AUTOMATION SOLUTIONS FOR ADAPTIVE WELDING

Welding automation solution that delivers high quality, reliable and repeatable welding performance

THE MOOG ADAPTIVE WELDING SOLUTION

The Moog welding automation system enables adaptive welding providing high precision, robust quality welds while improving productivity.

Precision positioning of the torch

By employing laser scanners, Moog can measure the weld groove quickly and accurately. It can also calibrate and position the torch tip with high precision. Additionally Moog integrates this capability with the wire feed and power supply thereby achieving high degree of closed loop control in the welding process.

Co-ordinate Torch Motion with Welding Process

Enables co-ordination of the torch tip motion with the welding process parameters. Automated dynamic modification of the welding process to match production variations while delivering robust high quality welds is the hallmark of the Moog solution.

Process Monitoring

The ability to process parameters and program a welding strategy along with dynamic real-time adjustments, provides the operator complete control.

The feedback and diagnostics that you receive with an integrated process ensures perfect welding up to the finish.

BENEFITS

- **Higher Productivity**
  - Fast scan times of weld groove
  - Reduced fit-up time as joint alignment does not need to be precise
  - Adaptive controls for maintaining constant fill height control eliminates strip pass welding

- **Superior Weld Quality**
  - Ability to evaluate weld joint fit-up prior to welding
  - Ability to adapt weld process to actual weld conditions
  - Control of weld start/stop features enable consistent and favorable bead transition profiles as well as precise weld bead tie-ins

- **Continuous Process Improvement**
  - Process monitoring and feedback to allow real time actions such as voltage control, real-time voltage/current feedback and power supply modulation
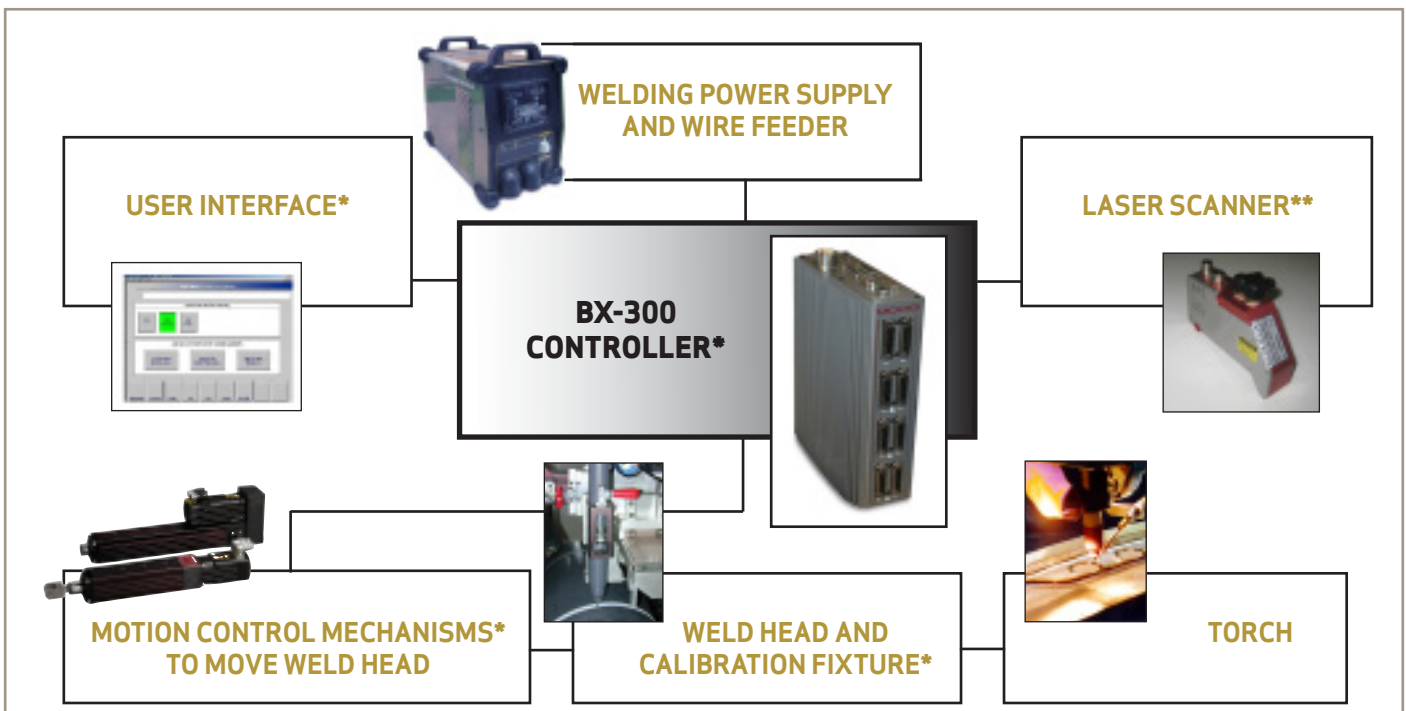
WHAT MOVES YOUR WORLD

