



## Use of an Adaptive Control Logic for Constant Current and Constant Voltage Characteristic SAW Welding Machine

**INTRODUCTION :** The submerged arc welding (SAW) process uses relatively high current values and large diameter consumable electrodes to achieve high productivity, good weld quality, and desirable bead profiles. As a result, SAW is used in a wide range of applications.

### Advantages:

- Very High Deposition rates.
- High and consistent quality.
- Produces high productivity, fast travel
- Speed, high repeatability, and quality results.
- High current and up to 100% duty cycle.
- The weld is hidden by flux.

### Applications:

- Civil construction
- Cranes
- Pipe mills, Pipelines
- Power generation
- Pressure vessels
- Process industry
- Shipbuilding
- Storage tanks

This includes power sources that produce a constant current (CC) output as well as constant voltage (CV) characteristics. Welding arc is dynamic, in which current (A) and voltage (V) are changing constantly. A CC power source will maintain current at a relatively constant level, regardless of fairly large changes in voltage, while a CV power source will maintain voltage at a relatively constant level, regardless of fairly large changes in current.

Following table gives the information about the constant current versus constant voltage characteristic welding machines.

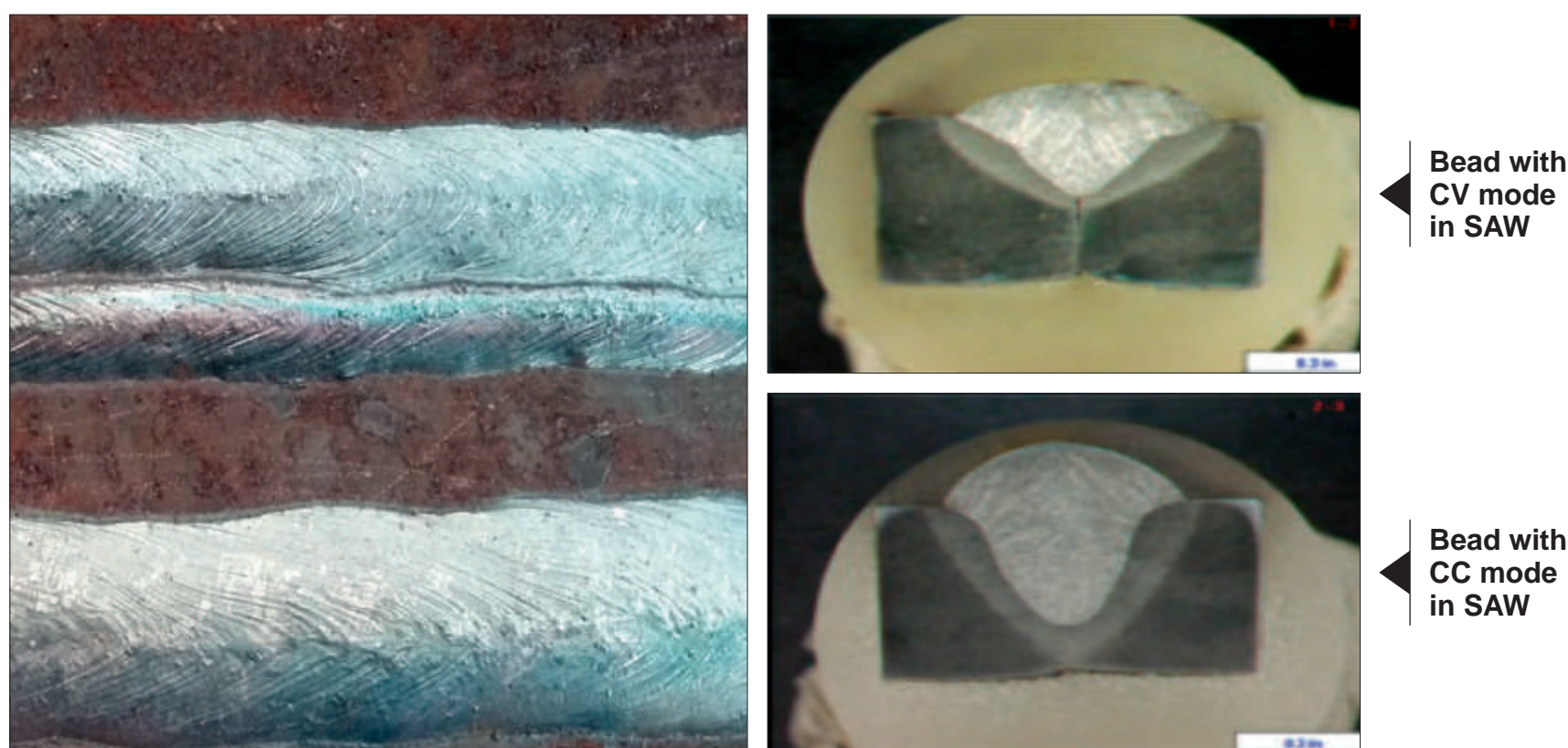
CC v CV		
	CC	CV
Characteristics		
Advantages	<ul style="list-style-type: none"> <li>• Produces a relatively constant current (CC) output.</li> <li>• Penetration depth of the material is fairly constant and provides uniform deposition rate.</li> </ul>	<ul style="list-style-type: none"> <li>• Maintains voltage at a relatively constant level.</li> <li>• Constant arc length lead to uniform welds bead shape.</li> </ul>
Disadvantages	<ul style="list-style-type: none"> <li>• Arc length varies.</li> </ul>	<ul style="list-style-type: none"> <li>• Fairly large variations in welding current.</li> <li>• Melt-off rate of electrode varies to a greater extent.</li> <li>• Not at all suitable for the application which demands constant deposition rate.</li> </ul>

