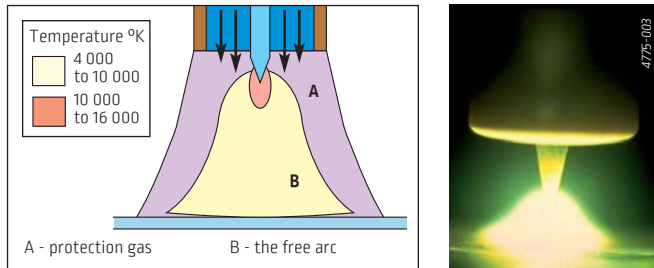


WELDING PROCESSES

TIG Technology

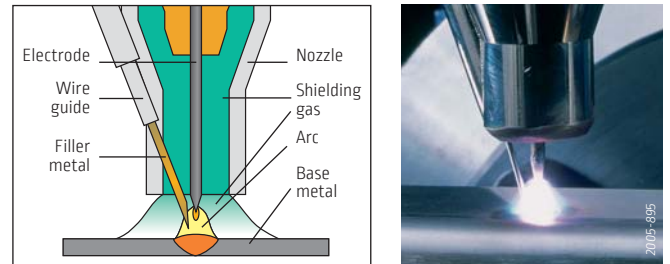


Metals are fused together by heating them with an electric arc. The electric arc is established between a non-consumable (does not melt) tungsten electrode and the workpiece. A filler metal may be used depending on the joint design. The molten metal is shielded from the atmosphere by a stream of inert gas supplied through the torch. The resulting deposited weld metal has the same integrity as the base material. This welding process is used for welding of carbon steel, stainless steel, aluminium, titanium, copper...

The benefits are:

- Good weld bead appearance,
- Aluminium weldability,
- Adapted for fine thickness,
- Welding in all positions.

TOPTIG Technology

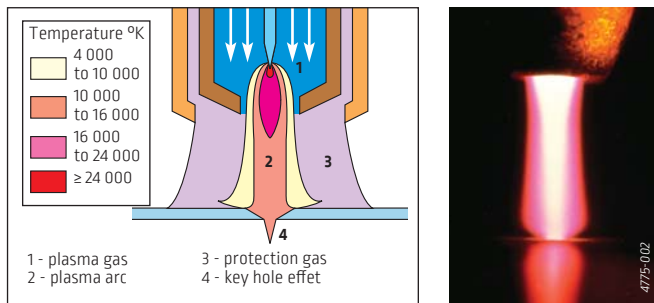


Based on principle of TIG process, an additional filler metal is fed through the nozzle directly into the arc with an angle of 20° to the electrode. This concept guarantees a high deposition rate and an efficient metal transfer. This welding process is used for welding of carbon steel, stainless steel, titanium, inconel, electro-galvanized coated steel (brazing)...

The benefits are:

- TIG high quality welding and guaranteed spatter free,
- Good global productivity,
- Excellent appearance of the weld bead,
- Torch accessibility and welding in all positions.

PLASMA Technology



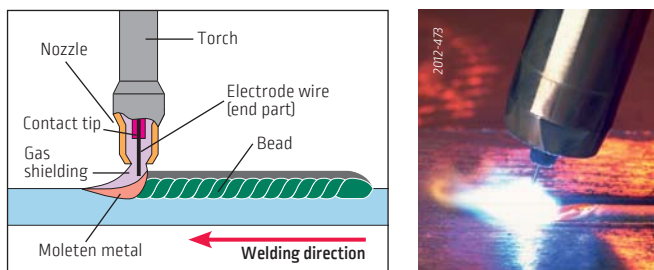
The contribution of energy necessary for welding is ensured by an electric arc in an atmosphere of plasmagene neutral gas. This arc established between an infusible electrode and the parts to be assembled is forced

through a nozzle which constricts it mechanically and pneumatically. This welding process is used for welding of carbon steel, stainless steel, duplex, titanium, Inconel, nickel and alloys...

The benefits are:

- Reduction in the preparation times for assemblies by eliminating bevelling for thicknesses up to 10 mm,
- Joint quality: Complete and regular penetration guaranteed, 100% X- ray quality,
- Reduction of the heat affected zone thanks to the arc concentration,
- Respect of the base material chemical composition,
- Low distortion,
- Reduction or elimination of finishing operations,
- Excellent visual aspect.

