SAW machine range

The SAW equipments are used in various domains from the simple head for any autonomous installation to complete welding systems for infrastructure, energy and piping industries. Air Liquide Welding developed turnkey solutions for the main applications we can found in these sectors of activity.

MEGATRAC SAW carriage offers the possibility to weld in restricted area and on large pieces. It is the ideal economical solution for welding on site or in workshop.

The H beams can be weld with the Air Liquide Welding dedicated solution: BEAM-MATIC.

The Autonomous SAW head can be combined with all external support.

Some dedicated plateforms exists as the wagon wheels cladding applications.
The Lamp post machine allows an increase of productivity in this hard competition domains.

For all other specific requests: consult us.
Applications:
Process for welding and hard surfacing of low alloyed carbon steel, stainless steel and refractory steel. It combines productivity, quality and operator comfort. It is used in thicknesses from 3 to 300 mm and provides a high welding speed and high deposition rates. With one or more wires, it is found in many industries: infrastructure, shipbuilding, offshore pipe mill, heavy duty pressure vessels, energy...

Values are indicative and depend on the material and the quality required.
SAW equipments

Air Liquide Welding offers a complete range of equipment combining performance, flexibility of use and ensuring high reliability in welding cycle management. Subarc 5 and D2C SAW installations allow:

- welding with direct current (DC) according to horizontal or drooping power source characteristics,
- welding with alternating current (AC) according to drooping power source characteristics.

**SUBARC 5 control**

For the most demanding users, a control box with:
- rugged, simple and user friendly controls,
- digital read-out of three parameters: current, voltage and wire speed,
- presetting of voltage and welding current,
- storage and read-out on digital displays of current and welding voltage,
- wire/workpiece short-circuit detection and display in manual wire feeding mode minimizes mechanical stresses on wire feed head supports.

**Power unit box**

The installation SUBARC 5 is completed with a power unit box installed to the top of the power source away from “sensitive” areas of the installation (near the arc).

It carries out the full control of all welding cycle time-delays. The controls for configuring the installation are accessible on the front panel of the power module.

**Software for analysis and recording of welding parameters (option)**

The installation can be equipped by software for the analysis and recording of the welding parameters (current, voltage).

Two parameter display screens are available; the first provides the trace of both current and voltage, the second provides a display of the welding data: current, voltage and energy.

**D2C SAW: Digital Cycle Control**

Digital welding system for the complete management of the machine and the main parameters of SAW welding (current, voltage, wire speed, welding speed) from only one cycle control:
- centralized console to manage welding process, machine cycle and integrated peripherals as laser spot, crossed slides of the head, seam tracking...
- large graphic display on touch screen with user friendly and intuitive interface allowing the programming, controls and follow up,
- easy setting of the machine,
- data saving via ethernet connection.

**Remote control RC-MATIC**

For immediate action throw push buttons, a remote control can be added to the D2C SAW welding system. Connected at the welding head throw a cable of 5m, the operator can get the useful basic function of SAW head management. Fixation of the remote control on steel basis by magnet.

**Remote service**

This complement facilitates the maintenance of the machine thanks to a remote assistance of ALW through a network connection.

The customer can save downtime of production after failures or can have welding expertise assistance for the SAW process.
SAW: Submerged Arc Welding

POWER SOURCES
A complete range of power sources DC or AC available for the various SAW applications:
• rugged, reliable, suitable for aggressive industrial surroundings,
• fan cooled, fitted with thermal cut-out,
• easy to move using crane or forklift,
• quick connection,
• remote control.

