

YASKAWA

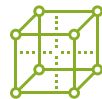
Forward in 3D

Advanced Motion Control for Additive Manufacturing



Moving Your Machine Forward

Bring new precision
and performance to every
stage in your development.



Rise above the desktop

Shaky, imprecise desktop machines become robust industrial performers with motion control that overcomes vibration, boosts speed and gets you ready for tomorrow's hybrid technologies.



Advance the industry standard

Industrial quality printers benefit from Yaskawa's smooth and precise motion, plus worldwide support that distinguishes your machine in a crowded marketplace.



Restate the state of the art

Top tier manufacturers need new ideas, plus the engineering support to make them work. Yaskawa supplies both, using the latest linear and robotic motion systems and Singular Control to create a seamless, supportable development environment, whatever the future may bring.

The Next Step

Yaskawa prepares you for the hybrid future of additive manufacturing.

Yaskawa improves performance from Day One, but we don't stop there. Our motion control technology also prepares you for new frontiers in additive manufacturing:

- Robotic systems that produce curvilinear motion for true 3D deposition
- Additive/Subtractive technology which combines the benefits of 3D printing and traditional routing/machining



**ADDITIVE /
SUBTRACTIVE**

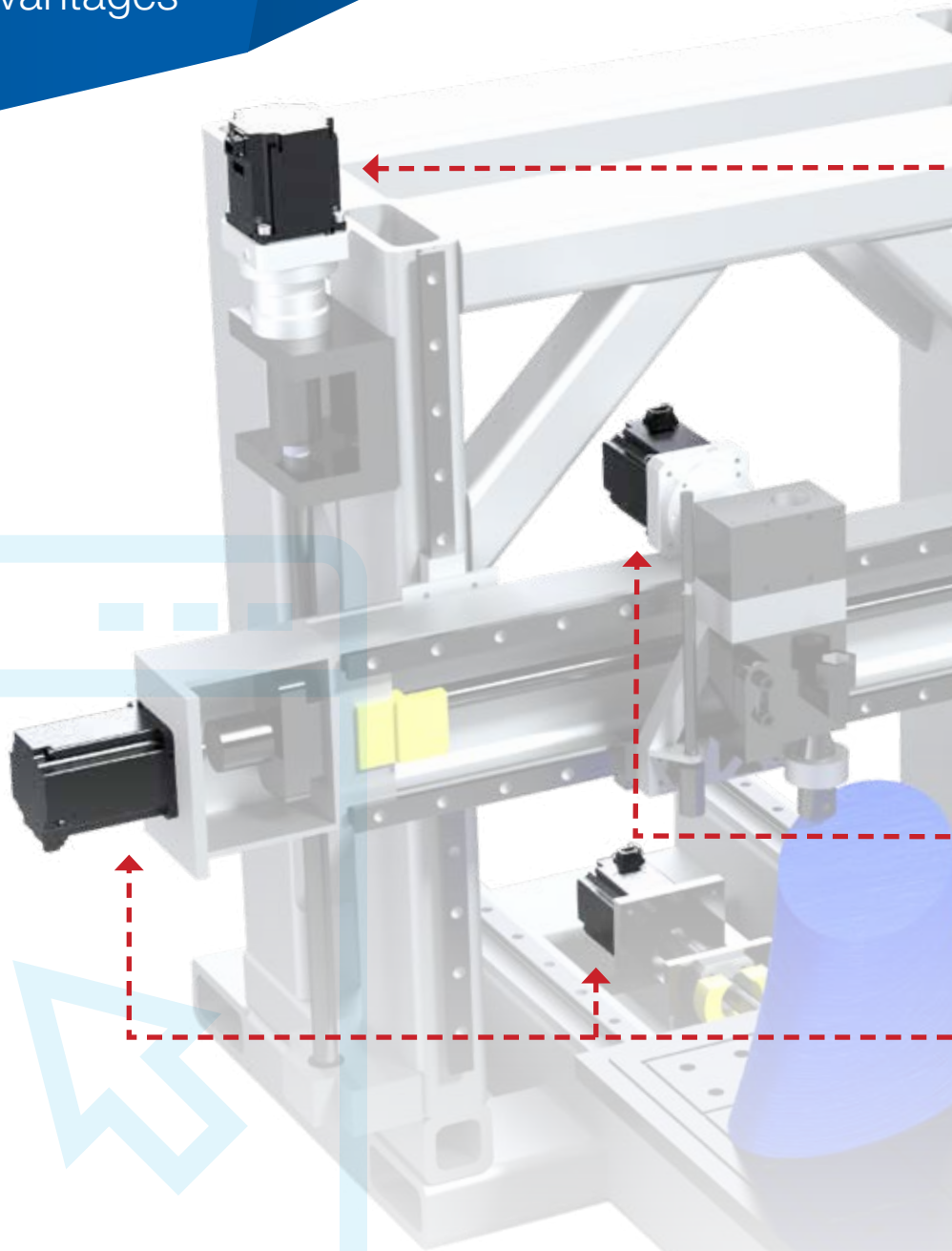


Smoother, Faster, Smarter:

The Yaskawa upgrade advantages

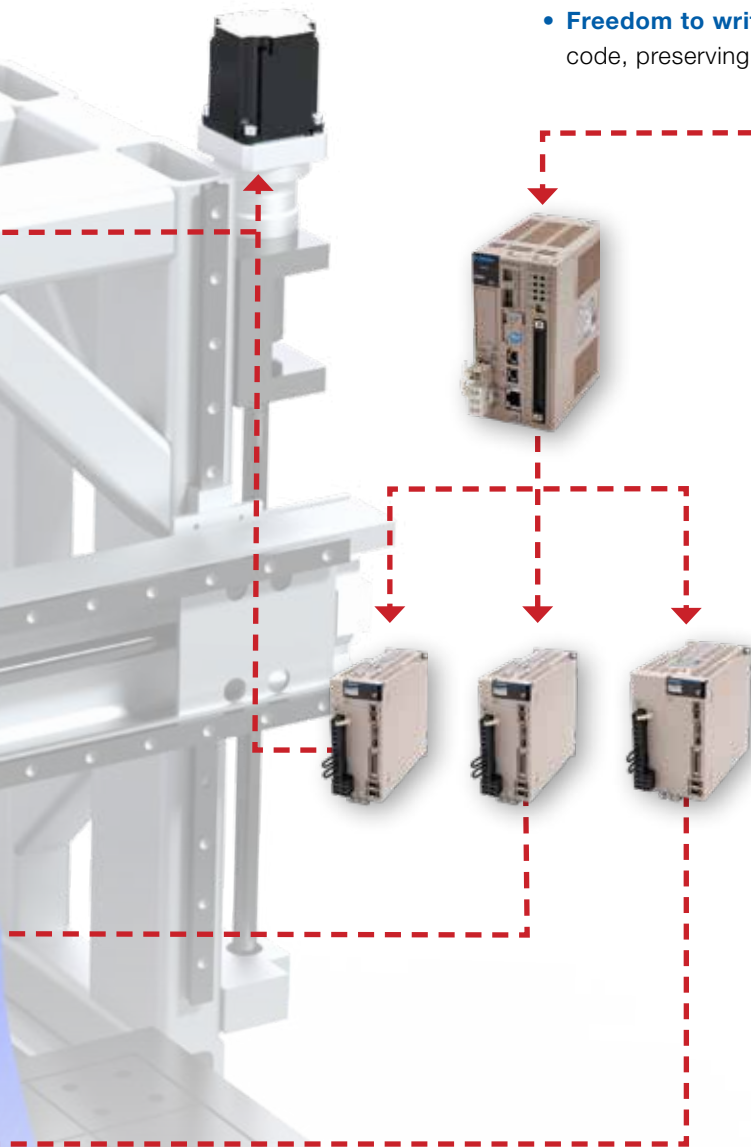
Sigma-7 Servo Motors: Step Up to Smoother Speed

- Industrial quality servos eliminate stepper motor torque ripple
- Ramp up machine acceleration for faster move to point speed and higher print resolution
- 24-bit absolute high resolution encoders for axis and extruder accuracy, synchronization and jam protection
- Super low 0.007% failure rate, documented in tough machine tool applications



Yaskawa Compass™: Your CNC Navigator

- **Save time with built-in configurations.** Choose from a variety of pre-developed, ready-to-use plugins for 3D printers
- **Simple, quick customizing.** Easily amend a style library to match your company's custom colors and logos, enhancing a machine's brand identity.
- **Develop your own plug-ins within Compass.** Use the Compass interface to create your own custom screen functions, then store and utilize them in a future machine or in other Compass projects.
- **Freedom to write your own code.** Compass will integrate your existing computer code, preserving your company's existing software assets



