LINC-MASTER

Plasma & TIG Welding System

LINCOLN® ELECTRIC

PLASMA & TIG PROCESS

Applications

This installation meets the highest quality standards for welding and productivity for industries as diverse as boiler-making, aeronautics, chemical engineering, energy production, transformation and transport as well as prefabrication of gas and petrol pipelines.

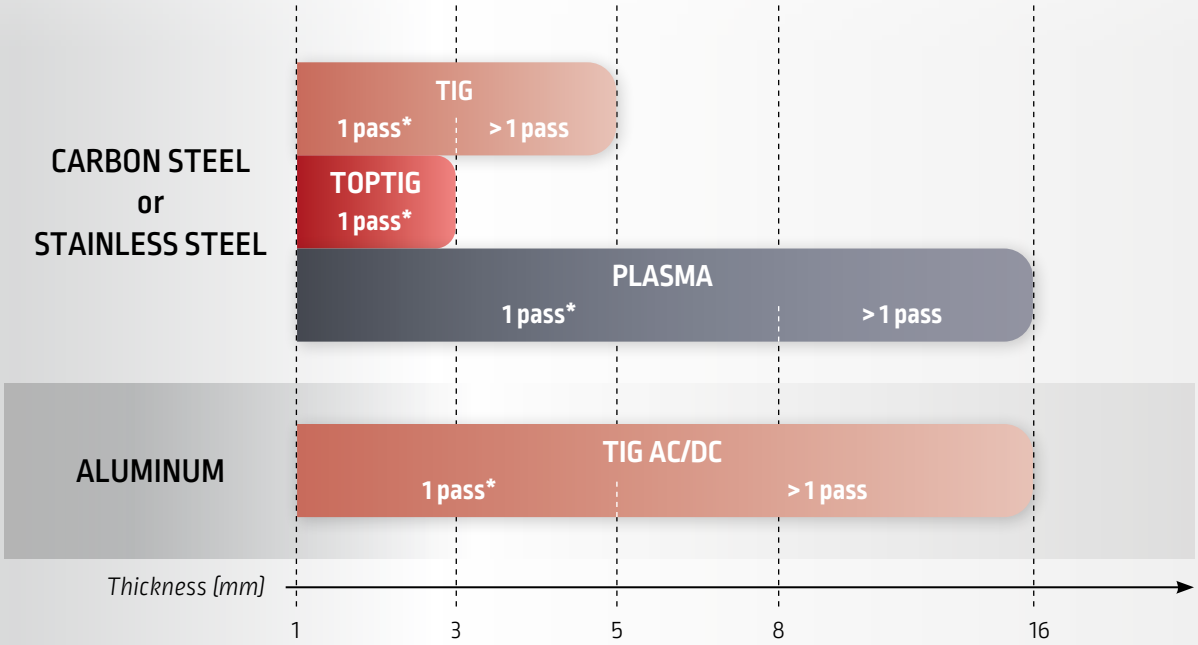
Welding processes

The Linc-Master welding installation enables the following processes to be used in automatic applications:

- DC TIG
- DC plasma
- AC TIG
- DC TOPTIG
- Tandem configuration Plasma + TIG

All these processes can be performed in smooth or pulsed current.

Welding performances



** Indicative value depending of materials, preparations, applications...*

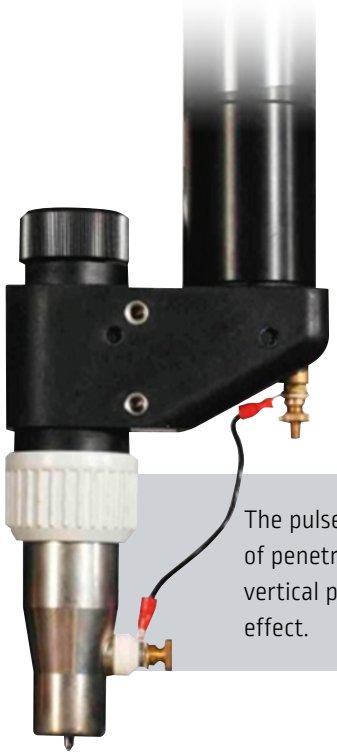
TIG PROCESS

Applications

This process meets the highest quality standards for industries as diverse as storage tanks, food industry, transport, structures and ship building.

For carbon steel, stainless steel, titanium and inconel the TIG DC is ideal for thicknesses up to 3mm.

For aluminum, technique of TIG AC is applied for thicknesses up to 5mm.



