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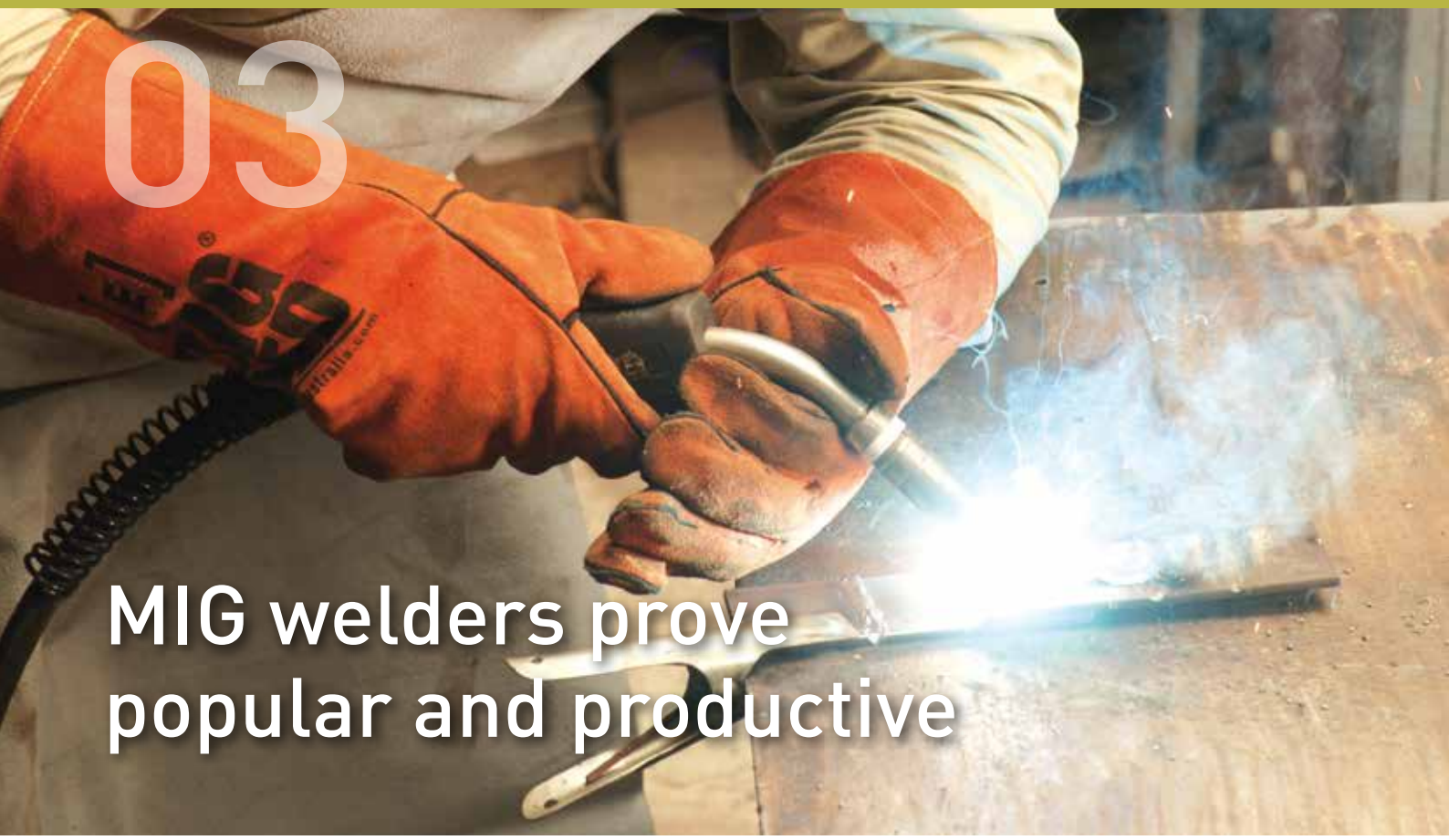

MIG welders prove popular and productive

MIG welders are a completely different animal compared to a stick welding unit. Filler wire is fed through the handpiece instead of using an electrode, and atmospheric gases are kept out of the weld using a shielding gas instead of the flux coating on a stick electrode. MIG welders are productive and produce neat welds, but are more expensive to purchase.

At a glance:

- MIG welders use a filler wire which is fed continuously through a handpiece to the weld.
- Gas is used to shield the weld instead of flux.
- MIG welders produce neat welds and can be more productive than stick welders.
- But MIG welders are not as versatile as stick welders and care needs to be taken to select a unit which is suitable for the tasks it is required to perform.

As metal inert gas or MIG welders become more compact and cost-effective, they are making the move out of large fabrication shops and into home workshops and farms.

MIG or wirefeed welding replaces the electrodes used in stick welding with filler wire which is automatically fed through the handpiece to the work.

MIG welders also use a different shielding method to protect the weld against atmospheric gases. Instead of using a flux-coated electrode like stick welders, MIG welders use shielding gas which is piped from a cylinder to the handpiece and is distributed around the weld pool during welding.