### SAW MACHINE (ADOR MODEL : MAESTRO-1200) CC VS. CV MACHINE FEATURES :

Using the adaptive logic control for wire speed control for maintaining the voltage constant, ADOR Welding Ltd has developed the SAW power source which can be used for SAW process either in Constant current or Constant voltage mode of welding output. Following table gives the observations of SAW processes in CC and CV mode of operation.

MAESTRO-1200 CV	MAESTRO-1200 CC
<ul style="list-style-type: none"> <li>• Power Source operates in CV mode.</li> <li>• Major Disadvantages:                             <ul style="list-style-type: none"> <li>× Large variation in welding current.</li> <li>× Penetration depth is not constant.</li> <li>× Weld material deposition is uneven.</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• Power Source operates in CC mode.</li> <li>• Major advantages over MAESTRO-1200 CV:                             <ul style="list-style-type: none"> <li>✓ Welding current is constant.</li> <li>✓ Welding voltage is maintained constant by adaptively controlling wire feeding rate.</li> <li>✓ Bead shape is fairly constant with uniform penetration depth.</li> </ul> </li> </ul>

### WELD BEAD SHAPE IN MAESTRO-1200 :



### HOW ADOR ACHIEVED SAW WELDING IN CC MODE :

To achieve CCCV characteristic is very difficult in SAW welding. The rate of melting and deposition of electrode depends on the welding current. The wire electrode is to be fed at a controlled rate to maintain constant arc length and rate of melt-off. This has been achieved by implementing an Adaptive Control Logic where if arc length is too high wire speed is to be increased till the arc length is corrected & if arc length is too short decrease the wire speed till arc length is corrected.

For SAW welding in CC mode of operation, CC power source with a wire feeder is required to automatically adjust the speed at which consumable wire is delivered to a weld so as to maintain a target welding voltage set by an operator. Wire feed speed and voltage at the weld is inversely related therefore to increase the arc voltage at the weld, the wire feed speed must be decreased and to lower the voltage at the weld, the wire feed speed must be increased. In contrast, Wire feed Speed and Current are directly related and an increase in Wire feed Speed will cause an increase in current and vice versa.

### Conclusion:

SAW with CC mode of operation is a consistent, often highly automated process, it can offer excellent weld quality and consistent, repeatable results, with minimal spatter and weld fume. These characteristics also enhance operator comfort and promote a worker-friendly environment.

The low fume and absence of an open arc contribute to greater operator comfort and safety, especially when the application involves long periods of welding.

Follow Us:



For more information on the above please get in touch with [cmo@adorians.com](mailto:cmo@adorians.com)