Benefits

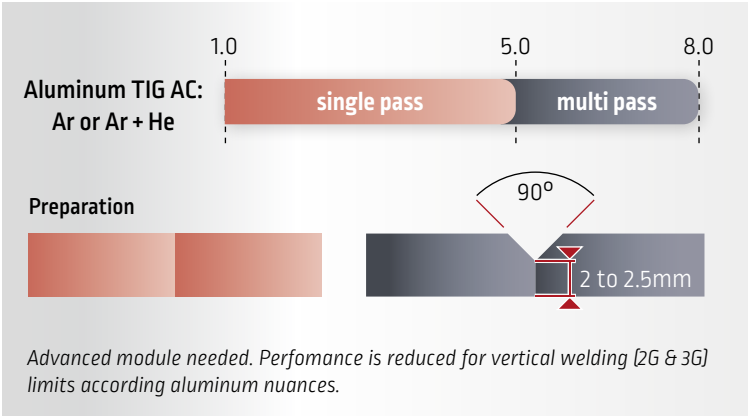
- Beautiful bead appearance
- Accurate for thin layers
- Welding in all positions

The pulsed mode allows greater control of penetration, welding in cornice or vertical position and gives an aesthetic effect.

Aluminum TIG performance

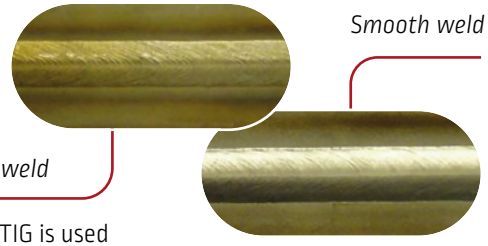
Single pass TIG performance

Maximum thickness weldable, flat with butt-joint.



Advanced module needed. Perfomance is reduced for vertical welding (2G & 3G) limits according aluminum nuances.

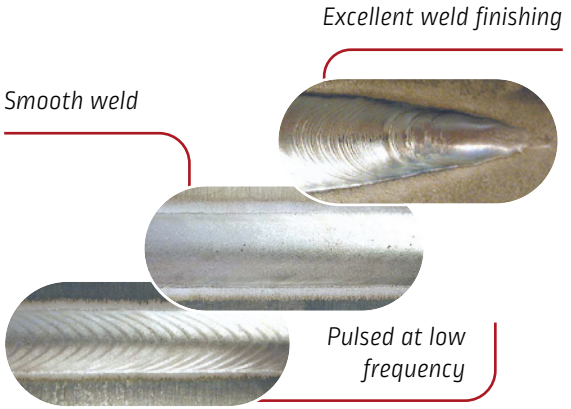
Smooth or pulsed DC



Pulsed TIG is used for welding in position and for an aesthetic appearance of the weld.

Variable AC TIG polarity

The flexibility of variable polarity lies in the total independence of the welding and deoxidising parameters. This results in better control of the weld pool and better weld bead appearance.



DC TOPTIG PROCESS

Applications

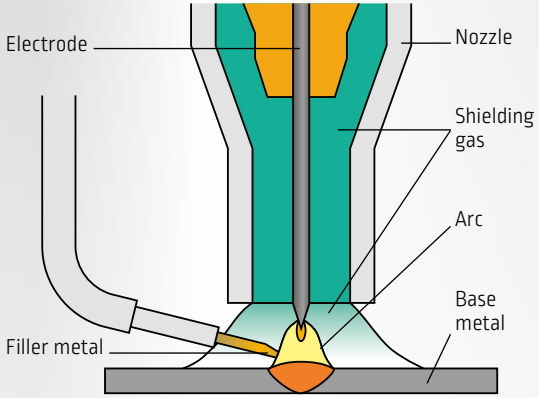
TOPTIG process is a major innovation in the world of automatic welding. Developed in the Lincoln Electric research center, TOPTIG is a process that can be used effectively on carbon steel or stainless steel plates up to 3mm or on galvanized sheets with weld brazing.

The activity sectors are:

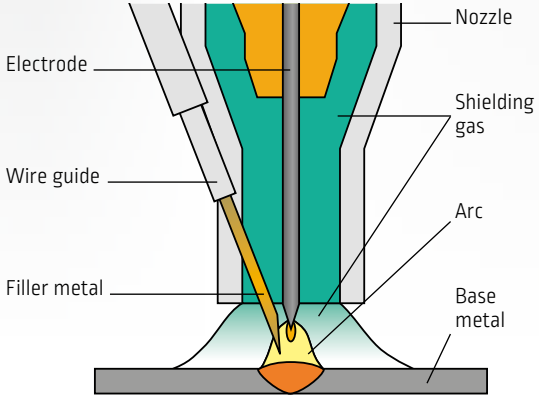
- Automotive subcontracting.
- Metal furniture.
- Fine boiler making.
- Aeronautics subcontracting.

Process Principle

TIG standard



TOPTIG



Benefits

- Finished bead appearance from the first pass.
- Compact torch.
- Improved deposit rate up to 3kg/hour.
- Welding in all positions.