<table>
<thead>
<tr>
<th></th>
<th>STARMATIC 650 DC</th>
<th>STARMATIC 1003 DC</th>
<th>STARMATIC 1303 DC</th>
<th>STARMATIC 1003 AC/DC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Duty cycle at 100%</td>
<td>650 A - 44 V</td>
<td>1 000 A - 44 V</td>
<td>1 300 A - 44 V</td>
<td>1 000 A - 44 V</td>
</tr>
<tr>
<td>Primary power supply</td>
<td>3x 400 - 440 V / 50-60 Hz</td>
<td>3x 380 - 400 V / 415 V / 50-60 Hz</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Power consumption</td>
<td>34.5 kVA</td>
<td>69 kVA</td>
<td>103 kVA</td>
<td>122.7 kVA</td>
</tr>
<tr>
<td>Protection class</td>
<td>IP 21</td>
<td>IP 23</td>
<td>IP 21</td>
<td></td>
</tr>
<tr>
<td>Weight</td>
<td>247 kg</td>
<td>394 kg</td>
<td>483 kg</td>
<td>540 kg</td>
</tr>
<tr>
<td>Dimensions (H x W x D)</td>
<td>692 x 565 x 914 mm</td>
<td>900 x 650 x 950 mm</td>
<td>1 120 x 692 x 1 170 mm</td>
<td></td>
</tr>
</tbody>
</table>

Tools and wire feeding accessories
A wide choice of tools and accessories for the wire feeding with wire lead-ins and nozzles dedicated to standard or heavy duty use.

<table>
<thead>
<tr>
<th></th>
<th>SD range Standard duty &lt;700 A</th>
<th>HD range Heavy duty &gt;700 A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Single wire</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ø 1.6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ø 2.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ø 2.4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ø 3.2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ø 4.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ø 5.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Twin wire</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 x Ø 1.2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 x Ø 1.6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 x Ø 2.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 x Ø 2.4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tandem</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ø 3.2 + Ø 3.2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ø 3.2 + Ø 4.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ø 4.0 + Ø 4.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ø 4.0 + Ø 5.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ø 5.0 + Ø 5.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ø 3.2 + 2 x Ø 2.4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 x Ø 2.4 + 2 x Ø 2.4</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

DX7 wire feed unit for spools and drums
A simple and rugged mechanical assembly, easy to configure to suit application: with single wire Ø 1.6 to 5.0 mm or twin wires Ø 1.2 to 2.4 mm.

The wire feed unit with accessories is mounted on a tubular support with collars allowing a quick and easy adjustment of the wire in the joint.

This support authorizes the positioning without misadjustments in welding positions required:
• rotation axis +/- 90° in tool center for a circular or longitudinal welding,
• rotation axis +/- 45° for a fillet welding.
SEAM TRACKING

TRACKMATIC device guarantees the good positioning of the torch in the joints to be welded without operator intervention.

A sensing probe finger or an inductive sensor detects positioning errors (height or alignment) and commands the necessary corrections required to the torch trajectory thanks to motorised slides travel 100 - 200 or 500 mm.

Whilst increasing productivity, it ensures a constant weld quality, a reduction in repair operation and easier use for the operator.

FLUX MANAGEMENT

Equipment to improve productivity and ensure operator safety.

Flux recovery equipment
A compact unit to reduce significantly manual refilling of the flux feed hopper 10 liters powered by compressed air.
Pressure 4 to 6 bar.
Venturi device completed with tank and filter cartridge for recovery and dust filtration.

Flux supply equipment
Pushed flux supply system providing a greater welding autonomy due to the flux hopper capacity of 70 L.
To avoid any risk of humidity recovery in the flux, ALW can propose a system equipped with a device to keep the temperature of the flux up to 50 °C.

Centralised recovery
Centralised flux recovery system through pushed flux device and electrical turbine with filtration of flux dust. Ideal system for heavy duty application with reduced flux consumption and minimum flux handling.
The system can be equipped with a device to keep the temperature of the flux up to 120 or 200 °C.

VIDEO CAMERA

Combined with a laser spot, the video camera unit allows to view the welding area and can remotely control the positioning of the torch in the joint.
This is an essential tool for welding in difficult access area like inside a tank of small diameter.
The equipment is supplied with a spot light to illuminate over viewed area, and a color LCD industrial screen high definition 15”.