MOOG

AUTOMATION SYSTEM FOR WELD HEAD

The Adaptive Welding System will transform your welding project into a high precision workpiece. Total integration allows for expert welding with complete control and accuracy along with full diagnostics. Every component is programmed for speed, accuracy and longevity so that you can deliver your weld product faster and consistently. At the heart of the process is the BX-300™ controller which seamlessly delivers comprehensive welding control for amazing results.

KEY COMPONENTS

- BX-300 Controller
  - Machine control center that integrates the motion control, process and weld power supply

- Welding Tool kit and Software
  - Provides an intuitive user interface

- Motion Control Mechanisms:
  - Electric Linear Servo Actuators
  - Servo Motors

- State-of-the-art Laser Scanners
  - Provides integration with precision laser scanners for precise measurement of weld groove and torch placement
  - Optional Water Cooling
  - Laser Safety Classification

- Power Supply
  - Integrates with welding power supply to deliver superior control over welding process
  - Interface Module (PSIM)

USER INTERFACE*

WELDING POWER SUPPLY AND WIRE FEEDER

BX-300 CONTROLLER*

LASER SCANNER**

MOTION CONTROL MECHANISMS* TO MOVE WELD HEAD

WELD HEAD AND CALIBRATION FIXTURE*

TORCH

*Designed and manufactured by Moog
**Supplied by Moog

COMPONENT FUNCTION AND PERFORMANCE SPECIFICATIONS

Laser Scanner	290 points / scan at a rate of 93.5 Hz
BX-300 Controller	Control center integrates motion, process and weld power supply; 0-50° C ambient operating temperature; 100 M bits Ethernet networking; 6 internally powered servo axes, 24 to 160 VDC, 10 A continuous
User Interface	Welding Toolkit enables creation of application specific weld along with an intuitive interface for set-up, configuration and diagnostic operations
Power Supplies	Interface with the following power supplies available; others in development: Lincoln Electric: PowerWave I400, PowerWave S350 and PowerWave R350 Miller: Dynasty 350 Thermodyne: PowerMaster 500
Weld Head, Laser, Torch Mechanism	Scan speed of 800 mm/sec
Automatic Calibration of Torch Tip using Laser Scanner and Calibration Fixture	Positioning accuracy of weld head and torch tip of +/- 0.015 in

BX-300™ CONTROLLER

The BX-300™ controller provides the solution. Already written, pre-integrated, and time-tested control software that dramatically reduces the need for new code development.

The combination of superb motion control, high-power drives, E-stop and light curtain systems, I/O and power supplies in a single small module—radically reducing control system footprint, wiring, and cost.

- Pre-integrated controls—reduce cost, and time to market
- Advanced software: already written, integrated, proven
- 6 internal drives, and 8 axes of motion control
- Internal E-stop and light curtain safety systems
- 46 optically isolated I/O points

WELDING TOOLKIT

Unique and powerful configurable software environment for equipment front-end modules, and welding integration and control.