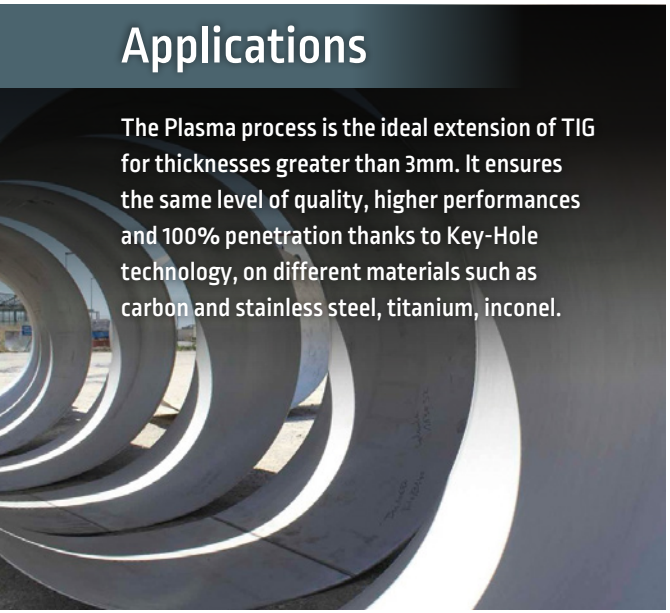
Torch accessibility

Compared with a traditional automatic TIG torch, the compactness of the wire lead-in incorporated into the nozzle gives accessibility at an angle comparable with that obtained using a MIG/MAG torch.

This increases the scope for robotization and extends the range of workpieces which can be welded automatically.

DC PLASMA PROCESS

Applications



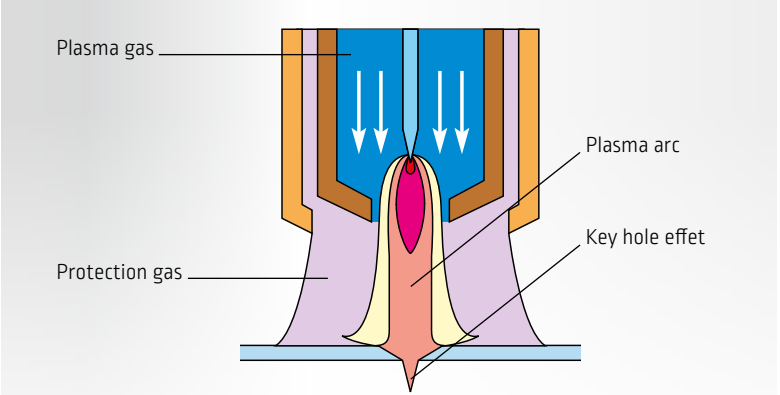
The Plasma process is the ideal extension of TIG for thicknesses greater than 3mm. It ensures the same level of quality, higher performances and 100% penetration thanks to Key-Hole technology, on different materials such as carbon and stainless steel, titanium, inconel.

Benefits

- Reduction of preparation and welding time
- 100% X-ray quality
- Excellent visual aspect
- Reduced affected zone
- Complete and regular penetration

Plasma arc

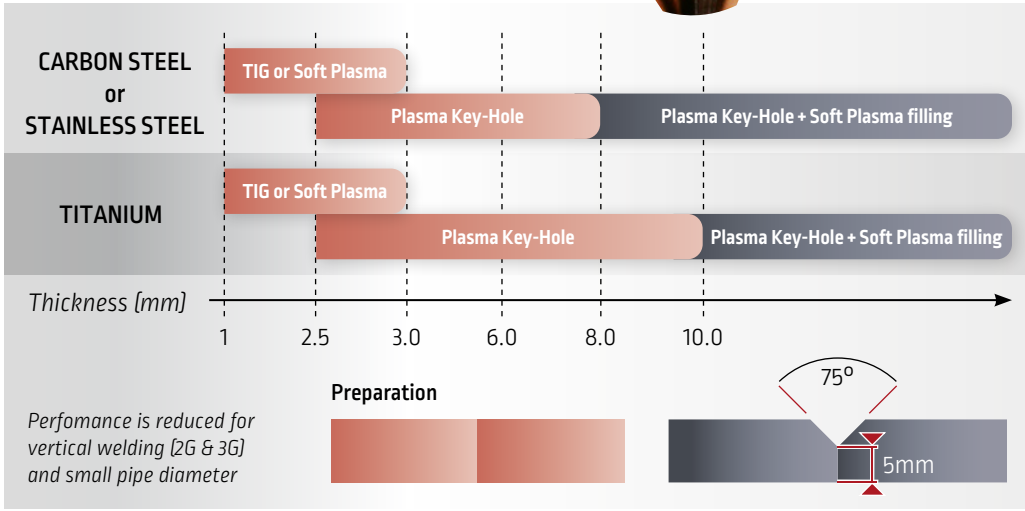
High temperature, a concentrated beam for better productivity.



