

WA Technology

Optimizing Shielding Gas Use and Eliminating Waste Learning Program

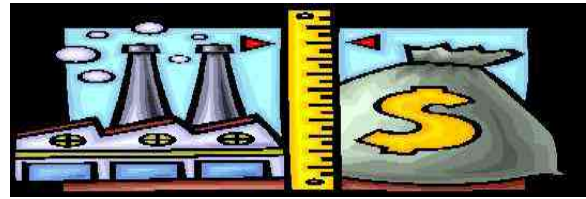
*Assign your lead welder, welding foreman or welding supervisor the task of measuring gas flow. Have them review the information provided in our **Lean Welding Manufacturing Tools Learning Program**. It defines the maximum shielding gas flow rates they should use. It shows them why excess shielding gas pulls air into the shielding gas stream making shielding quality worse not better. Have them measure flow on all welding machines and discuss desirable flow rates with all welding related employees.*

Setting the proper gas flow rate is very important. Unfortunately welders often follow the adage, "**If a little is good more must be better.**" Our training material outlines the **maximum flow that should be used** before your pulling air into the shielding gas stream. It defines **how much draft or wind can be tolerated** in MIG welding and why increasing flow beyond defined levels makes shielding worse.

With a little information from purchasing, each month total shop shielding gas usage divided by the pounds of wire used can be plotted. A simple way is shown to develop a 3 to 6 month rolling average of this ratio to raise a red flag when values increase. Benchmark data is provided for comparison.

Findings can be communicated to all those involved in welding by **posting a simple "Gas Usage" graph** on the manufacturing bulletin board that is easy to understand. Maintaining a focus on gas usage will help reinforce the waste and poor weld performance that will occur from excessive gas flow rates set by a welder or occurring at the weld start.

An understanding of **gas waste due to weld start surge** is presented and a simple solution defined. How this gas surge creates start problems is also discussed.



You'll Receive a 11 Module Learning Program That Includes:

- Over 120 pages of easy to read bullet points, figures, graphs and tables.
- Each page includes notes that help explain the key points
- Sufficient information to allow key personnel to understand the problems associated with gas waste.
- Training material they can use to educate all welders.
- Production data showing how weld quality improved with a reduction in weld start surge.
- A simple method to check gas flow rates at the welding torch and compare torch gas flows with those on a gas flowmeter or flowgauge.
- Example tables showing ways the data can be recorded and maintained.
- Information on why torch and flow gauge flow rates will be different. If significantly different, possible reasons and solutions are provided. The loss could cause poor welds.
- A suggested approach to plot usage data each month. This keeps the focus on gas waste problems and monitors results for each welding machine.
- Examples of gas usage and savings are provided and explained.
- Each Module has a short Quiz to test if the concepts and information provided is understood (answers are provided in a separate document.)

Persons taking this course will learn how a 0.035 "wire size" leak in a 50 psi gas pipeline or hose can cost over **\$14,000/year**.. Fixing one leak of that size will payback the cost of the program in 2 weeks !!

Module Titles and Outline

Module 1 - Overview and Summary Outline

- Summary of what is covered in each of the Learning Modules

Module 2 - Reasons for Gas Waste

- Average user of MIG welding uses 5 to 6 times as much shielding gas as necessary.
- Published references documenting losses.
- Reasons for losses:
- Excess gas surge at weld start creates waste and excess weld spatter
- Excess flow settings
- Leaks

Module 3 - Reasons for Gas Surge At Weld Start

- High Pressure in gas delivery hose creates excess gas surge flow
- Bernoulli equation
- Volume of excess gas in high pressure cylinder
- Reasons for high gas pressures
- Simple orifice can reduce surge flow but may not save significant gas!

Module 4 - Solution To Excess Start Gas Surge

- Simple solution, GSS
- How it works:
- Reason for surge reduction
- Features of each element
- Production examples
- Conventional applications
- Spool gun
- Installation
- Payback calculations

Module 5 - Why Extra Gas is Needed at Weld Start

- Need for extra gas at start
- Critical orifice
- Past solutions create other problems
- High pressure needed for automatic flow compensation
- Restriction orifice controlling flow at feeder creates two problems
- Restriction orifice stopping surge saves little gas
- GSS solves all problems with no moving parts

Module 6 - Setting Proper Gas Flow Rates (Why more isn't better)

- Flow that creates turbulence –TWI
- Tests to check flow needed to handle drafts
- Production result confirms benefits of surge reduction
- Minimum flow rates

Module 7 - Gas Leaks and Solutions

- Leaks in fittings
- Leaks in solenoid
- Leaks in internal feeder fittings
- Leaks in torch gas connections
- Leak in cylinder valve
- Leaks in pipeline
- Pressure decay test
- Other methods of finding leaks in pipeline

Module 8 - Comparing Overall Gas Use With Theoretical Need (and benchmark data)

- What is typical percentage of overall cost for shielding gas
- Defining your average wire deposition rate
- Comparing and plotting gas to wire usage ratio
- Using a 3 month moving average provides more usable data
- Compare your usage data with data from 7 benchmark graphs provided

Module 9 - Other Savings Ideas

- Significant gas savings allows use of two welders per cylinder
- Residual gas returned to the supplier
- Wrong Flowmeter reading
- Cost of cylinder handling

Module 10 - Advanced Topics

- Derivation of Bernoulli Equation for excess gas surge
- Principle of a critical orifice.
- Leaks out means air in!

Module 11 - Summary

- Summary and Quiz Answers

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