MIG/MAG Technology

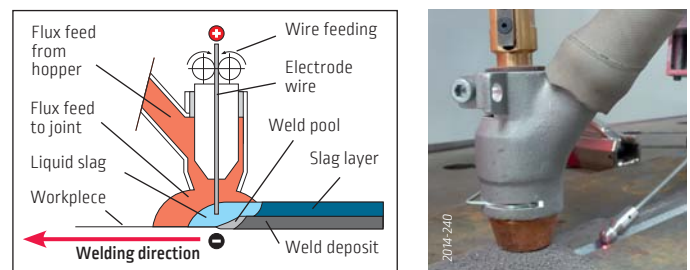


An electric arc forms between a consumable wire electrode and the workpiece (metal) which heats the workpiece metal causing them to fuse. The arc and weld pool are shielded by an inert or active gas. Metal is transferred in the form of drops through the arc towards the workpiece. This welding process is used for welding of carbon steel, stainless steel, aluminium, copper...

The benefits are:

- Easy implementation,
- High welding speed,
- Welding in all positions,
- Low welding investment cost.

SAW Technology



Similar to MIG/MAG welding, SAW involves the formation of an arc between a continuously fed wire electrode. Covering flux is used to generate protective gas and slag protecting the weld metal. The flux can also help donate alloying elements. It is dedicated mainly for flat and fillet welding. This process is generally used for the welding of materials as carbon steel and stainless steel.

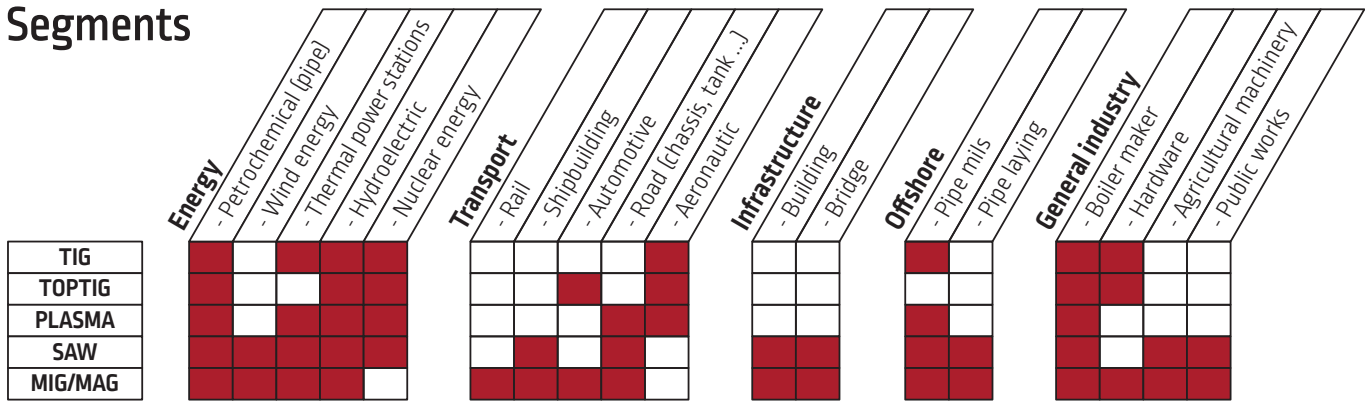
The benefits are:

- High deposition rates,
- High penetration,
- Large execution speeds obtained by the use of high currents on one or more electrode-wires,
- Excellent compact joints with good mechanical properties,
- High duty cycle,
- Operator comfort: low fumes and invisible arc.

