

AMET Multiple Wire Sub Arc Solutions

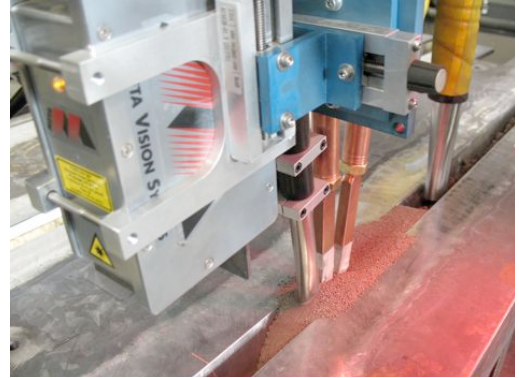
SAW Series

Multiple Wire SAW Weld Head Product Information

Introduction

The nuclear power, petrochemical, shipbuilding, off-shore, pipe mill, wind tower and other heavy industries have continue to pursue advanced SAW processes that would efficiently weld very thick components while ensuring that critical properties are achieved.

For over 2 decades AMET has been developing and producing advanced systems for critical nuclear, aerospace, medical, automotive, and heavy industry applications. AMET's Digital Signal Processor (DSP) based controls have led the industry in the digital control of welding processes. Now, with the newly released Lincoln AC/DC 1000 Power Waves and Meta's advanced sensors, AMET has utilized its digital Arc Link interface and controls to provide robust and precision systems for GMA and Submerged Arc applications.



Specifically, over the past few years, AMET has focused on specific industry needs related to the multi-wire SAW solutions. As we have developed the controls and sensor platforms to improve the control situation for various SAW applications, AMET can to realize that these industries also needed a source for well-designed, robust SAW weld heads. Thus, AMET has invested a significant amount of resources into the development of several multiple-wire, SAW weld heads. These heads not only address the necessary mechanical features required on these types of weld heads, but also include the necessary housing and junction points for the accessories we include to control the weld process. Thus our heads provide a complete integrated solution to compliment the control solutions. As a result, the control and sensor package and the weld head assembly become an effective solution.

The Team

AMET

LINCOLN[®]
ELECTRIC
THE WELDING EXPERTS[®]

META

AMET has teamed with Lincoln Electric and Meta Vision Systems to develop and produce advanced SAW systems specifically addressing the performance and reliability needs of multiple-wire SAW process:

- Ensure that the wire, power, and flux are accurately and repeatability controlled and precisely delivered during the welding process.
- Provide the operator and engineer powerful tools in a simple interface to program, control, monitor, verify, and document the process.

To this end, our multi-wire systems have incorporated all the recent advances in precision digital process control, Arc Link communications, advanced power supplies, and laser tracking, our own robust and precision servo controlled submerged arc heads to produce the most advanced SAW systems available.



AMET provides complete integrated SAW Systems for the following major applications:

Thick-Wall Pressure Vessel and Boiler applications:

- Traditional Single and Tandem wire weld heads – for Internal or External welding
- Reduced Bevel Single and Tandem wire weld heads - for Internal or External welding
- Narrow-Gap Single and Tandem wire weld heads – one model available

Spiral Pipe Mill applications:

- Tandem and 3-Wire weld head solutions for the external weld head
- Tandem wire weld head solutions for the internal weld head

LSAW Pipe Mill applications:

- 2 to 5 wire external weld head solutions
- Compact 2 to 3 wire internal weld head solutions

Wind Tower and Off-Shore Manufacturing applications:

- Tandem wire weld head solutions for linear welding, circumferential welding or for both
- Single and Tandem wire weld heads for flange welding
- Tandem SAW weld heads with GMAW torch for root pass welding

Submerged Arc Welding Systems – Control/Sensor/Weld Gear Platform

AMET Control Platform

Process repeatability, minimizing operator setup and control errors, ease of programming, reliable process verification and data acquisition are all associated with the quality and design of the control system. AMET can offer these solution thru two control platforms, the XM control and the new SX control.

The AMET XM and SX control systems are the culmination of 20 years of designing, producing, and supporting multi-processor, network based, digital welding control systems. The XM and SX use their CANBUS network to coordinate each of the Digital Signal Processor (DSP) powered modules that are dedicated to controlling each positioning or welding task. This architecture allows all tasks to be easily programmed and controlled from a single controller. As a network based system it naturally includes Ethernet to transfer programs, data, and provide system and performance information over your LAN.



All Power Wave parameters including mode (AC, CC, CV, etc), all servo axes including the torch angle (in degrees), all Meta Laser Parameters (sidewall offset, etc), and all travel parameters can be programmed for each pass and controlled by a single, powerful, and flexible XM controller.

