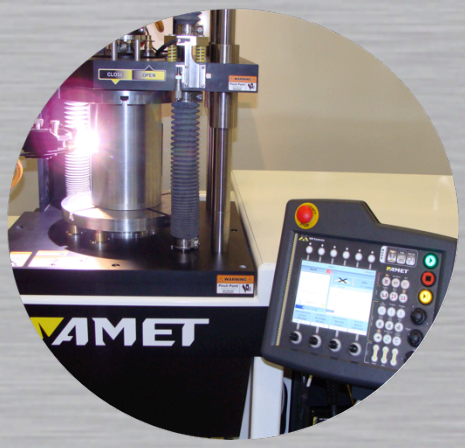
XM Weld Process Controller

Advanced Automated Welding Systems

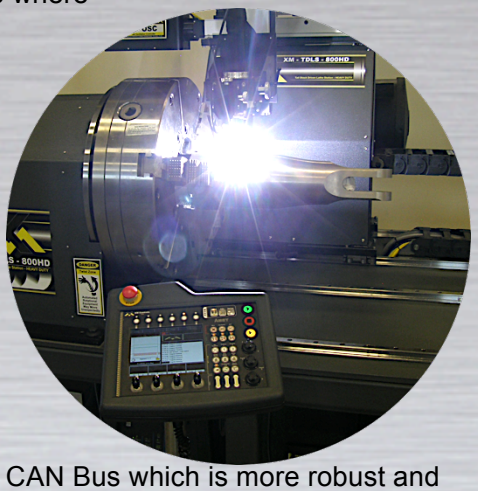
The XM is AMET's most proven Weld Process Controller. The networked architecture of the XM Controller and the XM control modules has been the foundation for 100s of completely integrated welding systems for over a decade. The versatility of the XM's modular architecture, combined with the CAN Bus communication protocol, allows AMET to provide some of the most robust and reliable welding automation solutions on the market.

The XM features a user-friendly HMI (Human Machine Interface) for weld program creation and execution. Programming is performed using a combination of "select and dial" inputs and a graphical display. Simply select a parameter and dial in the desired value. The end result is an easy-to-program controller that does not require knowledge of any special machining languages.

Advantages



- Single control interface. AMET integrates the XM Controller with the motion axes, wire feeder, welding power supply, mechanical and magnetic oscillators, mass flow controllers, safety equipment, laser seam tracking, etc. using XM control modules and a CAN Bus network. This allows them all to be programmed from a single interface point for a turnkey automated welding solution.
- High-precision motion control. AMET uses servo motors with encoder feedback on all programmable motion axes for repeatable and consistent performance.
- Long-term support. AMET has developed and maintained both the software and hardware for the XM using an embedded Linux operating system. The open-source nature of Linux allows AMET to have complete control over future OS revisions. This combination of using a Linux embedded OS with AMET produced hardware and software virtually eliminates the risk of system obsolescence.
- Tactile feedback. The XM Controller incorporates physical joysticks, knobs, and buttons allowing the operator to make control adjustments while still viewing the weld. This is much more difficult for an operator to sense that a change has been performed on a touchscreen interface where there is no tactile feedback.



- Manual overrides. The operator can make adjustments to welding parameters and the motion axes during welding operations, accounting for variations in the materials, fit-up, or weld joints. A supervisor or welding engineer can set override limits that prevent the operator from altering or overriding the parameters beyond a defined range, if desired.
- Retrofit capable. The XM can be integrated with existing fixtures such as lathes, seam welders, and manipulators to extend equipment service life and expand capabilities. The retrofits can even be performed on suitable equipment that was not produced by AMET, which can help reduce costs by reusing positioning equipment.
- Communication. The XM Controller and XM modules communicate via CAN Bus which is more robust and reliable than Ethernet. CAN Bus is used in critical applications and harsh environments, which is why it has been a required communication protocol in the US automotive industry.