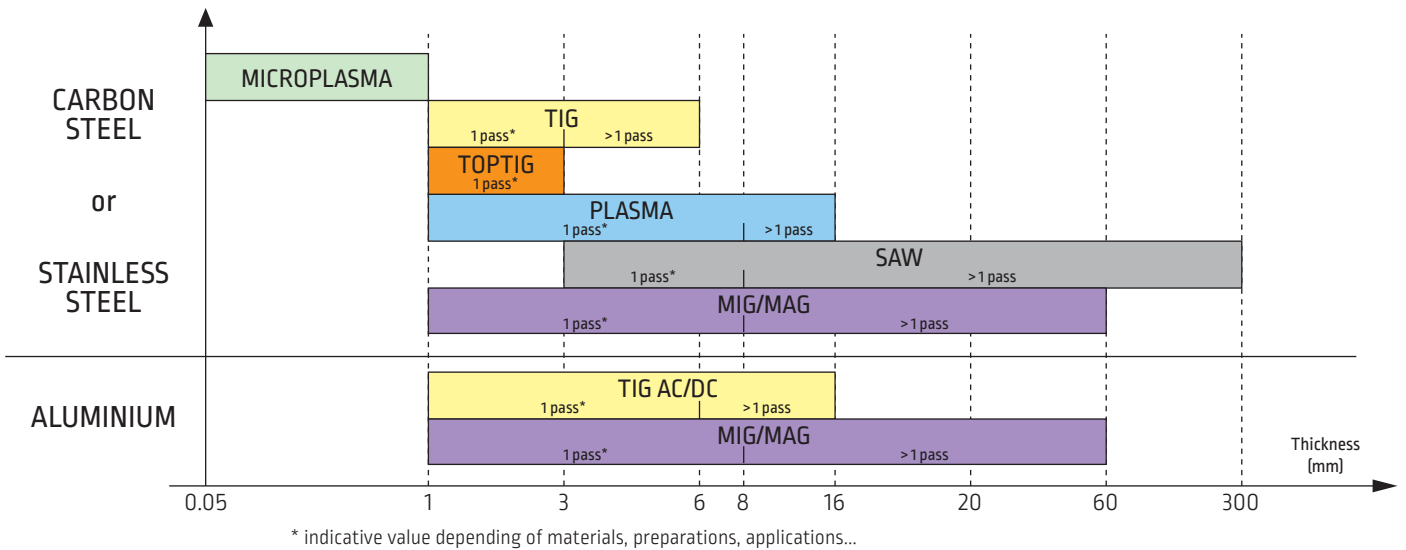
Lincoln Electric offers a large choice of welding processes through its products.

Several criteria allow to define the best process adapted to the customer application, function of materials, thicknesses, technology, quality and productivity required.

Segments



Welding performances



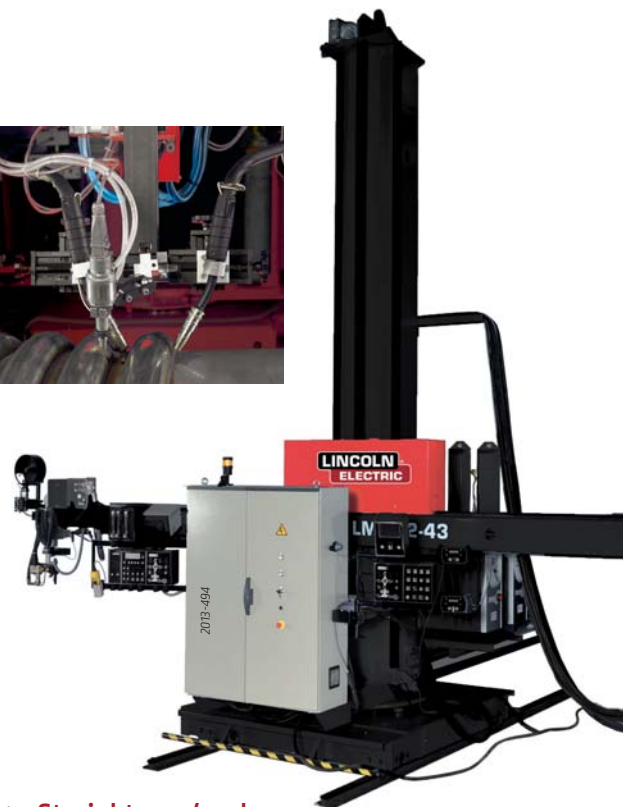
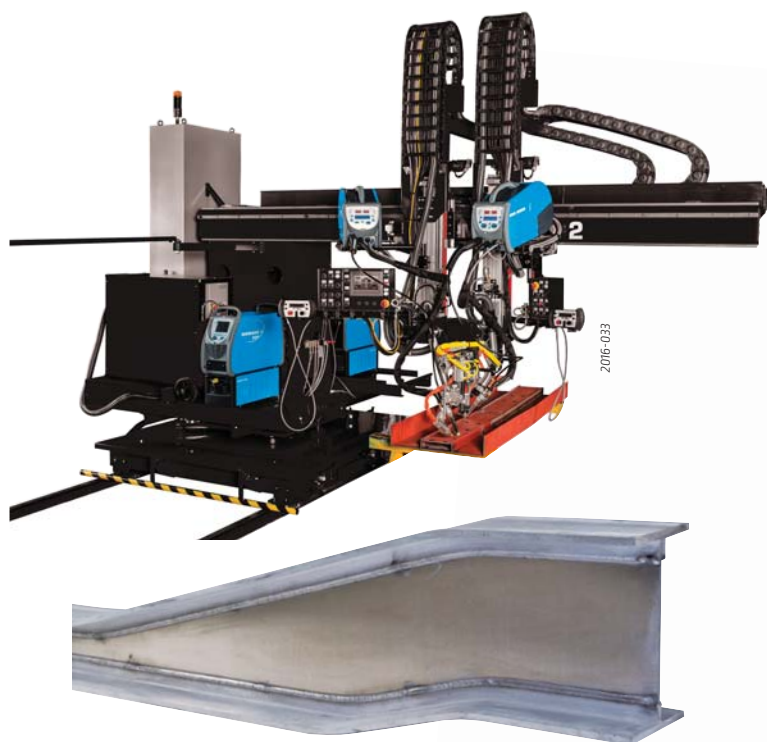
Comparison of the main welding processes

