

In an ideal weld

While MIG has superseded MMA welding in most industries, a shortage of skilled welders is resulting in defects and poor productivity. Welding technologist and senior inspector David Keats offers advice

You don't have to be a welding expert to know that in every fabrication shop up and down the country at every level from DIY to high-tech, the MIG welding process is used, and for very good reasons. MIG has all but replaced manual metal arc (MMA) welding, and in a fabrication environment has completely replaced oxyacetylene welding in all but in the smallest of vehicle body shops. In its simplest form, it hasn't totally replaced MMA where pressure vessels are concerned. Although in its high-tech form 'synergic,' the process provides solutions to some of its weaknesses. Synergic may best be described as 'pulsed' current control.

The MIG welding process clearly offers major advantages over MMA, not least of which is a massive increase in productivity and yes, it is easier both to learn and to use.

Increased potential for defects

Because the process is 'semi-automatic,' however, it does mean in less experienced hands the potential for weld defects is actually increased. In real terms, producing high quality

unnoticed until a failure occurs. Out of all the welds or welders we test, MIG has the highest failure rate; only 20% of the welders we see are able to ensure adequate root fusion on their first attempt. In the main, this is due to this 'semi-skilled' mentality.

MIG welding, being semi-automatic, controls voltage and wire feed speed automatically, thereby, controlling arc length/burn off rates automatically. Where MIG welding is used, a high percentage of welders will be self-taught or at best semi-skilled.

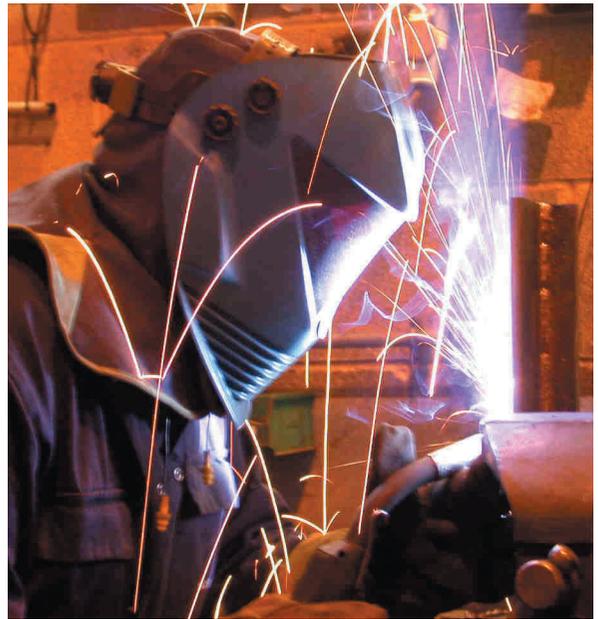
This 'semi-automatic' principle of operation does not mean the process is 'semi-skilled,' although the machine will accommodate an inappropriate or less than ideal setting, thereby, permitting a weld to be made by inexperienced welders.

A MIG power source has a 'flat' characteristic or constant-voltage output. This means you can see a large change in current for a small change in voltage so the power source controls arc-length. If this were left to the welder as in MMA, the change in current would be so large it would not be possible to produce acceptable welds. Therefore,

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welds by MIG welding should be no easier than any other welding process, but because the operating parameters and controls for the machine are easier to select/control the process can provide the illusion of creating a successful weld, when the reality may be quite different. Even in the hands of an inexperienced welder it is possible to produce 'acceptable' welds in a very short period of time. As we don't have the bank of skilled welders we once had, manufacturers have to source welders wherever they can. Personnel employed in one discipline are often asked to master several, usually without the benefit of formal training.

Because of the undoubted benefits of MIG welding, the process is often the only sensible solution when it comes to production environments. However, it is these very benefits that are now affecting industry, through an increase in weld defects, which tend to go



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in all semi-automatic welding the arc-length and the 'burn-off' rate are controlled by the machine.

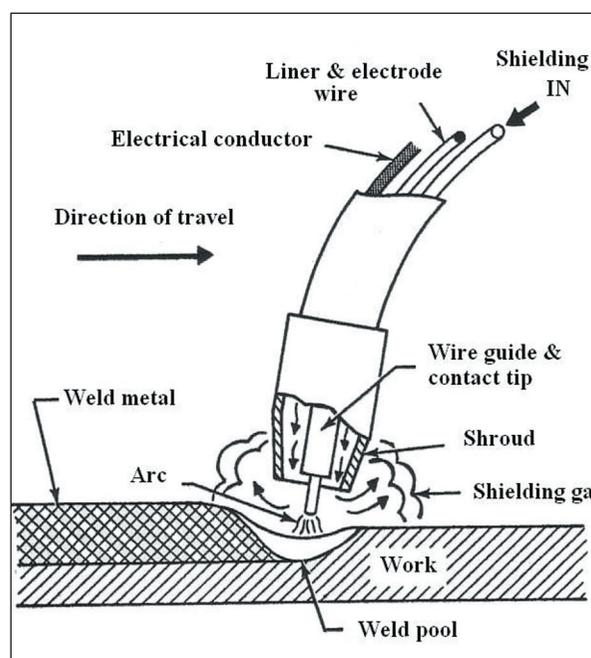
The burn-off rate increases as the arc-length decreases so as to rapidly compensate for the increase in current from I1 to I2. This response rate needs to be extremely rapid. Of course the welder needs to try and maintain a consistent 'stick-out' length – the distance from the contact tip to the work piece.

Operating to best potential

If you cannot answer the following basic questions or are not familiar with the terms, the chances are you are not operating the process to its best potential and weld defects and poor productivity will be inevitable:

- How many methods of transfer does MIG welding provide?
- What do the terms 'dip', 'globular', 'spray' or 'pulsed' mean to you?
- Are you familiar with the term 'inductance' or 'choke'?
- How is amperage selected for MIG welding?
- What are the settings on the front panel on a MIG machine controlling?
- Do you always get high levels of spatter when welding?
- What gas flow rate should be selected?
- What is the importance of the contact tip and weld quality?
- How do you need to set the feed roller pressure?

There is a need to train welders so they better understand the process and can select the correct welding parameters. Speciality Welds can help you improve your skills, productivity, quality and costs.



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