

Five Reasons for Welding Gun Failures and How to Prevent Them

Understanding how to properly set up and use a GMAW gun can eliminate problems

BY JEROME PARKER

Having the right equipment in the welding operation is important, and making sure it works when it's needed is even more so. Welding gun failures cause lost time and money, not to mention frustration. Like with many other aspects of the welding operation, the most important way to prevent this problem is education.

Understanding how to properly choose, set up, and use a gas metal arc welding (GMAW) gun can help optimize results and eliminate many of the problems that lead to gun failure.

This article discusses the five common reasons that GMAW guns fail and how to prevent them.



Being educated on the most common causes of welding gun failures, and how to avoid them, can help you optimize results while saving time and money.

Reason No. 1: Exceeding the Gun Rating

One of the most common reasons for GMAW gun failure is arc-on time that exceeds the gun's rating. This increases heat in the system and can burn up the gun. The rating on a GMAW gun reflects the temperatures above which the handle or cable becomes uncomfortably warm. These ratings do not identify the point at which the welding gun risks damage or failure.

Much of the difference lies in the duty cycle of the gun. Duty cycle is the amount of arc-on time within a 10-min period. Because manufacturers can rate their guns at 100%, 60%, or 35% duty cycles, there can be significant variances when comparing manufacturers' products. One manufacturer may produce a 400-A GMAW gun that is capable of welding at 100% duty cycle, while another manufacturer makes the same amperage gun that can weld at only 60% duty cycle. The first gun would be able to weld comfortably at full amper-

age for a 10-min time frame, whereas the latter would only be able to weld comfortably for 6 min before experiencing higher handle temperatures.

Choose a gun with an amperage rating that matches the duty cycle required and the length of time the operator will be welding — Fig. 1. It's also important to consider the materials and filler metal wire that will be used. The gun should be able to carry enough power to melt the filler metal wire cleanly and consistently.

Reason No. 2: Improper Setup and Grounding

Improper system setup can increase the risk of welding gun failure. It's important to pay attention to not only all consumable connections within the gun but also all connections in the entire weld circuit to optimize performance.

Proper grounding helps ensure the operator isn't sending too much power to a restricted window for the power to travel through. Loose or improper ground connections can increase resistance in the electrical circuit. Be sure to put the ground as close to the workpiece as possible, ideally on the table that holds the workpiece. This helps provide the cleanest circuit structure for the power to travel where it needs to go.

It's also important to place the ground on clean surfaces so there is metal-to-metal contact; do not use a painted or dirty surface. A clean surface gives the power an easy path to travel rather than create obstructions that produce resistance, which increases heat.

Reason No. 3: Loose Connections

Consumable connections play an important role in gun performance. Consumables should be tightly secured to the gun, and all threaded connections should also be secured. It's especially important to check and tighten all connections after a gun has been serviced or repaired. A loose contact tip or gun neck is an invitation for gun failure at that spot — Fig. 2. When connections aren't tight, heat and resistance can build up. Also, make sure that any trigger connection being used is working properly and provides constant power.



Fig. 1 — To avoid exceeding your welding gun's rating, select one that matches the duty cycle required with the necessary welding time.



Fig. 2 — Make sure consumables and all threaded connections are secured. A loose contact tip or gun neck can lead to gun failure at that spot.

Reason No. 4: Damaged Power Cable

Cables can be easily damaged in the shop or manufacturing environment, for example, by heavy equipment or improper storage. Any damage to the power cable should be repaired as quickly as possible. Inspect the cable for any cuts or damage; no copper should be exposed in any part of the cable. An exposed line of power in the weld system will try to jump the arc if it touches anything metallic outside of the system. This can result in a wider system failure and a possible safety concern. Rereminate the gun and make the cable shorter if necessary, removing any cable sections that have nicks or cuts.

Also be sure the power cable is the proper size for the power that the feeder is supplying to the welding gun. An oversized power cable adds unnecessary weight, while an undersized cable causes heat buildup.

Reason No. 5: Environmental Hazards

The manufacturing environment can be harsh for tools and equipment. Take care of tools and equipment to help extend their life. Skipping maintenance or treating tools poorly can result in failure and reduced life.

If the welding gun is connected to a boom arm above the welding cell, make sure there are no areas where

the gun or cable can be pinched or damaged. To avoid crushing the cable or disrupting shielding gas flow, set up the welding cell so there is a clear path for the cable. When the gun is not in use, employ gun anchors to help keep the gun in a good position and the cable straight, which is crucial for avoiding excessive strain on the cable.

Concluding Thoughts

Gun failures in water-cooled welding guns typically happen more frequently than failures in air-cooled gun models. This is primarily due to improper setup.

A water-cooled welding gun requires coolant to chill the system. The coolant must be running before the gun is started because the heat builds quickly. Failure to have the chiller running when welding starts will burn up the gun, requiring replacement of the entire gun.

Welder knowledge and experience regarding how to choose between these guns and maintain them can help prevent many of the issues that result in failures. Small issues can snowball into larger issues within the system, so it's important to find and address problems with the welding gun when they start to avoid bigger troubles later. [WJ](#)

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Maintenance Tips

Following some basic tips for preventive maintenance can help extend the life of the welding gun and keep it operating smoothly. It also helps reduce the chances of reactive emergency maintenance that can take the welding cell out of commission.

Regularly inspecting the gas metal arc welding (GMAW) gun can be an important part of reducing costs and gaining good welding performance. However, preventive maintenance doesn't have to be time consuming or difficult.

The following are easy tips to help you maintain your GMAW gun:

- **Check the feeder connection regularly.** Loose or dirty wire feeder connections cause heat to build up and result in voltage drops. Tighten connections as needed and replace damaged O-rings as necessary.

- **Properly care for the gun liner.** Gun liners can often become clogged with debris during welding. Use compressed air to clear any blockages when wire is changed. Follow the manufacturer's recommendations for trimming and installing the liner.

- **Inspect the handle and trigger.** These components typically require little maintenance beyond visual inspection. Look for cracks in the handle or missing screws, and be sure the gun trigger isn't sticking or malfunctioning.

- **Check the gun neck.** Loose connections at either end of the neck can cause electrical resistance that results in poor weld quality or consumable failures. Ensure all connections are tight, and visually inspect the insulators on the neck and replace if damaged.

- **Inspect the power cable.** Regularly checking the power cable is important to reduce unnecessary equipment costs. Look for any cuts or kinks in the cable and replace as necessary.