PLASMA ARC - 150A - 28V

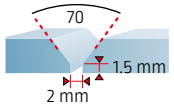
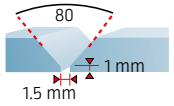
- The arc established from electrode is constricted through a nozzle.
- The 10 000°K to 18 000°K temperature zone is transferred to the workpiece in a concentrated beam.

DC Plasma performance



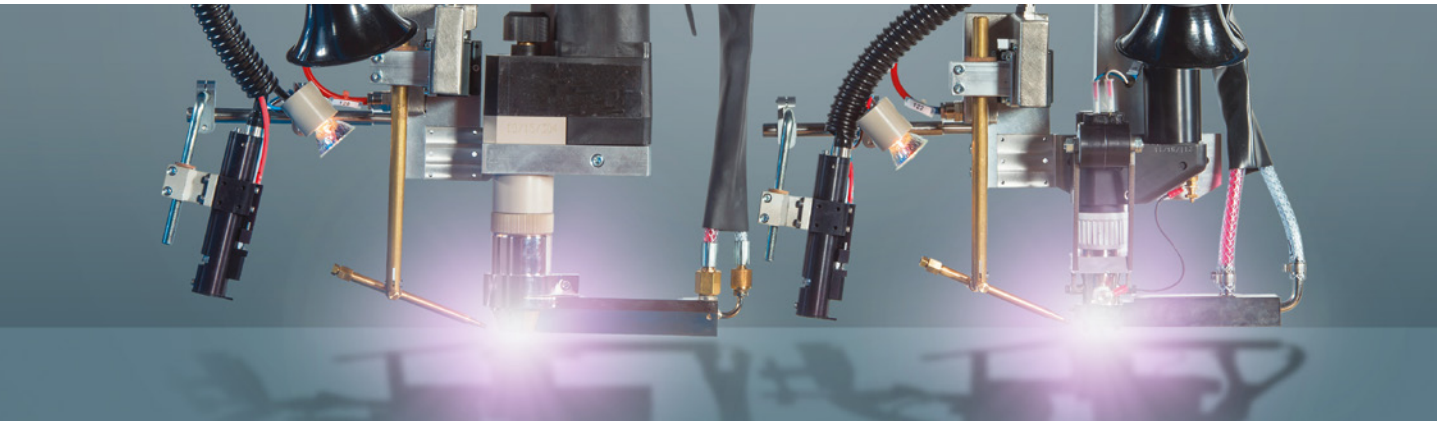
Perfomance is reduced for vertical welding (2G & 3G) and small pipe diameter

Example on 5mm stainless steel

Process	Preparation	Time and excecution
Electrode (S.M.A.W)		Preparation + 2 passes at 15 to 20cm/min grinding
Manual TIG (G.T.A.W.)		Preparation + 2 passes at 10cm/min
Plasma (P.A.W.)		Key hole plasma: 1 pass at 30cm/min

PRODUCTIVITY IMPROVEMENT

PLASMA + TIG Process



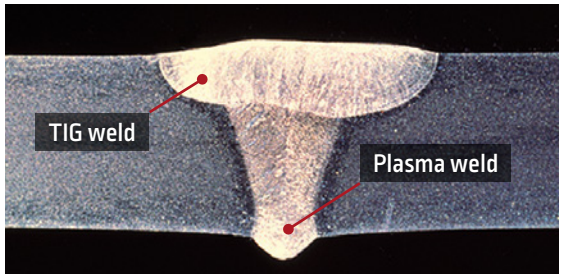
The Plasma + TIG process is specially designed for assembling panels for the prefabrication of vessels longer than 4 meters and carrying out circular welds for diameters greater than 2 meters.

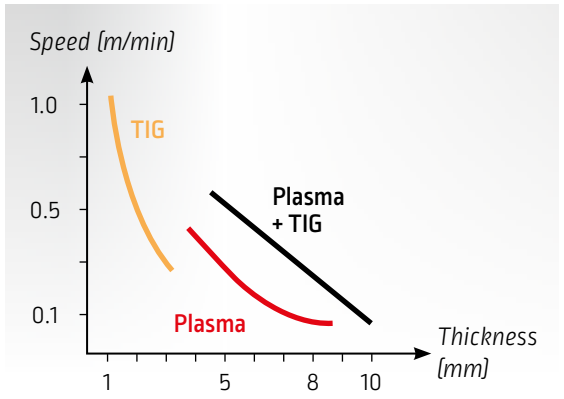
The “plasma” arc penetrates the butt-jointed panels. The “TIG” arc equipped with filler metal, electromagnetic arc oscillation and a gas trailing shield produces a perfect surface finish which can often be left without any further treatment.