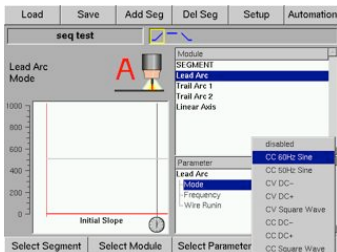
The SX is dedicated to single and tandem wire solutions only, with use of the SLS type laser sensors. The XM can be used for single to 5 wire weld heads, SLS or DLS type laser sensors and handle more complicated applications. The XM can be used to control one or two weld heads simultaneously, whereas the SX can only control one weld head.

Power Wave Power Supplies

The Power Wave 1000SD is simply the industry's most advance power supply. With input current requirements reduced by up to 50% for its new inverter-based system, customers consistently report significant energy savings over traditional submerged arc welding equipment. But the real advantage of these digitally controlled supplies is the ability, with the XM controller,

to change the mode and parameters by pass (position). This, combined with precision head and part position control, allows continuous automated welding, and in-process verification, from cap. This digital combination also provides a true tandem arc without arc interference and enables running ac/ac mode to further lower heat input and distortion.

Our XM control uses Arc Link Technology to communicate and control the Power Wave series of welding power supplies.



Meta SLS and DLS Sensor

Meta has developed two scanning laser sensors which can directly communicate with AMET's controls. Both models offer exceptional tracking capabilities for their capabilities. The SLS sensor is a single stripe based sensor with improved imaging and resolution. This sensor is an ideal solution with a joint depth of up to 40 mm, which means it can be used in applications with a wall thickness up to 80 mm, with a 50/50 joint profile and 4 to 6 mm land thickness.

META also has two spot-scanning lasers which offer excellent deep groove sight. The DLS-200 and DLS-300 have joint depth capability of 200 and 300 mm respectively. These sensors can easily view and track narrow groove type weld joints, with even a wall bevel angle of 0.5 degrees. This allows AMET a unique capability to accurately characterize the joint profile of deep, narrow grooves.



AMET and Meta have jointly developed a completely integrated interface to communicate all profile and position information. This integration allows our systems to determine where the wire and part intersect and accurately maintain sidewall offsets. Meta has also developed advanced joint profiling methods, which, combined with the XM control, allow for the travel rate to be modified and hence correct for joint variations and maintain a consistent fill. There are also options where these advanced systems can even compensate for varying root gaps. By using META laser tracking solutions, we are able to monitor the weld joint volume and make corrections resulting in AMET to optionally offer some unique adaptive fill solutions for our customers.

With the XM control and DLS tracking sensor with optional Line Tracking package, AMET can perform complete controlled root to cap pass welding.



AMET Sub Arc Weld Heads

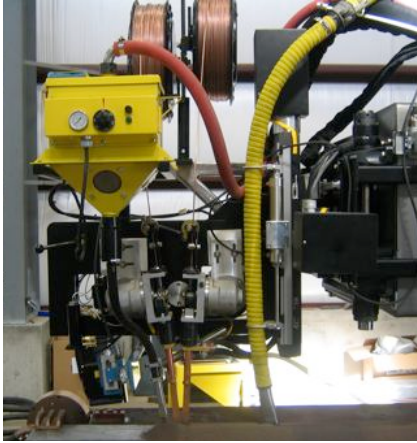
SAW Series

Narrow Gap SAW Weld Head (Single or Tandem Wire)

- Maximum Groove Depth – 350mm
- Groove Bevel - typically 1.2 to 1.5 degrees (2.4 to 3.0° Inclusive)
- Head Width 14 mm - Head Weight - 280kg, X-Y Slide and Bracket Weight - 250kg, Total - 530kg
- Individual Precision Tandem Torch Tilting
 - Servo Motor Control with Precision gearbox
 - Adjustable range – 5 Degrees Inclusive
- Precision X-Z weld head motion controls
 - Horizontal stroke – 150mm
 - Vertical stroke – 450mm
 - Precision Servo Controls for automated standoff, and seam tracking controls
- Adjustable spacing between torches – adjusting range 30mm
- Adjustable wire angle between torches 10 to 30 degrees
- See Narrow Gap Literature for more details and specifications



Reduced Bevel SAW Weld Head (Single or Tandem Wire)

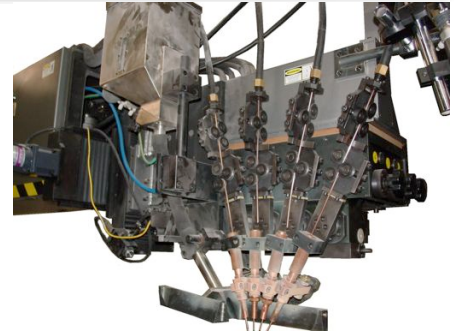
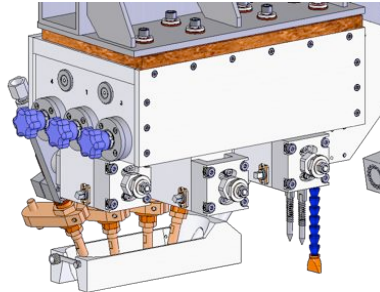