Choice criteria	PROCESSES				
	TIG	TOPTIG	PLASMA	SAW	MIG/MAG
Quality	●	●	●	●	●
Speed	●	●	●	●●	●●
Spatter	●	●	●	●	●
Completion	●	●	●●	●	●
Cost	●	●	●	●	●●

● Excellent
● Good
● Fair

MIG/MAG MACHINE RANGE

The **MIG/MAG** applications are used in various domains from the simple carriage for shipyard industry to large gantry for train manufacturing. The choice of the machine depends mainly on the size of the piece to weld. **Lincoln Electric** propose solutions according your need.



The **Straightener/cooler MIG/MAG application** is often combined to the food tanks manufacturing with plasma process.



The MIG/MAG **Autonomous welding head installation**



The **Autonomous carriages** allow the longitudinal and circular welding of large vessels. They are also often used in the shipyard industry.

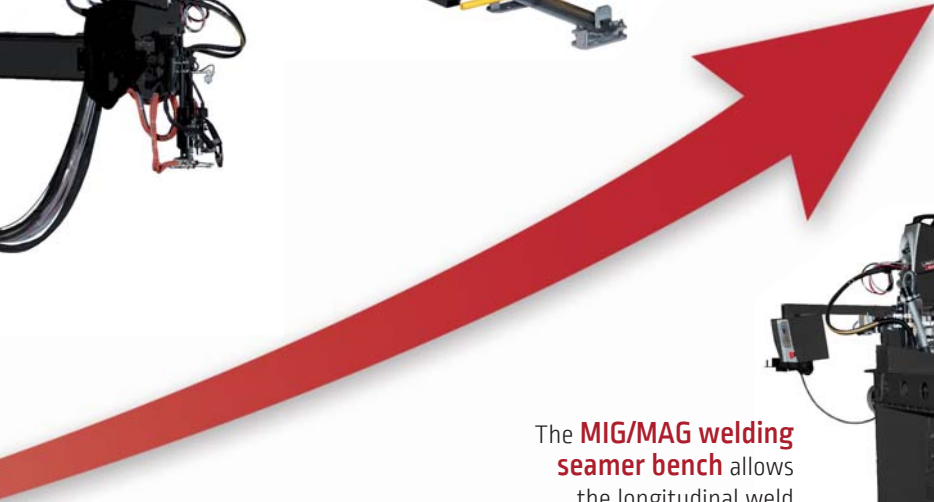


2011-377LE

MIG MAG welding aluminium Gantry with two torches to answer applications requiring a high level of productivity with large pieces such as the manufacture of railway wagons.



2231-62



The **MIG/MAG welding seamer bench** allows the longitudinal weld of sheet metal or tanks.



2010-782LE



2006-248LE



The **Turning electrode** is a simple solution for small circular welds with MIG/MAG torches.