MP3300iec: G-code Meets Industrial Strength IEC Control

- Continue using RepRap G-codes within a professional IEC 61131-3 programming environment
- Stream large G-code files from a host PC without excessive buffering
- Step up to an industrial strength machine controller, built for reliable connection and easy field service
- Ready made tools, bed leveling surface compensation, extruder advance pressure control, temperature and stepper control
- Control of extruders and auxiliary stepper axes

Sigma-7 SERVOPACKS for Superior Surface Finish

- World class vibration suppression cancels out machine resonances
- Built-in ripple compensation yields a smoother finished part
- Industry-leading 3.1 kHz frequency response
- Multi-network capable: MECHATROLINK-III, EtherCAT, Modbus, Analog and Pulse
- Built-in safety features with IEC 61508, SIL 3 Safe Torque Off

The 4th Dimension: Yaskawa Support

- Design help, plus assistance with motion system specifications
- System start-up and on site machine commissioning
- Online and in-person training in system design, motion programming and servo installation
- The worldwide support and repair service of a \$4 billion company with offices in 25 countries and 40 full service affiliates across North America

One Controller for All Motion



**MULTI-AXIS GANTRIES
AND ENTIRE MACHINES**

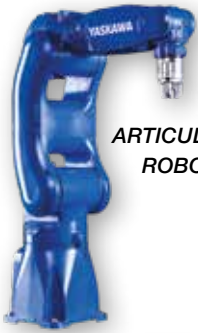


MP3300iec Multi-Axis Machine Controller

A single MP3300iec machine controller can operate gantries, robots, servo axes, G-code machining equipment—any motion device necessary to implement the latest advances in hybrid manufacturing. Also, it can operate articulated robots, robotic gantries and special robotic mechanisms, often without the need for a separate robot controller. It is possible to control all the robots and servo axes in an entire automation system from a single MP3300iec.

- Up to 62 axes of motion
- Multi-axis synchronization
- 5-axis simultaneous control
- Built-in web server lets you check status or run diagnostics through a standard web browser
- Networking options: Modbus TCP, EtherNet/IP, MECHATROLINK III and OPC
- Easy interface with HMI and I/O solutions

MP3300IEC



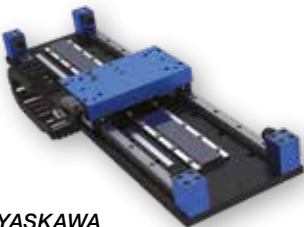
**ARTICULATED
ROBOTS**



**DELTA
ROBOTS**



**SIGMA-7
SERVO SYSTEMS**



**YASKAWA
LINEAR MOTION SYSTEMS**



SLIO I/O

Control Many Devices with the Same G-code

- A complete family of robots for additive/subtractive manufacturing and material handling
- MPP3S Delta robots
- GP7, GP8, GP12 and GP25 articulating robots
- Any type of gantry, T-Bot and H-Bot robotic mechanisms
- SIGMA-7 Servo Systems: fast and precise rotary, direct drive and linear models, with advanced autotuning software

The list of compatible devices is growing constantly, and code is also available to add your own custom mechanism.



PLUS: Engineering Help

Yaskawa's Engineered Systems Team of control engineering experts are ready to help with anything from simple servo indexing to specialized robotic mechanisms.

This capability is backed by 50+ years of service and support expertise.

One Software: *MotionWorks*[®] IEC PROFESSIONAL

If you are familiar with the conventions of IEC 61131-3 programming, you will be instantly at home in MotionWorks IEC. It was created to be as fast as it is familiar, with time-saving features that speed up results.

MotionWorks IEC was built on the conventional tools that automation professionals already know and trust:

- G-code execution
- Custom kinematics
- Sequential Function Charts
- Function Block Diagram
- Structured Text
- Ladder Diagram
- PLCopen Function Blocks, including Part 1, 2, 4 and 5

Yaskawa Toolboxes use application code for higher level automation tasks, created by Yaskawa experts in application programming. The range of tasks includes:

- Reusable motion code libraries to cut down the time and tedium of standard operations
- A built-in cam editor with ten powerful camming function blocks



Yaskawa is the leading global manufacturer of low and medium voltage variable frequency drives, servo systems, machine controllers and industrial robots. Our standard products, as well as tailor-made solutions, are well known and have a high reputation for outstanding quality and reliability.