

Robotic solutions



The constant changes in the economic markets in which our industrial customers operate lead them to a continual commitment to a rapid response.

Robotisation of welding or cutting processes is one of the possible option to optimise productivity and flexibility.

The Air Liquide Welding group offers a great number of applications in varied activity sectors: automotive subcontracting, metal furniture manufacturing, agricultural pieces fabrication etc... These solutions are often the outcome of a personalized approach leading to a unique proposal, although some components can be made on our standard JUNIOR and SENIOR installations.

Some examples of products that have been produced with Air Liquide Welding robotic installations

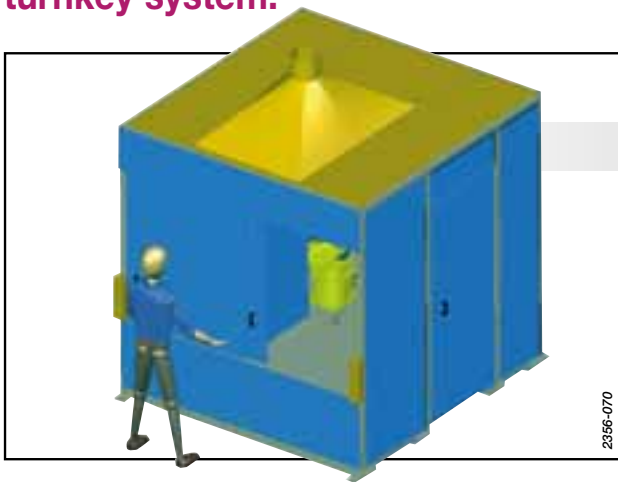


Standard Robotic Cells



Turnkey fork-liftable robotic cell equipped with two workstations. Easy to install and run, it is the perfect tool for fast welding of a large variety of steel parts.

Among our complete range of standard robotic cells you will surely find the perfect solution for enhancing your performance through a simple and flexible turnkey system.

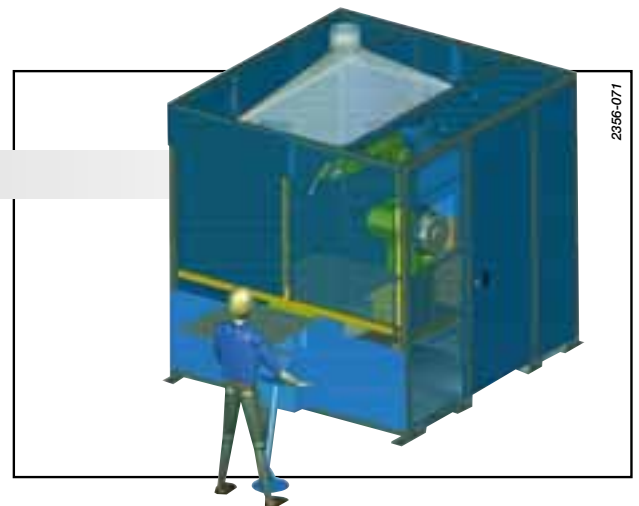


Highly Productive

Equipped with two workstations thus the operator can load and unload a work-piece on one side of the cell, while the robot is welding on the other side. In addition, our cells are pre-assembled and fork-liftable for reducing installing and setup to a few hours.

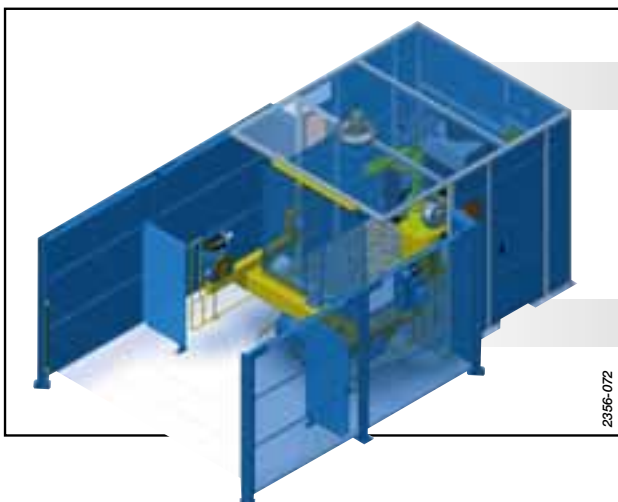
Flexible

All equipped with two workstations our workcells are successfully used for welding thousands of different parts. With or without external axis, they are designed for making it easy and fast to re-set the cell end resume welding a different part.