2231-40

MIG/MAG EQUIPMENT

DIGIWAVE III 520-R

DIGIWAVE III 520 A or R versions and wire feed unit DVU-R500

A for automation: level 1 (start/stop cycle ; analogic settings for U and I)

R for robotic: fieldbus communication

With its smart design, its color screen and its innovative communication interfaces, the **DIGIWAVE III** concretizes the most recent technologic breakthroughs and positions itself at the cutting edge of the welding techniques.

Main characteristics and advantages:

- Digital precision and outstanding welding performances,
- Full range of processes for all applications: Speed Short Arc, Pure Controlled Metal, Pulse, Soft Silence Pulse, Spray Modal, High Penetration Speed, Advanced Sequencer, MMA coated electrodes, Gouging up to 8 mm,
- More than 200 synergic curves with possibility to realize yourselves up to 50 customizable curves,
- Storage up to 100 welding programs,
- Traceability of the welding parameters,
- Control process: you set yourselves the control thresholds of the welding parameters not to go above, and you are warned in real time as soon as a fault is detected,
- User management and locking mode,
- Monitoring with USB, Ethernet,
- RC JOB II for remote control,
- DVU-R500 is only 6,1 kg and 4 rollers drive.



DIGIWAVE III 520-R	
Duty cycle at 100%	450 A (at 40°C)
Primary power supply	3 x 320 - 480 V / 50-60 Hz
Max primary consumption	28.5 A
Current range	15 to 500 A
Weight	40 kg
Dimensions (W x L x H)	273 x 736 x 1 521 mm

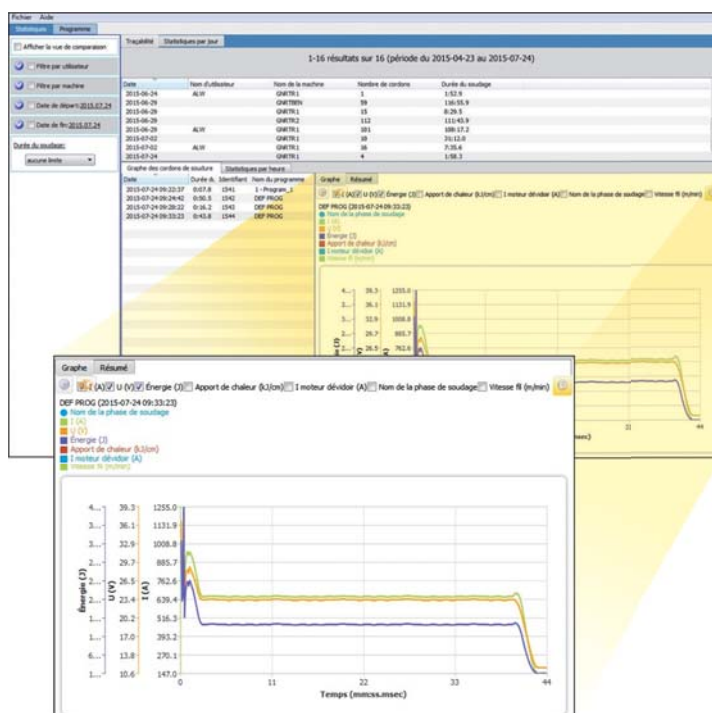
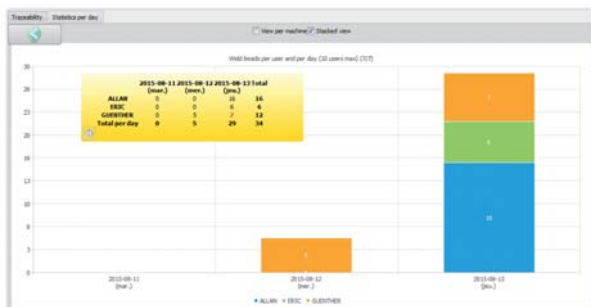
DIGIWAVE III Software solutions



Supervising Welding Administrating Network

A software solution to allow better traceability to ensure quality level:

- Follow the production,
- Compare weld beads,
- Get curves and statistic on welding parameters,
- Heat input,
- Identification of the bead by unit number.



POWER WAVE® S500 CE

Powerful Multi-Process Capability.

