may be a potential opportunity to increase productivity while reducing costs. For Harris Products Group, experience has shown that the most successful approach is working closely with our clients to understand their specific process and tailor a cost reduction strategy around their needs.

CONTINUOUS GAS SUPPLY: REDUCING DOWNTIME AND INCREASING PRODUCTIVITY

It is estimated that more than 50% of the welding market uses packaged gas; either liquid dewars or high-pressured cylinders. And in that case, those companies should ask themselves whether it would be advantageous to invest in a system that provides continuous gas and never shut down.

These companies are not making money when they cannot weld. And with large-production companies, every minute of downtime is staggeringly costly.

In bulk gas systems, they come equipped with an alarm that goes off when the gas supply hits a certain, predetermined level. That alerts the gas supplier to send out a truck to refill the bulk system. But if you are using package gases, changing cylinders is an in-house job. And even more than the hassle, your revenue stream ceases during the time it takes to change the cylinder. So when a cylinder runs out, how long does it take to change it out? And how much money does that cost? Over time, it can add up.

However, this downtime can be removed from the equation by putting in a system with a continuous gas supply. These automatic changeover manifold systems have a gas supply on both the left and right side, with one as the primary supply and the other as the reserve. When the primary cylinder reaches a predetermined level of depletion, it seamlessly switches over to the reserve source leaving plenty of time to replace the empty cylinder(s). The former "reserve" side now becomes the new "primary" side and the system will switch back and repeat the process when the new primary side goes empty.

In addition, fully automatic changeover manifolds are becoming very popular and have been proven to be an ideal solution for high-pressure cylinders, liquid dewars and even bulk systems requiring a packaged gas backup. This manifold could be attached so that the bulk system is always the primary, but with a six or 12 pack of high-pressure cylinders in reserve in case they were unable to get a delivery of gas before their bulk system was depleted. For high-end, high-production companies, this would provide the security of avoiding downtime.

New technology is enhancing the capabilities of these automatic changeover manifold systems. With new systems in development, like DataSMART from Harris Products Group, these will be interconnected with data that can provide in-depth efficiency and usage analysis, as well as providing alerts at pre-set levels both internally and externally so that replenishment becomes automatic – Fig. 3.

Fig. 3 *Automatic switchover manifolds ensure a continuous supply of gas. Some systems, such as DataSMART™, provide detailed data on usage and other information to help users better manage gas consumption.*

Additionally, systems that plug into the Internet of Things, like DataSMART, could prevent waste by not only monitoring a cylinder or cylinder bank to determine whether it needs to change over to the reserve cylinder, but users could also easily program and adjust the changeover pressure settings for either side for further optimization. This would maximize gas usage and avoid sending cylinders back to the supplier with as much as 25% of the gas still left in them. DataSMART will feature a mass flow meter that will measure molecules of gas consumed in the process to determine gas usage.

FIND THE BEST FIT TO REDUCE YOUR GAS WASTE

If you want to control your welding process and shielding gas system, then you really need to understand how eliminating inefficiencies in your system can result in a significant cost reduction and ROI. By analyzing the data, you may be surprised to learn how much you are wasting on shielding gas annually. If you do not have sufficient gas-saving protocols in place, an investment based on your unique needs could be a potentially massive windfall for you. There are many options out there, so take advantage of the data that you have to find a solution that maximizes your efficiency and output.

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ABOUT THE HARRIS PRODUCTS GROUP

The Harris Products Group, a Lincoln Electric company with headquarters in the U.S., is a world leader in the design, development, and manufacture of cutting, welding, brazing, and soldering equipment, consumables and gas distribution systems. Products are sold and used in more than 90 countries.

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