

Australian breakthrough in the traditional design of welding tips is allowing manufacturers globally to improve their welding operations using existing equipment.

The MIGfast welding tip was the result of four years of R&D initiated in the Cooperative Research Centre for Welded Structures with the original design by the CSIRO. The Australian manufacturing company, MIGfast, has successfully obtained patents on the design worldwide.

The tip is compatible with existing torch brands to allow simple and cost effective take-up of the technology. It significantly advances the control of the arc by creating a single point of contact within the copper body via a metallic insert and a ceramic insulator, leading to the following improvements:

- **Longer tip life:** resulting in downtime reduction, constant weld position and overall cost reductions.
- **Higher deposition rates:** reducing welding times; covering larger cross sections and achieving less distortion.
- **Improved arc stability:** reducing spatter for less clean up and equal penetration at higher travel speeds.

How traditional tips work

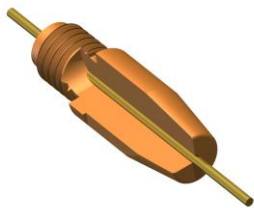


Fig 1. Traditional design

The traditional design consists of a hard drawn copper body with a machined through bore that is allowed to wear as the current passes through it (Fig. 1).

There are essentially two mechanisms responsible for melting wire consumables in GMAW.

1. Heating of the wire by the electric arc established between the end of the wire and the surface of a weld pool.
2. Preheating of the wire by the current established after the wire makes electrical contact with the contact tip.

With conventional tips the contact point can shift along the bore, causing large fluctuations in the voltage. This results in an unstable arc and a restricted wire melting rate (Fig. 2).

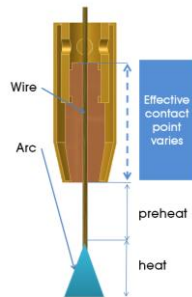


Fig 2. Limitation

MIGfast: A welding tip that improves performance, allowing better control of your welds.

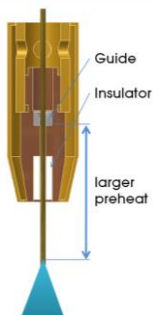


Fig 3. New structure

The MIGfast contact tip has improved control between the electrical contact and the wire, giving more stable operating conditions when welding with pulsed or constant voltage power supplies (Fig. 3). This is achieved via a geometric structure, made up of a body, guide and insulator. The wire is guided through the tip and only comes into contact with a single point along the copper bore, providing a stable contact point and creating a stable arc.

Eliminates ovalisation at the exit point of the tip

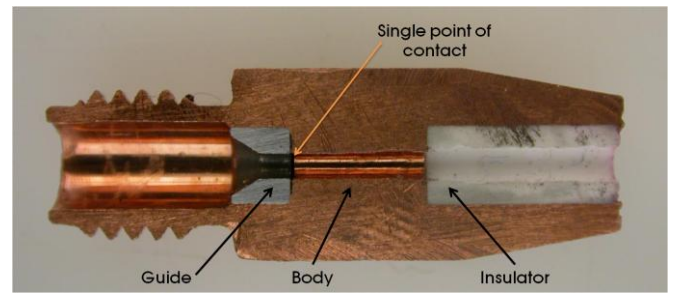


Fig 4. MIGfast tip

The guide system projects the wire to a single point in the copper bore, whilst the ceramic insulator prevents any further contact. The ceramic insulator also eliminates ovalisation at the exit point of the tip, ensuring greater accuracy in positional control of the weld throughout the tip's life. The guide, made from a hard wearing material, also provides a load bearing function for the wire, limiting the wear of the copper.

The uniquely engineered design (Fig. 4) overcomes the limitations faced with conventional tips by maintaining a constant contact point within the tip, increasing the preheating of the wire before the arc. The additional preheated wire allows the droplets to absorb more heat while passing through the arc, giving a smoother transfer into the weld pool.

Significant weld time reductions

Ø1.2mm wire	Tip speed (m/mln)	Wire feed speed (m/mln)	Arc on time (sec)	Current	Voltage
Standard	0.60	6	202	220	21
MIGfast	0.80	7.98	158	220	21
Difference	+33%	+33%	-22%		

Table 1. Case Study

The above table (1) are results of a case study done by a company comparing a standard welding tip with the MIGfast tip. The study was conducted on a robotic weld cell using the same amperage and voltage. As can be seen, the MIGfast tips reduced arc time by 44 seconds per cycle resulting in an extra 8 units a day, a 15% increase in output. The reduction in spatter allowed the units to go straight to paint without the need for manual cleaning or sandblasting.

Other industry results show extended tip life of approximately 5 times over conventional tips and deposit rate increases on average of 25%. Weld quality is also noticeably improved.

Commercial benefits to the welding industry

The end users are taking advantage of this in various ways; the tips extended life reduces the annual tip consumption purchased; for the same length of weld the increased deposit rate leads to significant weld time reductions; and smoother transfer into the weld pool reduces spatter, making cleanup easier. Robotic users have noted the arc stability has reduced the rework associated with burn-throughs in sheetmetal work.

Underlying advantages in using the tip also result in less distortion, constant weld position and ease of depositing fillet and butt welds in much quicker time with less heat input, whilst still maintaining the same penetration.

This state of the art welding tip is of benefit to both manual and robotic MIG welding users. It is also compatible with flux core wire.

MIGfast welding tips are available in various sizes. For further information on MIGfast welding tips please contact MIGfast Pty Ltd Tel. (03) 9238 5900 Email enquiries@migfast.com or visit their website at www.migfast.com