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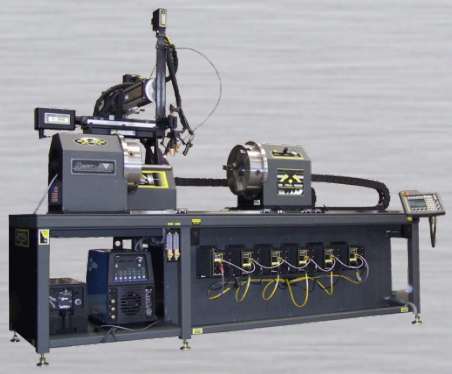
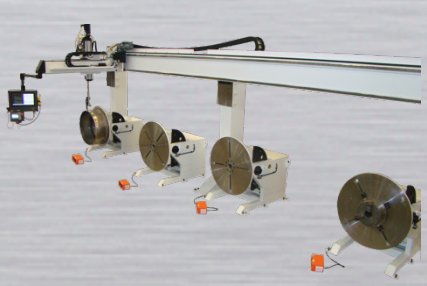
Integrated XM Systems

Using the XM weld controls, AMET has produced completely integrated automated welding systems for various applications and industries. The XM Controller, combined with the precision digitally controlled modules, provides the ability to manufacture welding systems with a wide range of capabilities and weld processes. A selection of AMET designed and produced XM welding systems is shown below.



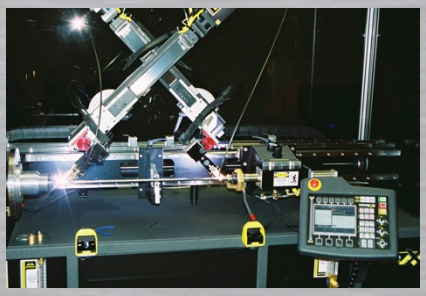
GTAW lathe with AVC, camera system, mechanical oscillation, and synchronized precision headstock and tailstock rotation for creating nuclear industry components.

GTAW and GMAW manipulator with separate wire feeders for hotwire GTAW and cold wire GMAW, AVC on both Z and X axes. Includes intersecting bore cladding capability for manufacturing oil and gas industry components.



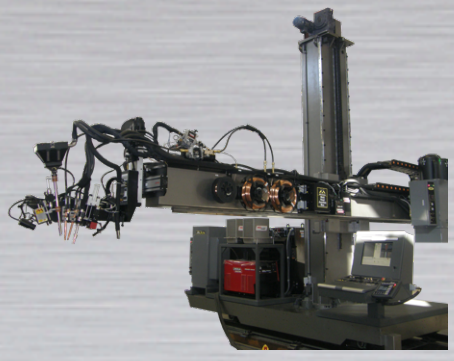
Sidebeam GTAW system with four precision positioners, laser seam tracking, AVC, wire feed, and 330 inches (8382 mm) of carriage travel.

Fully automated GMAW seam welding system for agricultural equipment manufacturing.

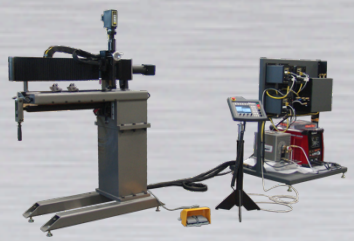


GTAW lathe with dual torch weld heads capable of performing welds at the headstock and tailstock simultaneously. Each weld head has touch retract and AVC capability.

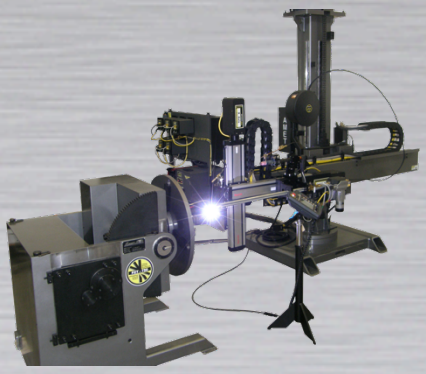
Precision PAW lathe with large pneumatic chucks and synchronized headstock and tailstock rotation for drilling industry components.