LASER SPOT

To show the wire point of impact relative to the joint on the workpiece.
The spot projects an illuminated point in front of the electrode wire for guiding. One spot is used for horizontal alignment and the association of two spots make it possible to monitor the horizontal position and the vertical distance between the torch and the workpiece.
MEGATRAC 6

Automatic welding often requires heavy and expensive equipment which can pay for itself only by this high productivity. Also, the geometry of some parts and handling difficulties sometimes make automation difficult by conventional means (boom, gantry, ...).

In such case, the MEGATRAC 6 welding carriage is the best solution to the problems of productivity associated with the welding of large workpieces that are difficult to handle.

Rugged and compact, the carriage MEGATRAC 6 is specially designed for intensive work.

**Carriage characteristics:**
- Welding in single or twin wires configuration:
  - single wire Ø 1.6 to 5 mm,
  - twin wires Ø 1.2 and 1.6 mm.
- Weight of carriage with welding equipment: 100 kg (without wire and flux).
- Internal welding in vessels Ø mini = 1600 mm.
- Travel speed: 10 to 200 cm/min.

**Applications:**
Its adaptibility and flexibility allows to respond the most demanding applications: long welds, welding of thick plate in one or more runs, welding of stiffeners in restricted spaces, welding inside or outside tanks, welding inside box sections.

**Welding Equipment SUBARC 3C:**
Associated with one power source of STARMATIC range the control box SUBARC 3C manages the welding parameters and the carriage travel. Simple to use, it includes all the necessary controls and displays for the operator during welding.

**Complements:**
- flux recovery system by venturi,
- steel wheels,
- 4 drive wheels equipment,
- 3 wheels equipment.
Air Liquide Welding can propose several solutions of internal boom welding.

The main processes are:
- pipe manufacturing by internal longitudinal welding,
- assembling of 2 pipes by circular welding.

Once the internal weld is done, the outside weld is performed by another equipment.

The structure and configuration of the internal boom depends on the length of the pipes.

Internal boom from 4 m to 12 m stroke.

The SAW process allows to weld high thickness, the minimum internal diameter depends on the welding head configuration.
SAW: Narrow Gap

Applications
Narrow Gap process is used to weld thick walled steel plate, mainly for the following industrial applications:
Power Generation, Nuclear, Pressure Tanks, Windmill, Petrochemical.

Process
It is a Submerged Arc process with single or tandem narrow gap torch, designed to weld thick plate (generally over 50 mm) using practically parallel sides and narrow gap preparation.
Narrow gap process allows to increase productivity and to result in lower cost welding by decreasing the volume of metal needed and the welding time compared to conventional preparation with bevel.
The process is adapted for both longitudinal and circumferential welding.

Equipment: Air Liquide Welding provides a full range of equipment for every application
Example of modular tandem welding head proposed

Flux recovery system
DX7 wire feeder
Single wire AC
Single wire DC
Flux supply
Video camera
Automatic seam tracking
SAW strip cladding

Applications
The cladding is mainly used for surfacing the internal surfaces of pressure vessels and large diameter pipes in the oil and gas and nuclear industries.
The process is also used to repair worn parts at low cost as cladding continuous casting rollers, valve body, etc...

Process
The cladding is a fusion welding technique in which a material is deposited on the surface of a parent material to achieve the desired dimensions or properties. It consists in using a thin wide metal strip instead of a wire as consumable electrode.
The majority of the parent materials are carbon or low alloy steels, selected for their inexpensive cost or for their specific mechanical properties.
The deposited sophisticated material imparts surface properties such as corrosion resistance to the substrate.
There are two cladding processes similar to the submerged arc welding: the submerged arc strip cladding and the electroslag strip cladding.

Submerged arc strip cladding (fig 1)
In the submerged arc strip cladding process the required energy to melt the strip and the base material is created by an electrical arc between the welding strip and the parent material under a flux protection. The flux is added on both sides of the strip. The mainly advantages of the submerged arc strip welding are:
- a low penetration,
- a good deposit rate,
- a low dilution preserving the mechanical properties of the weld metal.