- Provides an intuitive user interface for setup, configuration and diagnostic operations, eliminating the need for time consuming programming
- Enables creation of application specific weld recipes
- Enables automated modification of welding recipe to adapt to multiple variations such as in weld specimens, torch placement in weld head and weld specimen fixturing

WELD POSITIONING SYSTEMS

Moog has a wide range of building blocks of brushless electric motors, linear servo actuators and servo drives to design and manufacture weld head positioning systems as well as fixtures for holding the weld pieces.

- **Advanced Ball Screw Design**
- Higher efficiency results in increased continuous force rating as well as reduced energy consumption
- Higher dynamic load capacity provides up to 2x the life of competing technologies

- **Quick Start-Up**
- Simple mounting means lower installation times
- Automatic configuration of actuator through intelligent drive

LASER SCANNERS

Integration with Moog supplied/third party laser scanners for improved performance in torch placement and weld groove measurement

POWER SUPPLY INTERFACE MODULE (PSIM)

Ability to interface with a wide range of commercially available power supplies to help deliver a high performance welding solution.

- Integration can enable both better welding and improved diagnostics

AUTOMATION SOLUTIONS FOR ADAPTIVE WELDING THAT WORK FOR YOU

OFFSHORE PIPE WELDING

Moog controllers seamlessly manage real-time machine, motion, and welding process control in an offshore pipe laying application. The shipboard systems have 5 welding stations—each with 6 arc torches, and 14 servo axes. The precise location of each weld tip, and all important welding parameters, are continuously controlled to ensure weld quality. The systems have set numerous records for joint weld production rates.
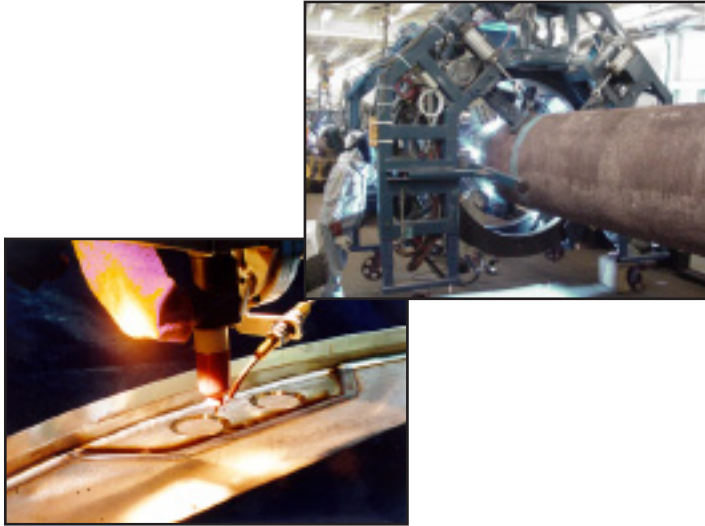
NUCLEAR CANISTER WELDING

Sealing dry storage canisters of "spent" nuclear fuel requires welding automation to limit radiation exposure of workers. The nuclear power industry's most automated, reliable, and respected automated welding system is powered by a Moog machine controller. It provides machine, motion, and comprehensive welding process control.

TOTAL RELIABILITY

For 25 years, Moog has incrementally improved the pre-integration of motion and machine controls. Controls pre-integration enables you to get new machine designs to market faster. It means your development schedule will be more reliable. It means your product design will be simpler, and more mature – from day one.

DESIGNED FOR EASE OF INTEGRATION

The Moog Adaptive Welding Solution is a composition of dynamic state-of-the-art hardware and software components, each designed with the purpose of adding value to new and existing welding systems.

Moog has offices around the world. For more information or the office nearest you, contact us online.

www.moog.com/industrial

This technical data is based on current available information and is subject to change at any time by Moog. Specifications for specific systems or applications may vary.

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