Tandem wire SAW and single wire GMAW system with motorized travel cart, laser seam tracking, flux delivery and recovery, and camera package for general manufacturing.



GTAW precision benchtop style seam welder for thin wall stainless steel hose manufacturing.



Precision GTAW manipulator system for repairing and manufacturing power generation industry valves.

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Standard Features

1. The Emergency Stop (E-Stop) button immediately terminates the weld program, stops weld current output from the power supply, and ceases all servo-controlled motion.

2. The six soft buttons each have a corresponding function that is displayed on the LCD screen. The functions change based on the selected Mode, which allows several functions to be performed by each button, streamlining the user interface.

3. The Mode buttons (Weld, Edit, and Setup) put the controller into its corresponding mode of operation. System settings are accessed in Setup Mode, weld programs are built or edited in Edit Mode, and weld programs are executed in Weld Mode.

4. The Sequence buttons (Start, Stop, and Advance) are used during weld program operation. The Start button activates the weld program. The Stop button extinguishes the arc, stops all motion, and advances to the downslope segment of the program. The operator must press the Advance button before proceeding to the next task or weld segment. The Advance feature allows for a pause or a continuous function to be included in the weld program.

5. The Function buttons enable or disable weld process specific functions such as gas flow, AVC, flux delivery, laser seam tracking, etc. These buttons also provide jogging and homing motion control for motorized axes.

6. Three joysticks are included to control up to six motion axes. The joystick control has a proportional feature, meaning, the farther the physical joystick is moved along its throw, the faster the axis it commands will travel.

7. The four encoder pots are used for “select and dial” programming. The encoder pots allow you to scroll through a list of functions by rotating the knob and then selecting the desired function by pressing down on the knob. After the function is selected, simply rotate the knob to dial in the desired value. The pots include tactile feedback with a detent for each incremental rotation, which allows the operator the ability to make override adjustments by feel without looking away from the weld.

8. One Ethernet and two USB ports are included for transferring weld programs and weld data files to and from external devices and networks. For example, flash drives can be plugged in to the USB ports for uploading or downloading weld programs. These connections are located on the backside of the XM.

Optional Features

- Automation – Ability to script up to 10 pre-weld and 10 post-weld automation tasks
- Data Acquisition and Tolerance Checking
- Virtual Alignment (Teaching Mode)
- AVC (Arc Voltage Control)
- Localization Software – Spanish, French, Korean, Russian and partial Chinese available
- Intersecting Bore Cladding
- Programmable Gas Control
- Wireless Communication
- Safety – Laser curtains, safety mats, door interlocks, etc.
- Multi-Processes/ Multiple Arc Weld Heads
- Multi-Wire Weld Head
- Laser Seam Tracking
- Barcode Scanner
- RFID Tool Scanner
- Monitoring Sensors – Heat, oxygen, humidity
- Offline Programming

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Technical Information

XM Control Architecture

Controller Configuration: The XM Controller is networked with a group of control modules for complete welding system integration. Each XM control module has its own DSP (Digital Signal Processor) and communicates with the XM Controller through the CAN Bus network. The use of DSPs allows for real-time feedback and monitoring of the welding processes and motion control.

Controller Specifications		
Specification	Value	
	Imperial	Metric
Width	12.25 in	31 cm
Height	11.25 in	28.5 cm
Weight	6.5 lbs	2.9 kg
Display (Color LCD)	6 in x 4 in	152 mm x 101 mm
Weld Segments	Up to 30 segments per program	
On-board Storage	Store 500+ weld programs	
Data Transfer	Includes 2 USB ports and 1 Ethernet port for data transfer between a PC and the XM	

Controller Manufacturing: All controller components, including the circuit boards, are developed and produced specifically for welding applications at our Rexburg, Idaho facility. AMET's in-house production ensures consistent quality and provides long-term availability and support.

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