BX-300™
MOTION AND MACHINE CONTROLLER

Pre-integrated hardware and software platform for machine control

Machine builders need a cost effective way to improve machine throughput, maintainability, and reliability to support the demands of future business.

Control system complexity, and unreliable software development schedules, are problems demanding a different approach to machine design.

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.

Hardware and software pre-integration that reduces machine development costs, and speeds time to market.

ADVANTAGES

- 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
- Ethernet: host and HMI connection; axes and I/O expansion

INDUSTRY APPLICATIONS

Moog controllers can be found in various industries including wafer handling, winding applications, metalworking and welding.

Moog is a leading developer and provider of flexible automation solutions to applications as diverse as nuclear welding and semiconductor wafer handling.

Throughout its 25 year history, Moog has approached motion control as a discipline. Successive evolutionary generations of highly-integrated, motion and machine controllers—the BX-300™ being the latest—have delivered world-class system performance integrity. Company capabilities include multi-disciplinary engineering expertise to deliver motion, process, and turnkey motion control solutions.

BX-300™ MACHINE CONTROLLER

All inside:

Ethernet

Safety

Drives

Controller

I/O

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

Putting the BX-300™ to work on your motion control challenges is simple when you consider the range of performance features it offers:

Internal Drives: One BX-300™ provides 8 axes of motion control, and 6 internal servo drives—simplifying purchase, integration, and wiring. The built-in drives support brushed and brushless servo motors, including linear motors—supplying up to 10 amps of continuous motor drive current.

E-stop & Light Curtain: Built-in systems support E-stop switches, light curtains, and other safety devices. Safety interrupts are handled by the controller's error handler. Force guided contactors inside the BX-300™ disconnect drive power.

Single Cable Connections: A single connectorized cable provides both power and feedback motor connections for each axis.

High Speed Internal I/O: The controller provides 46 optically isolated, configurable digital I/O points. All machine and inbuiltI/O states are known in real time.

Ethernet: The controller's 100 Mbit/s Ethernet port supports host and HMI (Human Machine Interface) connection, controller networking, and I/O expansion. All machine states and variables are shared through this fast, ubiquitous, and low cost bus.

64-bit RISC Processor: A 64-bit RISC processor manages all sequencing, motion and I/O logic control. All variables and calculations are performed with double precision floating-point math.

Space Savings: In addition to its small inherent size, a smart, rugged aluminum, finger-safe design, means many BX-300™ applications do not require a controls cabinet.

Integrated Software: A functionally rich, advanced on-line development and runtime software environment is included with the BX-300™. It includes a great deal of already written, time- and application-proven, software that dramatically reduces the need for new code development. Development time and cost are reduced. Product integrity is enhanced.

Integrated Error Handling: The controller features much firmware-resident error handling—providing increased state information and safety, without requiring extensive programming.

Programmable Application Layer: BX-300™ software supports user defined commands to customize software functionality.

Integrated General Loop Controllers: The controller software includes integrated servo loops (PIDs) for position, velocity, and torque control, general purpose controllers (GLCs), and analog and digital I/O logic to handle demanding process control applications. All servo, GLC, and I/O logic are tightly coordinated via a common state information database.

Autotuning: Integrated autotuning capabilities provide simplified servo tuning to ease commissioning and maintenance.

Electronic Line Shafting: ELS electronically links the motion of one axis (slave) to another axis (master), providing a flexible and programmable relationship between those axes.

Cam Profiling: Tightly coordinated non-linear motion profiles can be commanded by user defined position-based tables to specify a relationship between any master axis and its slave axis.

Programmable Limit Switch: PLS can electronically actuate control functions at specific points in a machine's lineshaft cycle—in full coordination with the rest of the machine operation.

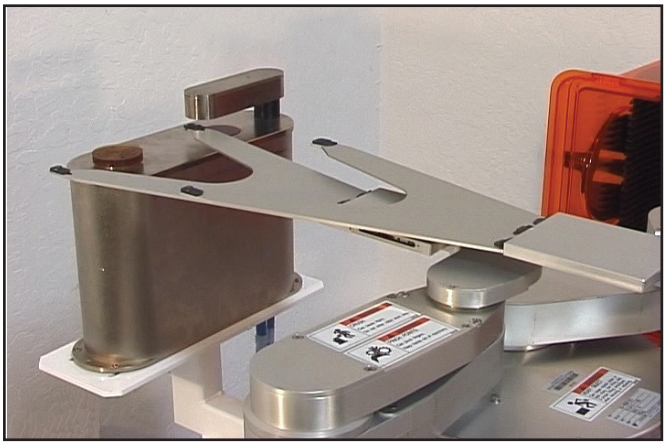
Flying Position Measurement: High-speed capture of position supports the most demanding of registration, flying shear and similar applications.

Diagnostics: Advanced controller-resident diagnostics simplify and speed machine maintenance and fault isolation.