MIG, MAG or GMAW?

Metal inert gas or MIG welding is the term most familiar to users of wire feed welders. The name is derived from the use of inert gas in the weld shielding process. Inert gas does not react chemically with the weld metal.

Argon and helium are common inert gases used in MIG welding.

But often wire feed welding uses gas mixtures which are active and cause a chemical reaction with the weld metal. In this case the process is more correctly termed metal active gas or MAG welding.

For example, when welding common low-alloy steels, often argon is mixed with carbon dioxide (CO_2) which is an active gas.

Gas metal arc welding or GMAW is another term which collectively groups the MIG and MAG welding processes but is not commonly used.

To further confuse matters, MIG welders can be operated with a flux-cored wire, eliminating the need for shielding gas.

For simplicity, and to keep in line with convention, *The Welding and Metalwork Book* uses the term MIG welding to describe all these welding processes.

MIG versus stick welding

The differences between stick welding and MIG welding are not confined to the shielding methods and wire feed.

Even though both processes achieve the same result, MIG welders are different in other ways:

- MIG welders use direct current (DC) instead of alternating current (AC) common to earlier transformer-based stick welders.
- Arc length is controlled by the wire feed rate and voltage settings rather than the handpiece.
- Weld penetration and fusion is controlled by voltage rather than by current. Most MIG units have preset voltage levels which are not infinitely adjustable like the current on a stick welding unit. Current will vary depending on the voltage setting and wire feed rate.
- Travel direction is usually forward, or forehand, instead of backhand which is commonly used with stick welding.
- Lack of slag makes cleaning weld runs quicker. But this also means slag cannot help weld bead formation, especially

when welding out of position, such as during vertical welding runs.
- Welding is steadier because both hands can be placed on the handpiece.

MIG welders produce neat welds which are smooth and have little spatter because the gas shielding method eliminates slag.

If well-chosen and set up correctly, they are more productive than stick welders because they deposit metal at a faster rate and the operator does not need to stop regularly to change electrodes. But a small MIG welder may not finish work more quickly than a general-purpose stick welder because smaller MIG welders usually have a lower duty cycle.

Because there is no slag, MIG welds require little cleaning before running more welds on top. Once the welding unit is set up correctly, it is easier to produce successful welds because there are less variables that rely on the operator's control over the handpiece than stick welding.

Welding thin steel is easier with MIG units, making them a popular tool for repairing vehicle panels.

In addition to the large range of metals they can weld, MIG units can also weld aluminium which stick welders generally cannot.

With large volumes of work MIG welding will be a cheaper option than stick welding. Even though the rental and refilling of the gas cylinder is an extra expense, the filler wire is cheaper than welding electrodes.

For example, a 15-kilogram spool of MIG wire costs about $35 while a 5kg pack of electrodes costs about $30.

MIG welding also makes more efficient use of filler metal, with more than 90% of the wire actually transferred into weld metal compared with about 60% for an average stick welder electrode.

MIG welders allow the operator to use both hands on the welding handpiece for greater control.

While many MIG welders use shielding gas and are confined to indoors use away from the breeze, a new range of ultra-portable units have hit the market. These are ideal where extreme portability is required, and can be used outdoors with flux core wire, which produces its own shielding gas.

Disadvantages

The most obvious drawback to owning a MIG welder is its price. As a general rule, a MIG welder capable of handling the same work as a standard stick welder will be about three times more expensive.

It costs more than a stick welder because it is a more complex machine. If the required work volume is small, the hire and filling of the gas bottle may not be offset by the lower cost of consumables and faster work rate.

Another disadvantage is that welding cannot continue when the gas bottle runs out. If handling a large volume of work and the gas cylinder depot is not conveniently located, it may be worthwhile keeping a spare full cylinder on hand. The other option is to keep on-hand flux-cored wire, which can be used without a shielding gas.

Also, MIG welders are not as versatile as stick welders. Changing the welder set-up for different metals requires the tedious task of installing a new wire spool and possibly changing the shielding gas.

The complexity of the wire feed unit adds to the likelihood of a breakdown as there are moving and wearing parts that will eventually need replacing. A stick welder has no moving parts so does not wear.

When working outside, even is slightly windy conditions, shielding gas is easily blown away, resulting in poor welds. Using flux-coated wire can overcome this problem.

Choosing a MIG welder

MIG welders come in many sizes. Some larger units have a separate wire feed unit which usually sits on top of the welding unit but can be shifted into tight areas instead of the whole welder if space is a problem. Other units have the wire feed incorporated into the main welding unit.

Generally large 240-volt units are the most suitable for welding in the workshop. A unit that can supply a current of 200 amperes or more with a 100 per cent duty cycle of at least 150amps will meet most needs.

Smaller MIG units are available for less than $600 but are only useful for welding steel of up to three millimetres thick because they have a low output and duty cycle.

They are best suited to repairing vehicle panels, which are usually thinner than 1mm.