+900%

PRODUCTIVITY

over manual TIG process
5mm stainless steel





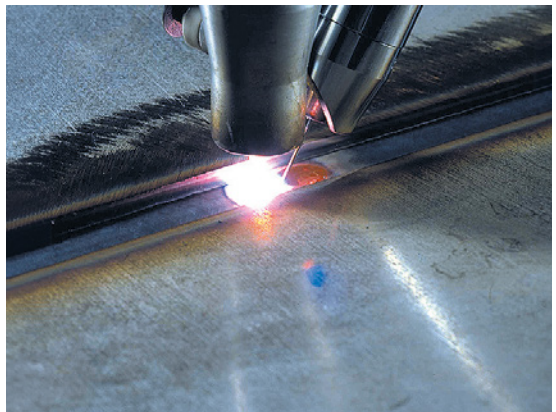
TIG Hot Wire

Productivity improvement by increasing the deposition rate. Hot wire is performed by additional power source connected to the wire feeding system delivering up to 200A. Used for filling bevels with multiple passes or for quality hard-surfacing.
Hot filler wire enables 2.5 to 3kg of metal to be deposited per hour.

+200%

DEPOSIT RATE

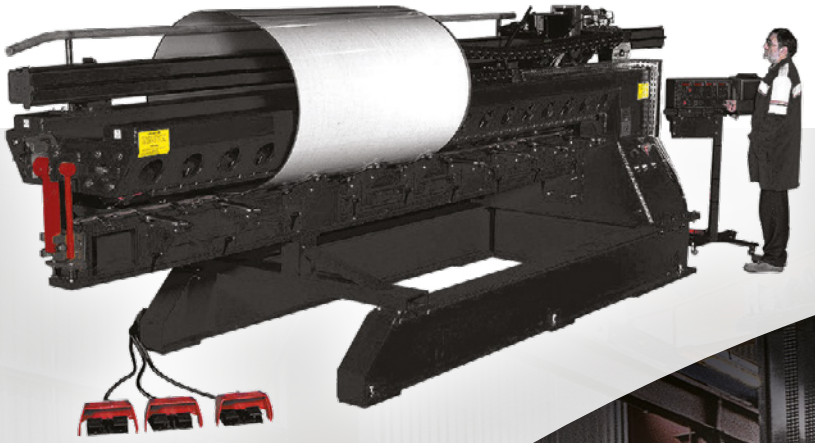
over DC TIG process



BOILER MAKER

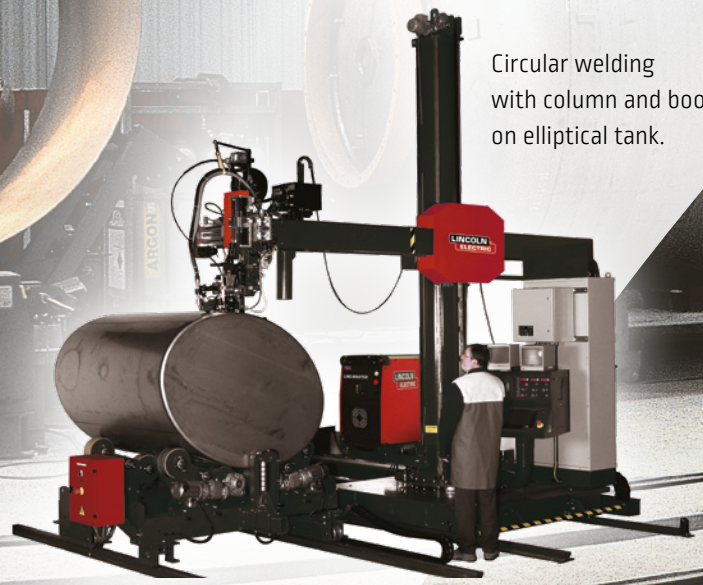
Applications

Manufacture of all types of product such as boilers, tanks, and pressure vessels, transforming the metal sheet, performing longitudinal and circular welding for the petrochemical, agriculture/food processing, aeronautical industries etc.



Longitudinal welding on seamer bench, up to 10mm thickness, for internal or external welding seam.

Circular welding with column and boom on rotator or positioner



Circular welding with column and boom on elliptical tank.

VERTICAL TANK

Applications

Use of plasma or TIG processes for vertical welding of steel and stainless steel, noble metals, or aluminum.
Manufacture of storage equipment for agriculture, food processing, petro-chemical industries.

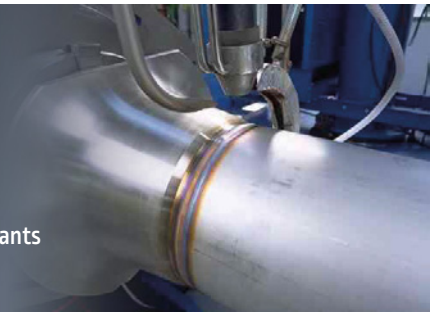
In order for a workpiece to be welded on a rotator it has to be rigid enough (relationship between diameter, thickness and dimensions) to ensure satisfactory stability while welding takes place.