The multi-process **Power Wave® S500 CE** is packed with **Lincoln Electric** performance technology for welding on thicker materials. It provides an extremely fast arc response, includes over 65 standard welding waveforms for optimized performance on almost any application and efficiently converts input power to reduce operational costs.

Power Wave® S500 CE proposes advances MIG-MAG welding process as:

- Pulse,
- Pulse-on-Pulse®,
- Power Mode®,
- RapidArc®,
- Rapid X™ (With STT® Module),
- Rapid Z™,
- Upgradable for additional processes to be developed in the future.



AUTODRIVE®
4R100 wire drive



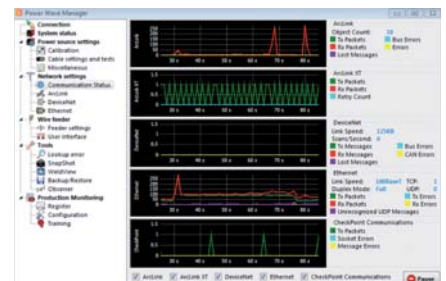
User
interface

POWER WAVE® S500 CE	
Duty cycle at 100%	450A / 36,5V
Primary power supply	200 / 208 / 220 / 230 / 380 / 400 / 415 / 460 / 575V 3 / 50 / 60Hz
Max primary consumption	60 / 54 / 30 / 27 / 21 A
Current range	5 to 550 A
Weight	68 kg
Dimensions (W x L x H)	355 x 630 x 571 mm

Power Wave® Software Solutions

Power Wave Manager

- Check the status of every component in your welding system.
- View and easily adjust the information associated with your welding operation.
- Setup the configuration of the different components of the welding installation.
- Display of all real-time measurement values like voltage, ampere, wire feed speed, torque.



CheckPoint™: Welding Production Monitoring

CheckPoint's secure, cloud-based access allows key stakeholders to view and track welding operations anywhere in the world, on any device:

- Track real-time weld production data 24/7.
- Create custom alerts and notifications.
- Operator Arc on Time.
- Material Consumption.
- Weld and Assembly Information.

Production monitoring™

Production monitoring monitors a lot of information for the management of the customer production.

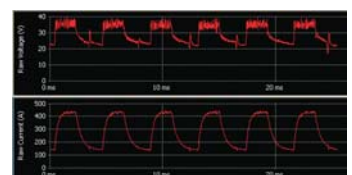
- Current status and shift analysis.
- Weld listing and downtime analysis.
- Monitoring by Weld ID, Employee ID or Consumable Lot ID.

Weldscore™

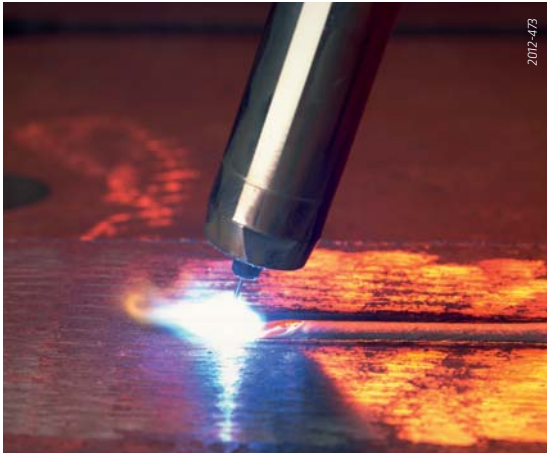
Allows you to score each weld based on a trained sample of acceptable welds.

Great for:

- Expanding quality control capabilities,
- Trade school monitoring, grading and final examinations,
- Critical welds with specific quality control requirements,
- Operator testing and certification programs or Consumable Lot ID.