Profitable

Simplicity and flexibility are keystone concepts for securing your investment. Comparing to highly complicated custom-tailored thus expensive solutions, work-cells will boost the profitability of your project

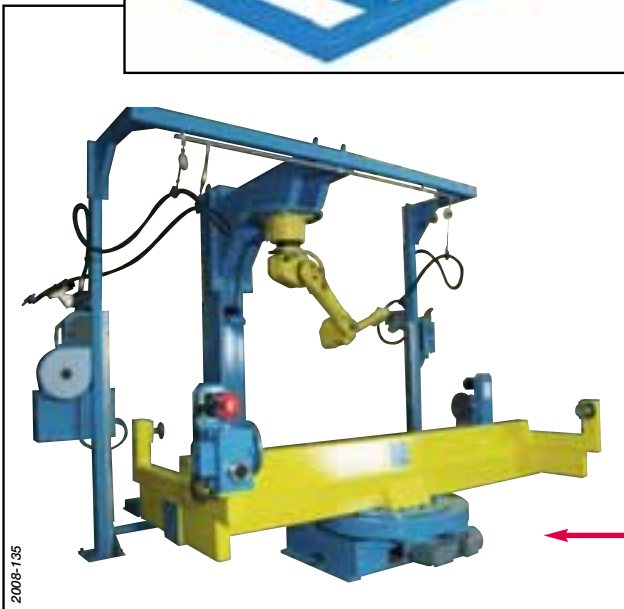
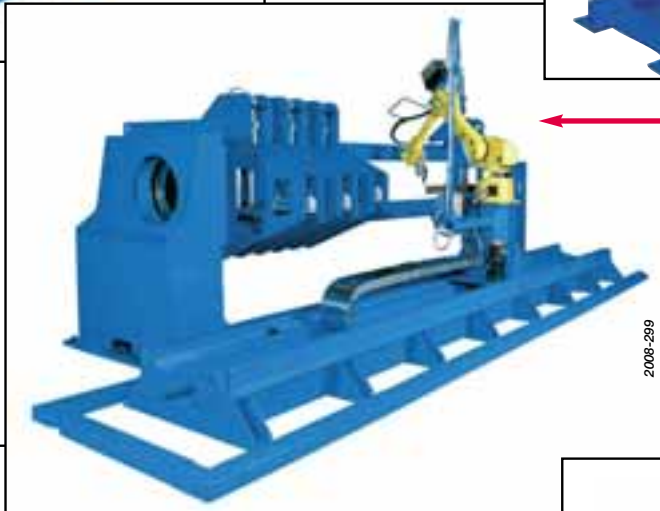
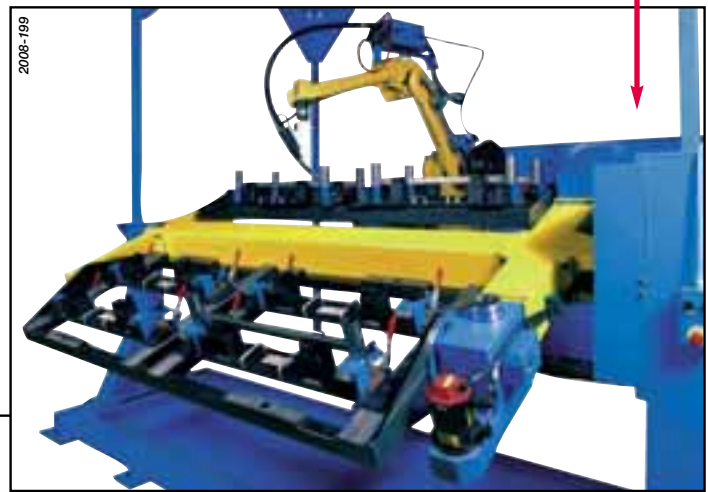
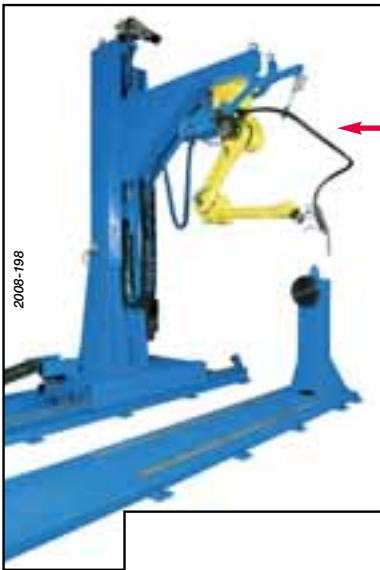


Easy to use

Robot programming through teaching, pre-settings for welding process and finally station changeover through a simple table rotation; it simply could not be easier and faster to get a workcell to weld your parts.