For cases where rigidity is not sufficient, or costly (vessel sizing tools), difficult or even impossible to improve because of the large variety of parts used, Lincoln Electric has produced equipment enabling welding to be carried out “in the vertical axis” where the workpiece is rotated using a horizontal turntable and the torch remains static in the horizontal welding position.

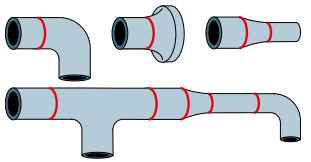
PIPING WORK

Applications

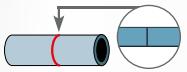
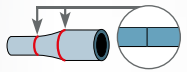
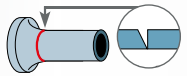
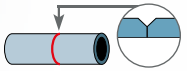
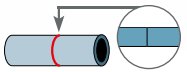
It is used in a variety of industrial sectors:
- Shipbuilding and off -shore platforms
- Refineries and power stations
- Chemical and agriculture/ food processing plants
- Gas expansion and distribution stations.



Prefabrication of pipe work is carried out upstream of installation. It enables sub-assemblies to be prepared and welded from basic components (pipes, flanges, elbows etc...) in the workshop.

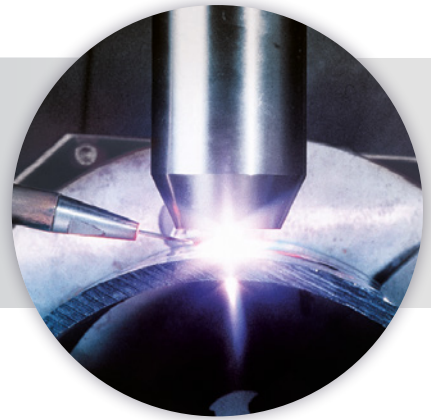


Example of welding times, assemblies are pre-tacked using manual TIG.

Exterior tube Ø (mm)	Wall thickness (mm)	Type of steel	Joint preparation	Time taken for plasma welding not counting positioning of assemblies	Time taken for same operation carried out manually
60	2.9	carbon		2 min *(2 consecutive passes)*	15 min
133	3.8	carbon		4 min *(2 consecutive passes)*	24 min
406	9.52	carbon		14 min *(2 consecutive passes)*	24 min
114	8	AISI 304		4.15 min *(2 consecutive passes)*	38 min
170	3.2	AISI 304		2 min *(1 pass)*	55 min

Plasma welding is suitable for prefabricating pipe work of diameter greater than 1.5inch. Parts with smaller diameters can be TIG welded using the same equipment.

LINC-MASTER
TIG & PLASMA WELDING



Linc-Master installation for TIG, Plasma or Plasma+TIG powered by the Power Wave® S500.

The modular concept allows Linc-Master to be set in Plasma or TIG to accommodate the welding need, and facilitates machine and retrofit integration.

Management of welding functions such as current, wire, voltage, gases and welding speed

Modular design to fit with welding need

ECO design: Low primary consumption, excellent efficiency

Compact system for easy integration

THE LINCOLN ELECTRIC GREEN INITIATIVE
Inverter Technology *reduces energy demand*
www.lincolnelectric.com/green

The **Power Wave® S500** is recognised for its automation application performance and lifetime. It is compliant with the latest European ECO design requirement so offers reduced power consumption coupled with greater efficiency.

	Power Wave® S500
Primary supply	230-575 V / 3 ph / 50-60 Hz
Welding current - Duty cycle	5 to 450A @100%
Efficiency	87%
Hibernation	32.8 W

** If registered on www.lincolnelectric.com*

The **Pilot Unit** is an auxiliary source which generates a pilot arc in plasma welding. The pilot arc current is adjustable from 5 to 25 amps and is controlled by the Linc-Master unit.

The **Advanced Module**, controlled by the Power Wave®, further expands welding capabilities adding TIG AC process using variable polarity.

	Advanced Module
Max. current	300A @100%
Frequency	50 to 200Hz
Cyclic ratio	35 to 85%

The **FRIOJET 300W** is used to cool down torches in heavy situations.

	FRIOJET 300W
Primary supply	230 V / 1 ph / 50-60 Hz
Pressure	5.5 bars
Nominal water flow rate	0.26 m^3/h

TIG & PLASMA INSTALLATION

1 WIRE FEEDER

It is often necessary to feed the melting bath with metal during the operation in order to prevent the seam from showing hollows, to supply soft steels with deoxidizing elements, for successive seams. Wire sizes from 0.8 to 1.6mm.