MIG/MAG EQUIPMENT



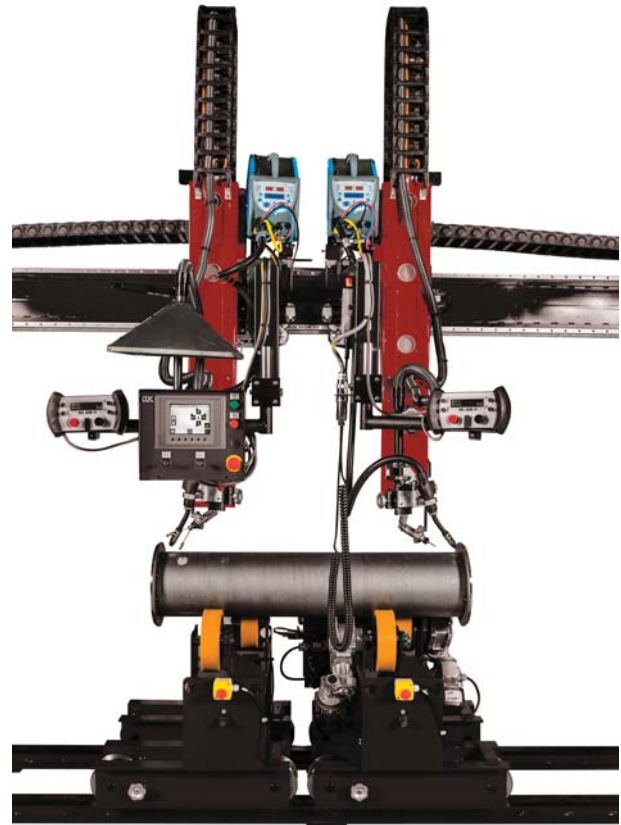
2012-473

Options for all types of installation

Torches

Water cooled torches dedicated for automatic welding MIG/MAG installations.

- Excellent cooling up to the nozzle holder,
- Good gas protection with the long shape of the nozzle.



2016-414

Characteristics	TM 501W	TR 600	TM 700
Duty cycle	500 A at 100%	400 A at 100%	700 A at 100%
Wire diameter (mm)	1 to 2.4	0.8 to 1.6	1.2 to 3.2
Harness length (m)	1 to 2.5	1 to 4	Without - direct connection
Version	Straight or curved 22 or 45°	Straight or curved 22 or 45°	Straight
Option	-	-	Additional gas protection for light metal alloy



2011-446



2003-085



0725-026

Seam tracking

TRACKMATIC device guarantees the good positioning of the torch in the joint to be welded without operator intervention. A sensing probe finger or an inductive sensor allows joint tracking (height or alignment) and commands the necessary corrections required to the torch trajectory. It ensures a constant weld quality, an increase of productivity, a reduction in repair operation and easier use for the operator.



2010-554

Video camera

The video system **VISIOARC VA2** including protection against spatters and fumes, can be easily integrated. It uses a greatly enlarged image which enables the precise position of the welding torch to be viewed thus making the operator's work easier and improving the quality of the welding operation.







System with large color screen 15", miniaturised camera and additional lighting.



2014-105

MIG/MAG CARRIAGES

Carriages for MIG/MAG welding

			
WELDYPOCKET	WELDYCAR	WELDYSTIFFENER	WELDY-RAIL
Autonomous carriage with rechargeable battery. MIG/MAG welding with manual equipment.			
Flat position welding, small footprint. Basic application, easy implementation.	All positions welding (permanent magnet). Exists in 2 models: - WELDYCAR - speed 5 - 140 cm/min, - WELDYCAR PRO - speed 5 - 140 cm/min, with programming (continuous welding or not).	Welding with 2 manual welding torches. Programmable carriage. Exists in 2 models: • for height: 60-160 mm, • for height: 120-320 mm.	All positions welding of carbon steels, stainless steels and aluminium. Exists in 2 models: • WELDY-RAIL manual, • WELDY-RAIL with linear oscillating. 2 rail models: • Magnetic rail, • Pneumatic rail.
Applications	This carriage is used to facilitate the implementation of a regular welding. Boiler making in carbon steel.	Angle, butt, overhead and vertical welding with guidance by crabbing arm. 	Welding of stiffeners in ship yards. 

Main features

Carriage speed	15 - 120 cm/min	5 - 140 cm/min	15 - 180 cm/min	5 - 80 cm/min
Di mensions (L x l x h)	140 x 240 x 220 mm	250 x 300 x 260 mm	500 x 500 x 600 mm	220 x 270 x 230 mm
Weight (netto)	5 kg	11 kg	16 kg	7 kg
Options	Arc protection	Pendular oscillating unit. Linear oscillating unit. Magnetic crabbing rails, aluminium wheels... many other options on request.	-	Linear oscillating unit for WELDY-RAIL manual.

Thanks to a modular design, the carriages can be used in different configurations.