Custom-made solutions

A large choice of kinematics components and manipulators are available to enhance robot reach and weld-part positioning. We will match your specific needs and we will go beyond offering you the best suiting solutions.



TOPTIG: high productivity TIG welding for automation

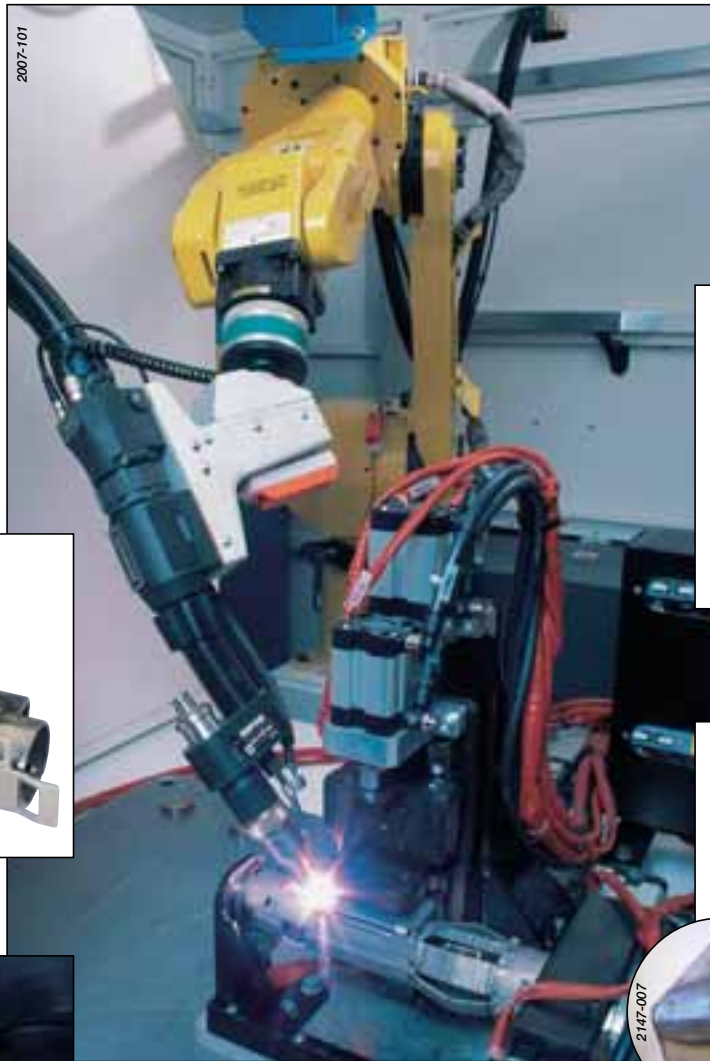


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TOPTIG process is a major innovation in the world of automatic or robotized welding. Developed in the Air Liquide Welding research centre, TOPTIG is a new process development from arc welding classical solutions. This new process can be used effectively on carbon or stainless steel plates up to 3 mm or on galvanized sheets with weld brazing.

Advantages:

- A better accessibility for welding complex structures;
- Very good performances concerning speed, tolerance and quality (projections free).



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Characteristics:

- A new wire feeding concept allowing a new design of the torch.