2 AVC SYSTEM

A constant distance between the torch and the workpiece is a key of quality to ensure a constant penetration and bead width. The Arc Voltage Control (AVC) keep this constant distance by digital regulation of the arc voltage.

3 JOINT TRACKING

The operator can work at remote distance to follow the joint, working easier and improving the quality of the welding operations.

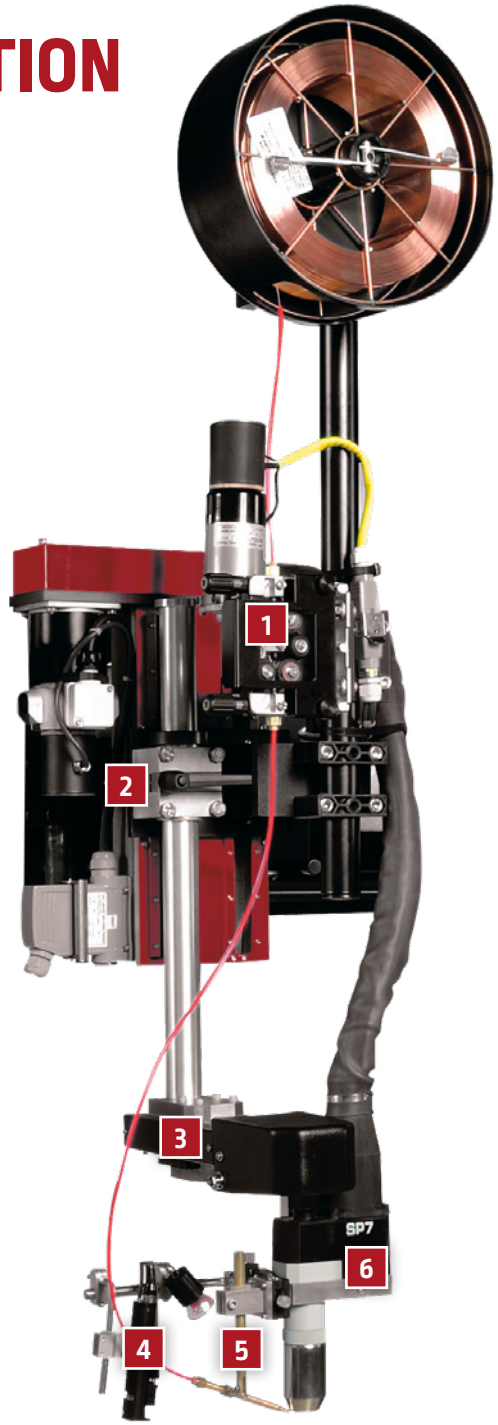
4 VIDEO CAMERA

The TIG/plasma video system uses a greatly enlarged image which enables the precise position of the welding torch.

5 WIRE PLACEMENT

2 micro-slides allow a precise impact of the wire into the molten pool. Manual or electrical option.

For operators' safety but also for the protection of the environment, user must collect and filter welding fumes.



6 TORCHES

All the torches are water-cooled and equipped with quick connection system for easy change and maintenance.

SP7 is the reference on the market, for soft and key hole plasma welding.

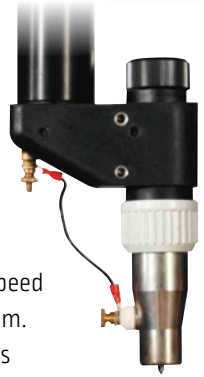
- Duty cycle 450A @ 100%
- Standard electrode simple to replace and self-aligning
- Cold massive nozzle ensuring long life time

Options:

- Gas trailing device to protect welds in sensitive metals

Toptig is an innovative welding torch with improved deposit rate and typical nozzle design. It includes wire to reach welding joints in the most complex places.

- Duty cycle 350A @ 100% with water-cooled nozzle
- Compact torch ; 3 different nozzles
- Improved deposit rate up to 3kg/hour
- Excellent weld bead appearance



MEC4 is a TIG welding torch for harsh environment It can be fitted with several options.

- Duty cycle 500A @ 100%
- Standard electrode easy to replace
- Twin HF ignition for better arc striking

Options:

- Gas trailing device to protect welds in sensitive metals
- Arc deviation: electrically deflect the TIG arc forward in the welding axis, increasing the speed by 30 to 50% for thicknesses of less than 2mm.
- Arc oscillation: deposition of metal over areas up to 15mm wide to fill bevels or reconstitute surface coating. Oscillation can be magnetic or mechanical.

CONTROL PANELS

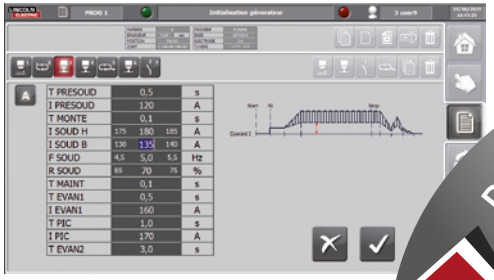
Two different systems to manage the Plasma/TIG process are available.