APPLICATIONS

WAFER HANDLING

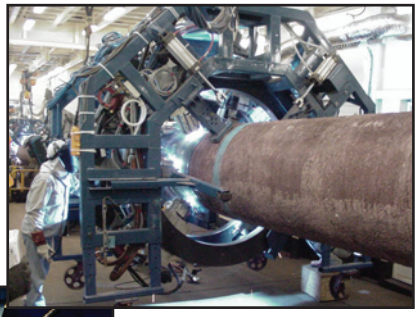
BX-series controllers move semiconductor wafers as precious as Ferraris, rapidly with sub-millimeter precision, in a variety of demanding fab cleanroom processes. Controller capabilities uniquely enable automation of robot calibration—improving fab tool reliability, while dramatically reducing downtime.

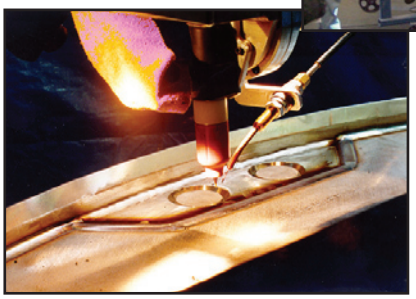


WELDING

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.

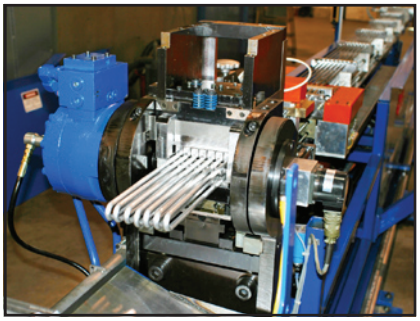
WINDING

Production processes that wind glass optical fiber require extraordinary precision and speed. In one of several optical fiber applications, a BX controller runs an advanced spooling and transferring takeup machine at fiber speeds over 45

m/sec (100 mph). And when one spool gets full, the fiber is automatically transferred to a second spool—with no slowdown, or interruption of the sensitive glass preform draw, and thus providing a dramatic productivity enhancement.

METALWORKING

A multi-decade builder of Hairpin Benders (machines that form tubing for heat exchangers) replaced a PLC-based control system with a BX controller—which directly controls both electric and hydraulic axes. The results: reduced complexity, panel size, and wiring; critical hairpin size tolerances improved by more than 300%; higher production throughput; simpler operation; and reduced downtime.



SPECIFICATIONS

Controller Performance

- 64bit RISC processor
- Multitasking of servo control
- Expandable to 56 axes with networked controllers
- 6 internally powered servo axes, 24 to 160 VDC, 10 A continuous
- Drives brushed & brushless motors

Software

- Functionally rich, on-line development and runtime software environment
- Advanced firmware-resident error handling; much already written software
- Programmable application layer eases interface to existing systems
- Integrated servo loops (PIDs), general purpose controllers (GLCs), and I/O logic
- Servo, GLC, and I/O logic tightly coordinated via a common state information database
- Electronic Line Shafting, Cam Profiling, Programmable Limit Switch, Flying Position Measurement
- Integrated autotuning, and advanced controller-resident diagnostics

Internal I/O

- 14 Digital outputs, 24 VDC
- 32 Digital inputs, 24 VDC
- Pre-integrated E-stop circuit
- Pre-integrated drive power interrupt circuit
- Connectorized to reduce point-to-point wiring
- I/O expansion via distributed Ethernet modules

Connectivity

- 100 Mbit/s Ethernet networking
- Multi-controller network
- Windows XP/2000/NT interface
- Accessories:
  2 or 4 channel serial port module

Power Requirements

- Drive Power:
  24 to 120 VAC, 1ph/3ph, 50/60 Hz
  1600 W continuous
- Control Power:
  24 VDC, 1.7 A plus requirements to power I/O points (10 A max)

Physical

- 290 mm x 219 mm x 86 mm
  (11.425 in x 8.6 in x 3.375 in)
- 5.2 kg (11.5 lbs)
- Panel mount, to back or side

Environmental

- 0 to 50 °C ambient operating
- 0 to 95 % relative humidity, non-condensing
- Integrated fan cooling

Test Marks/Regulatory Compliance

- TUV of North America:
  Certified to IEC61010-1
- CE (EMC):
  EN61326; for Emissions
  EN61326, EN61000-4-2, EN61000-4-3:2002, EN61000-4-5, EN61000-4-6, EN61000-4-11; for Immunity

12 INCH LCD COLOR TOUCHSCREEN

The Moog TS-5112 is a 12.1 in. SVGA TFT LCD touchscreen user interface ideal for use with BX-Series controllers.

The unit features an Al-Mg housing, and a NEMA4/IP65 compliant front panel.

It is provided with Microsoft Windows CE .NET operating system installed, and has an Ethernet port, four serial ports, and two PS/2 ports.

AC AND DC SERVOMOTORS

Moog offers AC and DC servomotors to complement its

machine controllers, and simplify your automation integration task.

Offered servomotors feature integral position and velocity feedback elements, and single-connector connectivity. Available options include brakes, shaft length, and encoder resolution.

To complete the single cable servomotor-to-controller connection, Moog manufactures cables to your length requirements.

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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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