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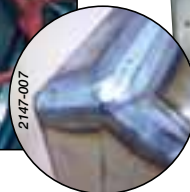
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Activities sectors:

- Subcontracting automation
- Fine boiler making
- "Noble" tack welding and metal furniture
- Aeronautics subcontracting



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TOPTIG process innovation



The TOPTIG welding process offers:

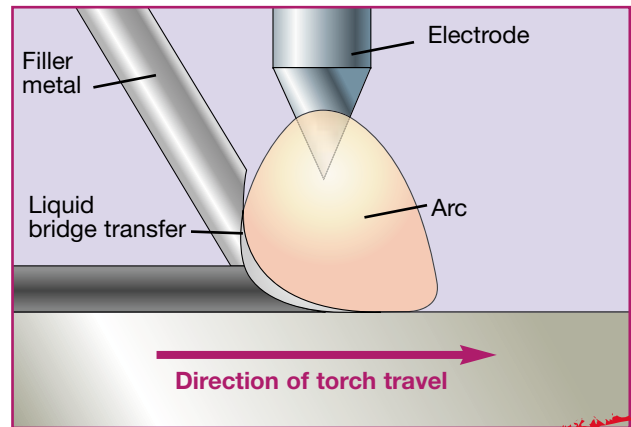
- the TIG quality welding and guaranteed spatter free
- good global productivity
- excellent appearance of the weld bead
- torch accessibility
- flexible solution and reasonable cost

TOPTIG innovative process principle

In TIG automatic welding mode, the filler wire is fed into the weld pool in front of the torch. A feature of the TOPTIG process is that the melting of the filler wire is equivalent to MIG.

Indeed, the support wire is fed through the welding nozzle into precisely that area of the arc where the temperatures are the highest. The wire therefore melts into small droplets exactly as in the MIG process.

The use of a pulsed current synchronized with wire gives a better control over the welding operation.

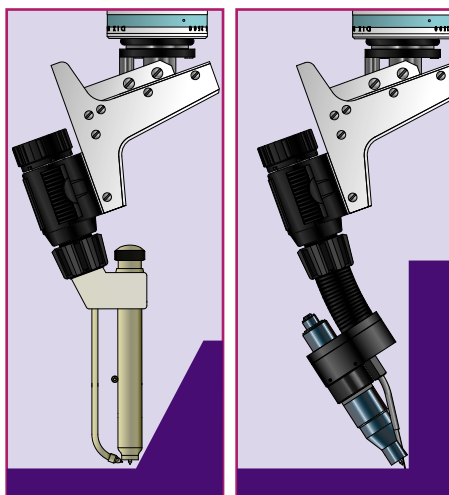
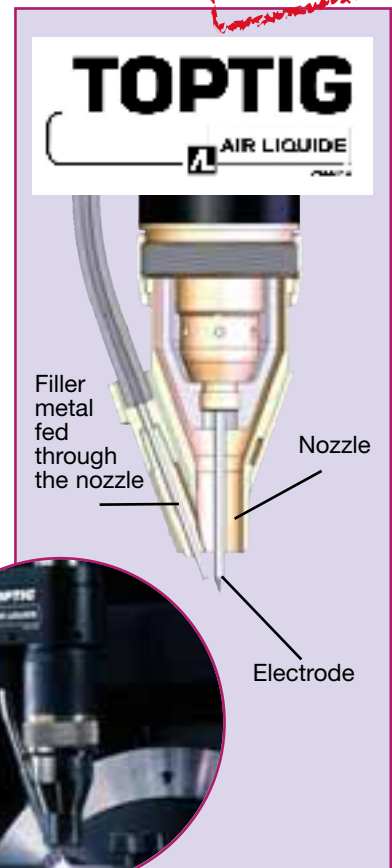


Comparison of the main welding processes

Feature Processes	Speed	Quality	Spatter	Cost
TIG				
MIG				
LASER				
TOPTIG				

😊 Excellent 😊 Good 😐 Fair

TOPTIG CONCEPT



Conventional TIG torch

TOPTIG torch

Torch accessibility and simplified robot trajectories

The TOPTIG torch compactness gives accessibility and a good access angle. Welding is multidirectional, so the robot trajectories are simplified and the scope of robotization is widened.

On classical robotic TIG torches, the filler metal is brought by an external cross and the wire is oriented with an angle close to 90° relative to the electrode. Moreover, the cross can only be positioned ahead of the torch and these features bring problems in terms of access, positioning and reliability.

