AMET

NARROW GAP TANDEM SUBMERGED ARC WELDING SYSTEMS

AMET combines the latest technologies to produce the ultimate solution for

Tandem Submerged Arc Narrow Gap Applications

AMET Precision "Industrial" Tandem Head

AMET Advanced XM Controller for complete control of all positioning equipment, power supplies, and sensors

LINCOLN ELECTRIC®
THE WELDING EXPERTS®

Lincoln Electric

Advanced – Digitally controlled
AC/DC Power Wave SD Supplies

Meta Vision System

Scanning Laser
Tracking Sensor

META Welding with Vision for 25 years

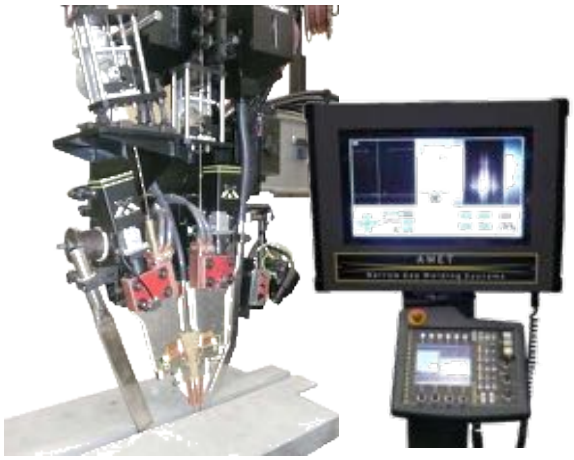
AMET

Advanced Manufacturing Engineering Technologies
25 Years of Welding Automation Excellence

Narrow Gap Tandem Sub Arc Systems

NGTS Series

NGTS Product Information



Introduction

The power, petrochemical, shipbuilding, and other heavy industries have been continuing to pursue processes that would efficiently weld very thick components while ensuring that critical properties were achieved.

The Narrow Gap Submerged Arc process has been utilized for over 3 decades with limited success, especially when utilizing the tandem (two torch method). Although the advantages of significantly reduced welding times, reduced potential for defects, and improved “as welded” properties have been demonstrated with tandem submerged arc process; the fixturing, power supply performance, and process controls have not been able to achieve the necessary precision while maintaining the robustness required for these long duration welds. The process and quality advantages have not been realized.....until now.

For over 2 decades AMET has been developing and producing advanced welding systems for critical nuclear, aerospace, medical, automotive, and heavy industry applications. AMET specializes in the digital control of welding processes and after the Lincoln released the AC/DC 1000 power supplies, AMET utilized its digital Arc Link interface to provide completely automated systems for GMA and submerged arc applications.

The Team

AMET has teamed with Lincoln Electric and Meta Vision Systems to develop and produce an advanced system specifically addressing the needs of the narrow gap process:

- Ensure that the wire, power, and flux are accurately and repeatability delivered during each pass of the process.
- Provide the operator and engineer powerful tools in a simple interface format to program, control, monitor, and verify the process.

To this end, the NGTS system has incorporated all the recent advances in precision digital process control, advanced power supplies, laser tracking of deep grooves, with its own robust, precision tandem submerged arc head to produce the most advanced narrow gap system available.

AMET provides completely integrated Narrow Gap Tandem Submerged Arc Systems including manipulators, turning rolls, flux delivery/recovery systems with following major components:

AMET Precision Narrow Gap Tandem Submerged Arc Weld Head
- Massive head designed for both precision and industrial robustness

AMET Advanced XM Control System
- Complete control system to program, control, and record all aspects of the NGTS process

Lincoln Electric AC/DC 1000SD Power Wave Supplies
- Powerful, accurate, reliable, and very efficient digitally controlled supplies

Meta Vision Systems NG Scanning Laser Sensor
- Precision Sensor for reliable sidewall offset and height control

Narrow Gap Tandem Submerged Arc Welding Systems - NGTS Series

AMET NG Head

Successful narrow gap welding must begin with the head. The accurate placement of the wire in groove requires a rigid head driven by precision servo controlled drives. The head must also be able to dissipate the heat from long continuous welds at high currents. The head must also smoothly and accurately move the torches from side to side during each pass.

The head includes the following features to achieve these requirements:

- Massive frame for rigidity, current transfer, and heat dissipation
- Servo controlled torch angle drives for programmable precision torch placement and smooth transitions from pass to pass
- Redundant wire straightening to ensure wire is accurately placed
- Servo controlled X and Z slides for precision, smooth height and cross-seam (tracking) control

AMET NG Controls

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.

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

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

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 the 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 to change the mode and parameters by pass (position). This, combined with precision head and part position control, allows continuous automated welding from root to cap.

LINCOLN® ELECTRIC
THE WELDING EXPERTS®

Meta DLS Sensor

Meta has developed a scanning laser sensor specifically for accurately characterizing the joint profile of deep, narrow grooves. AMET and Meta have developed a completely integrated interface to communicate all position information. This integration allows our NG system 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 maintain a consistent fill.

Narrow Gap Tandem Sub Arc Systems

NGTS Series

System Features

Programmable Sidewall offset -- The combination of accurate laser tracking and precision servo tilt of the wire nozzles allows the NG system to be programmed and maintain a specific sidewall offset. The XM controller also allows this offset to be overridden by the operator during welding, if enabled.

Multi Pass Sequencing – Since the XM controls all aspects of the NG system, the number of passes, the control of pass transition, and overlap positions and durations are all completely programmable.

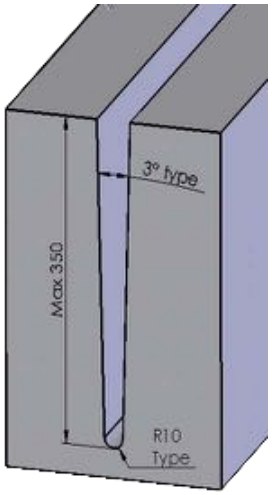
Adaptive fill – The Meta Laser Scanning system is also capable of joint volume measurements. This information combined with XM's control of the welding parameters and travel rate can be used to automatically adjust the weld to maintain even fill.

Independently Adjustable Torch Tilt -- The Lead and Trail arcs are programmed with independent tilt angles to more accurately and consistently control bead placement.

Torch Tilt Slew Rate Control -- During pass transitions, the slew rate is programmable to allow for smoother transitions from sidewall to sidewall.

Programmable Pass Overlap -- Positioning of the pass overlap is programmable to allow the pass transitions to be staggered.

Head Specifications



- Maximum Groove Depth – 350mm
- Groove bevel, typ. 1.5 degrees (min. 1.2 degrees)
- Head Width 14 mm
- Individual Precision Tandem Torch Tilting
  - Servo Motor Control with Precision gearbox
  - Adjustable range – 3 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 16 to 50mm
- Adjustable torch angle – 15 to 30 degrees
- Manual adjustment to tilt entire weld head, +/- 10 degrees from center.
- Non-conductive torch body for lead and trail torches
- 2-axis wire straighteners for both lead and trail torches
- Tandem wire feeders with 25Kg wire spool mounting – other wire delivery options available
- Integrated color viewing camera with work lamp
- Flux delivery and recovery nozzle, hopper, and mounting

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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