According the typology of machine, the number of parameters to control, the monitoring and the traceability requirements.

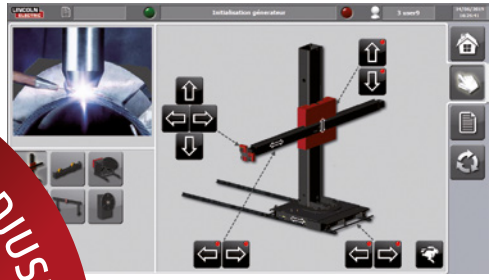
Controller	T/P Controller	PILOT ADVANCE
Typology of machine	- Stand alone process for retrofit - Simple machine with 1 analog axis	Machine management including process with unlimited digital axis
HMI type	- LCD display - 99 programs	- 19" user touch screen - Unlimited programs
User management	General lock with code	3 user profil levels
Traceability, reports and connectivity	Program import/export	- Complete traceability - Pilot Cockpit - OPC UA - Remote service

PILOT ADVANCE

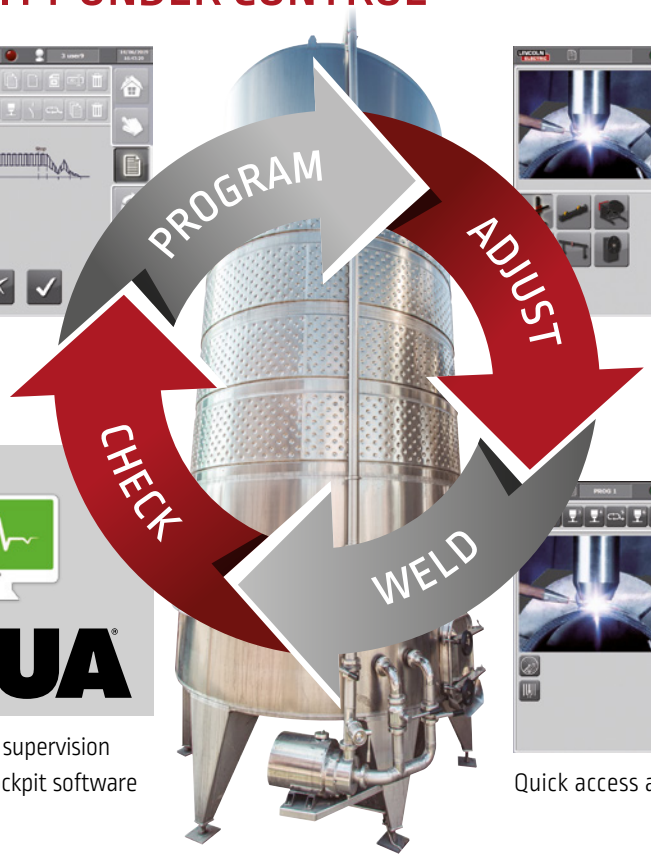
WELDING ACTIVITY UNDER CONTROL



Clear display of welding cycle and related parameters



Graphic display of the machine and welding head



Industry 4.0

Secure gateway to ERP system, real-time supervision

OPC UA

A suite of welding traceability and supervision embedded or off-line with Pilot Cockpit software

Quick access and display of welding functions

PILOT COCKPIT

EXPLORE YOUR WELDING DATA

Windows compatible software that support you in exporting and formatting your welding data. Analyzing and storage as never been easier !

5 exports are available:

- Welding programs
- WPS : Welding procedure specification
- Welding ticket
- History of events
- History of alarms

PLASMA WELDING READY PACK

HARNESS		LINC-MASTER PLASMA WELDING PACK		VIDEO SYSTEM	MOTORIZED WIRE PLACEMENT
17 M	22 M	■ Linc-Master control unit ■ T/P controller panel ■ Power Wave® S500 ■ Arc Voltage Control ■ Wire feeding ■ Plasma SP7 torch	■ Joint tracking slide & joystick ■ Cooler ■ Shielding & backing gas flow meters ■ Plasma gas (RDM) ■ Disconnecting box with emergency stop ■ Pilot unit	■ HF protected camera ■ Industrial 15" color screen	■ 2 electrical slides ■ Joystick
AS-WM-95575211	AS-WM-95575311		✓		
AS-WM-95575212	AS-WM-95575312		✓	✓	
AS-WM-95575213	AS-WM-95575313		✓	✓	✓

COMPLEMENTS

			
SP7 GAS TRAILER	**SP7 WEAR PARTS CASE**	**MEC4 TIG TORCH**	**MEC4 GAS TRAILER**
AS-WP-95575011	W000275494	AS-WP-95575020	AS-WP-95575021

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