- Maximum Groove Depth – 300mm
- Groove Bevel - typically 5 to 8 degrees (10 to 16° Inclusive)
- Head Width mm - Head Weight - 150kg, X-Y Slide and Bracket Weight - 120kg, Total - 270kg
- Precision X-Z weld head motion controls
 - Horizontal stroke – 150mm
 - Vertical stroke – 400mm
 - Precision Servo Controls for automated standoff, and seam tracking controls
- Adjustable spacing between torches – adjusting range 30mm
- Adjustable wire angle between torches 10 to 20 degrees
- Includes specially designed reduced bevel contact tips, tapered and angled to allow for proper wire angle entry and proper sidewall offset position

Multi-Wire External SAW Weld Heads (2 to 5 wire)

AMET manufactures External SAW weld heads for Pipe Mill and Tower type applications. These heads vary from Tandem wire configurations to 5 wire configurations. Each head is designed with the following adjustments and features included:

- Distance between wires can be independently adjusted
- Wire angles can be independently adjusted
- Centerline adjustment between wires can be altered
- Wire Straighteners to insure consistent wire entry position
- Integrated mounting assembly for weld equipment
- Precision heavy-duty X-Z slide assembly used for locating weld head over weld joint

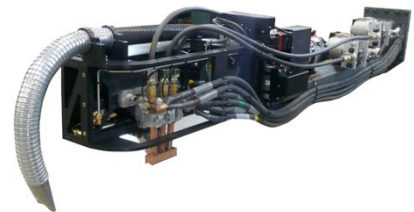


head and flux

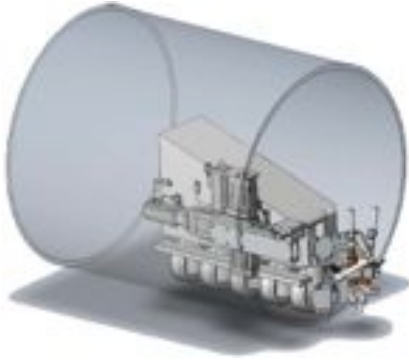
Multi-Wire Internal SAW Weld Heads (2 and 3 wire)

AMET manufactures Internal SAW weld heads for Pipe Mill and Tower type applications. These heads are designed for 2 or 3 wire configurations. We have designed heads to fit inside 18" (455 mm) diameters. Each head is designed with the following adjustments and features included:

- Distance between wires can be independently adjusted
- Wire angles can be independently adjusted
- Center line for lead and trail wire can be lined up with center wire
- Compact X-Z slide assembly to allow seam tracking of the weld joint
- Sub-structure to house wire drives and provide mounting point for head



Spiral Pipe External and Internal Weld Heads



AMET designs, manufactures, and installs welding heads and control packages on existing and new mill projects. While AMET does not manufacture pipe mills, we can provide the welding solutions for internal and external welds on spiral pipe mill projects.

On most projects, we provide tandem wire weld head solutions, but can provide 3 wire solutions on some external weld heads. Our solutions typically include:

- Precision Servo controlled X-Z slides for automatic seam tracking – one set per weld head
- META Laser Tracking sensors for precise location

of the weld head over the weld joint

- Integrated viewing cameras to allow operator to view both weld heads from one control location
- Direct integration with Lincoln Power Wave AC/DC 1000 SD power supplies
- Integration to existing Pipe Mill PLC based controls

Note: If customer is looking for a completely new pipe mill control package, including welding, we recommend contacting META. They provide complete pipe mill system control solutions for retro-fitting to existing pipe mills (one and two stage).



Standard External/Internal Tandem Wire Weld Heads



AMET also designs, manufactures, and installs typical standard tandem wire weld heads and control package, used on wind tower and pipe mill applications. On most projects, we provide tandem wire weld head solutions. These solutions typically include:

- Precision Servo controlled X-Z slides for automatic seam tracking – one set per weld head
- META Laser Tracking sensors for precise location of the weld head over the weld joint
- Integrated viewing camera(s) to allow operator

to view one or more weld heads from one control location

- Color camera solution to allow operator to view leading edge of the arc to verify torch position and overall weld process
- Direct integration with Lincoln Power Wave AC/DC 1000 SD power supplies
- Required interface junction as part of the weld head design
- Integrated flux delivery and recovery in the weld head design
- Typical head design allows for minimum diameter of 1500 mm (60")
- 90° Pivots to allow head to rotate between linear and circumferential weld positions (also available in constant centerline pivot)
- Proper cable and wire management



Worldwide Support

AMET is providing and supporting systems worldwide. AMET has manufacturing, integration, and support facilities in the US, Asia, and Europe. We have established history of developing long-term relationships with our customers. Please contact us and allow us to show you the benefits of our automation solutions.



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