TOPTIG equipment

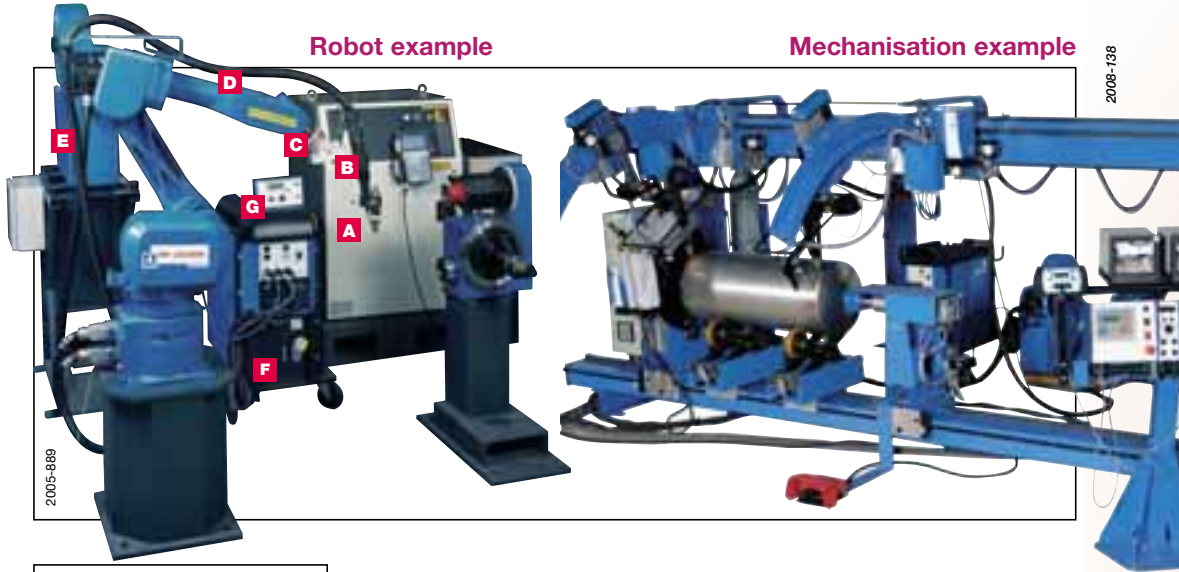


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To optimise the TOPTIG process, the torch is interfaced to a push-push high-quality wire feeder which guarantees the precision of the wire feeding. In order to prevent damage in case of a trajectory error (for robot) the torch is installed via an anti-collision device. Depending on the application and the welding current, an air-cooled or water-cooled torch nozzle, the size of the electrode and the appropriate wear parts can be chosen.

TOPTIG Installation

- A** TOPTIG torch
- B** Torch support
- C** Anti-collision device
- D** Harness L 5 m
- E** Wire feeder with spool support
- F** TOPTIG 220 DC power source
- G** Remote control



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TOPTIG 220 DC power source



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TOPTIG 220 DC supplies 220 A at 100% duty cycle with flat or pulsed current. It can drive a constant or pulsed wire feeding which is synchronized with the welding current. The RC-JOB permits a complete welding cycle to be programmed. Programs selection and chaining is done by analog signals.

TOPTIG push-push wire feeder

The complete push-push wire feeder system includes the spool support with slave feeding equipment, the electronic card driver, the 5 m harness, the anti-collision device, the torch support and the master head micro-motor.

Electrode changer (for robotic applications)

Especially designed for TOPTIG, the electrode changer permits an improvement to the global productivity of the installation. The electrode changing cycle lasts 20s, and this system avoids any manual intervention during production, and allows the electrodes, to be sharpened off-line.

NERTAMATIC 450 power source

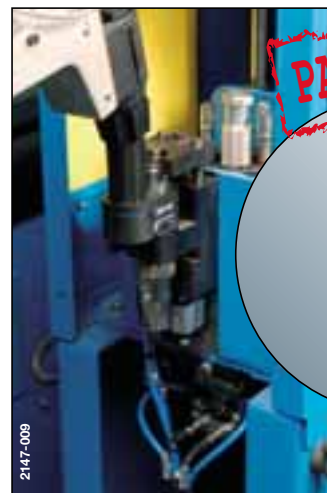


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2002-469R

NERTAMATIC 450 supplies 450 A at 100% duty cycle with flat or pulsed current. It can drive a constant or pulsed wire feeding which is synchronized with the welding current. The console permits a complete welding cycle to be programmed. Program selection is done by binary code, and program chaining by pulse.