Electroslag strip cladding (fig2)
The electroslag strip overlay process is based on the ohmic resistance heating of a molten electrically conductive slag.
There is no arc between the strip electrode and the parent material, the flux is added on the front of the strip.
The welding currents used are higher than for submerged arc strip welding and the temperature of the slag pool is higher. The main differences with the submerged arc strip cladding process are:
- a higher rate of deposition,
- a lower dilution,
- a less penetration.

Additional equipment for standard installation
STRIP CLADDING HEAD
This head is designed for Electroslag and Submerged Arc overlay with strip sizes of 30 mm, 60 mm and 90 mm, thickness 0.5 mm.
Other heads are available for reduced internal cladding environment.

MAGNETIC STEERING DEVICE
Magnetic steering device is used with Electroslag process to reduce the risk of lack of fusion at the overlap, and to increase the flatness of the surface of the deposit.
The automation of long workpieces welding (beams, wagons, box section constructions) requires sophisticated machines which move on rails.

The BEAM-MATIC system is used to weld castellated welded beams of constant or varying cross-section in widths between 220 and 2 000 mm*.

* Other dimensions on request.

2 types of BEAM-MATIC are available:
- cantilever: CT,
- on base column and boom: LM.

The BEAM-MATIC allows to weld in MIG-MAG or SAW (single or twin wire) process.
In standard, the machine is equipped with a flux recovery device and a pushed flux supply.
Possibility to use wire spools or wire drums on the 2 BEAM-MATIC.
The torch level is fix on the BEAM-MATIC CT and it’s possible to lift the torch level on the BEAM-MATIC LM.

**BEAM-MATIC CT**

**BEAM-MATIC LM**

**Clamping bench:**
The clamping bench allows the positioning of the web and the flanges before the welding, with an additional clamping bench it’s possible to save time and increase productivity.

* Other dimensions on request.
T-MASTER

The T-MASTER “Big size beam welding line” is designed to weld with Submerged arc process the T and I beams with the web in vertical position without need of continuous tack-welding of beam. A short tacking is only needed at the beam leading edge.

<table>
<thead>
<tr>
<th></th>
<th>TBL 2 000 x 800 - 1 000 kg/m</th>
<th>TBL 3 000 x 1 250 - 1 500 kg/m</th>
<th>TBL 3 500 x 1 500 - 2 500 kg/m</th>
</tr>
</thead>
<tbody>
<tr>
<td>A: Flange width mm</td>
<td>mini</td>
<td>maxi</td>
<td>mini</td>
</tr>
<tr>
<td>B: Flange thickness mm</td>
<td>8</td>
<td>50</td>
<td>8</td>
</tr>
<tr>
<td>C: Web height mm</td>
<td>200</td>
<td>2 000</td>
<td>300</td>
</tr>
<tr>
<td>D: Web thickness mm</td>
<td>6</td>
<td>30</td>
<td>6</td>
</tr>
<tr>
<td>L: Beam length mm</td>
<td>6 000</td>
<td>12 000</td>
<td>6 000</td>
</tr>
<tr>
<td></td>
<td>16 000</td>
<td>16 000</td>
<td>16 000</td>
</tr>
<tr>
<td></td>
<td>18 000</td>
<td>18 000</td>
<td>18 000</td>
</tr>
<tr>
<td>Weight / meter</td>
<td>1 000 kg/m</td>
<td>1 500 kg/m</td>
<td>2 500 kg/m</td>
</tr>
<tr>
<td>Taper angle</td>
<td>10°</td>
<td>10°</td>
<td>10°</td>
</tr>
</tbody>
</table>

Other dimensions on request.
Windmill solutions

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.
Lamp-post solutions

We propose some semi-automatic machines for the lamp-post welding. The operator positions the piece in the infeed line of the machine, once the clamping of the piece done, he adjust the joint to be welded, and then start the automatic welding of the lamp-post in SAW process. A burner ramp under the lamp-post allows decreasing the distortions. Once the piece welded, it’s evacuated thanks to a tilting device.

Several options are available on request.

Welding process:
- SAW single wire diameter from 1.6 to 5.0 mm

Machine cycle:
- SIEMENS controller
- Overview and control in real time of the machine, parameters recording, remote 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.

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%