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PATENTED



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6 electrodes cylinder for the electrode changer

TOPWAVE, digital high precision



Provided with the latest digital technology, DIGI@WAVE and CITOWAVE provide precision and simplicity even for the most complex robotic applications.

All-in-one simplified programming with a smart teach pendant for both power source and OTC robot.

MIG/MAG welding CITOWAVE and DIGI@WAVE: total quality.

- Digital control MIG/MAG current sources fitted with the latest generation inverter with synergic welding parameter management.
- Several models with various power ranges from 20 to 280 A at 100 % and up to 440 A at 100 %
- Graphic screen for easy and user-friendly adjustment.
- New arc transfer modes.
- New synergy laws (up to 152).
- Digitally adjusted wire feed for constant, controlled output.
- Smooth or pulsed welding current up to 500 Hz with reduced noise and pollution (no projections).
- Process control and traceability functions



Welding quality ensured by the high performance of the DIGI@WAVE and CITOWAVE power sources.

Advanced and fast communication between OTC robot and power source via digital bus.

Robotic plasma cutting

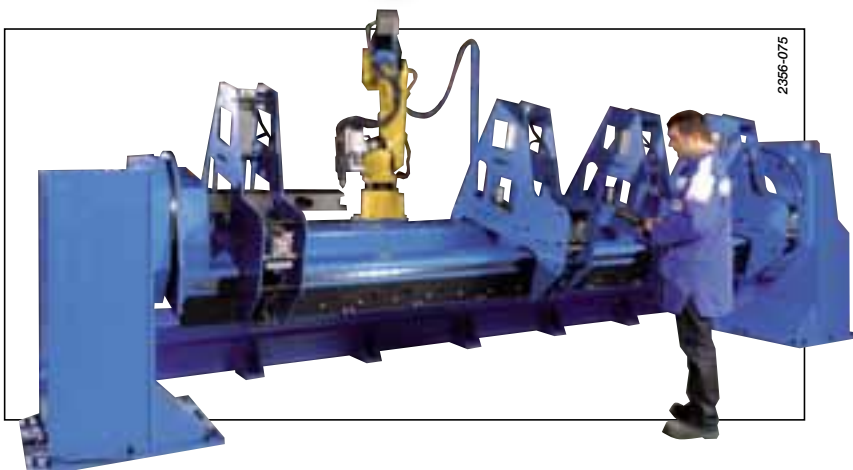
AIR LIQUIDE Welding has developed a specific NERTAJET plasma cutting pack for robotics. Complete and easy-to-use, this system is suitable for plasma cutting of a large variety of 3D work-parts.

Ideal for cutting 3D work-parts, our NERTAJET will perfectly match various applications:

- Cutting of holes, slots and saddle-cuts on round and square section tubes of various lengths
- Prefabricated I and H-beams cutting.
- Cutting of slots on lampposts
- Cutting on machinery chassis
- Boiler bodies and convex heads cut

NERTAJET HP125 Plasma Pack. High-performance plasma cutting through:

- Different levels of current intensity to find the best match with the thickness of the work-part to be cut.
- NERTAJET can be set either :
 - conventionally, to get the highest cutting speed.
 - Or in High-Plasma mode when looking for ultimate quality cut



Example of cutting system:

- Robot on ground track
- Plasma NERTAJET pack
- Headstock and tailstock
- Adjustable tooling



Suitable for cutting:

- Square section tubes
- Round section tubes
- Channels
- Boxes

Electron beam welding

Electron beam's range of applications extends from thin thicknesses to workpieces over 100 mm thick welding.

This directional energy beam has high energy density. The high quality welded parts make them immediately acceptable for the final assembly. These processes are recommended for large batch series or for high value added components.

Take advantage of Air Liquide Welding's

long experience over 25 years supplying "Electron beam".

Nowadays, our electron beam power supplies are the most reliable on the market.



Machine for tube welding with gun inside the chamber.

A new fashion to design your pieces

Since the energy density of the electron beam may be varied widely, it is possible to readily obtain sound welds, presenting satisfactory mechanical characteristics and without almost deformation, on materials for which a conventional welding process would be extremely complex to perform.



Machine for pinion welding.



Machine for gearshift fork welding.

The car and aeronautics industry

are intensively using these processes as well as small companies. Hundreds of Air Liquide Welding electron beams machines from 3 to 45 kW are in use every day. Air Liquide Welding has also many more references in electron beam welding in technological environment:

- Aeronautics
- Mechanic, hydraulic, pneumatic components
- Armement
- Motorcar automobile
- Nuclear
- Boiler construction.

WINDMILLS: the global solution of ALW



2006-632

Since the beginning, Air Liquide Welding has been involved in most mobile and fixed platform constructions in the cold waters of the North Sea and in the onshore wind-energy industry. Working closely with engineering departments and major manufacturers in this sector, Air Liquide Welding is constantly working to develop processes, equipments and consumables meeting the ever more demanding requirements of increasingly hostile environments. This constant innovation has resulted in an unsurpassable range of equipment and consumable solutions specially designed for wind-power industries.

Dedicated solution using our wide range of column and boom, and specially designed for heavy industrial environment.



Full range of rotators specially dedicated for windmill application.



Special head with automatic joint tracking allow longitudinal and circular welding with comfort and reliability.



Mono, twin or tandem submerged arc welding associated with our wide range of consumables offers high quality and productivity.

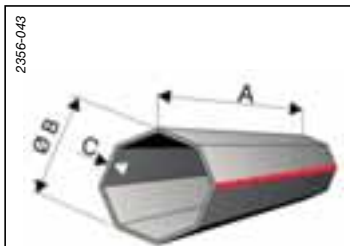


Controlled by our modern and friendly mobile control.



Submerged arc specific applications

Submerged arc LAMP POST



A: 3 to 17 m
B: 60 mm mini - 600 mm maxi
C: 3 to 6 mm
 Round conical, polygonal (32, 16 and 8 sides)
 Conicity maxi: 50%



Welding processes:

- ASW single wire diameter from 1.6 to 5.0 mm

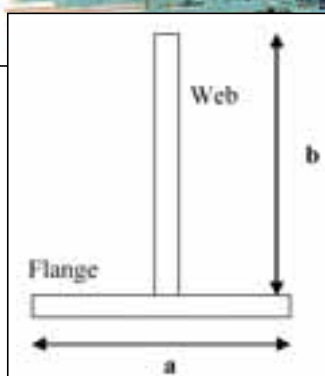
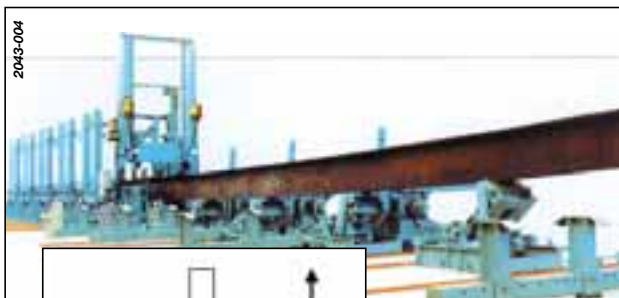
Machine cycle:

- SIEMENS controller
- Overview and control in real time of the machine, poles parameters recording, modem connection

Performances / Outstanding points:

- Joint tracking with camera and operator joystick
- Only 1 operator
- Machine availability: 95%
- Fix machine / Movable piece
- Speed range: 1 m /min. to 2.8 m/min.

T-MASTER installations



Small size

Flange a ⇒ min: 160 mm ⇒ max: 700 mm
 thickness: 8 ⇒ 40 mm

Web b ⇒ min: 200 mm ⇒ max: 2300 mm (1500 mm maxi)
 thickness: 6 ⇒ 25 mm

Length ⇒ min: 6 m ⇒ max: 16 m

Angle maxi: 30°

< 1200 kg/m

Big size

Flange a ⇒ min: 200 mm ⇒ max: 1300 mm
 thickness: 8 ⇒ 80 mm

Web b ⇒ min: 300 mm ⇒ max: 3200 mm (3500 mm maxi)
 thickness: 6 ⇒ 30 mm

Length ⇒ min: 3 m ⇒ max: 18 m

Angle maxi: 10°

≥ 1200 kg/m

**Other solutions
 and possibilities on request.**



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Founded in 1902, Air Liquide is the world leader in industrial and medical gases and related services. The company has offices in 75 countries and employs a work force of 40,000. Drawing on constantly renewed technologies, Air Liquide develops groundbreaking solutions used in making countless everyday products and in helping to preserve life.