Technologies That Make a Difference

Leading system integrators provide a glimpse of successful motion control solutions

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If you're looking for engineers who have mastered the art of building effective motion control systems, chances are you'll find many of them at integrator companies.

These are the firms that many busy OEMs look to when it is time to upgrade a packaging machine, design an inspection station, or tackle another challenge that demands an expert blend of controls, drives, motors, and actuators.

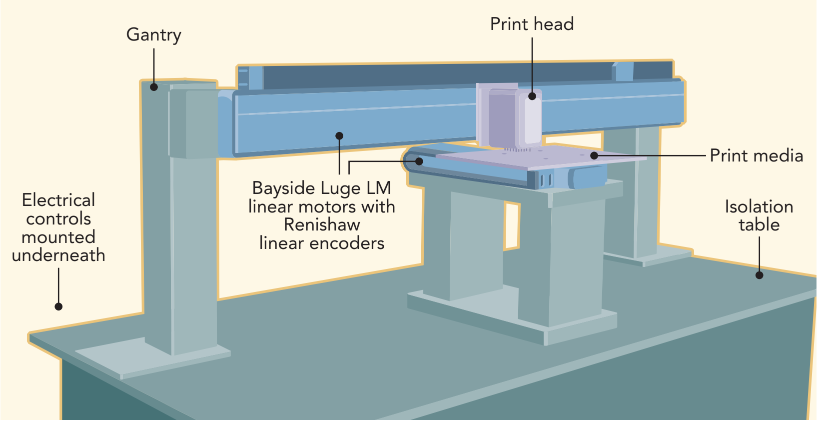
Since it's their job to stay on top of the fast-moving field of motion control, integrators are constantly surveying the vendor waterfront for new ideas in hardware and software to enhance their motion control designs.

Recently, *Design News* asked engineers from three well-known integrators to walk us through a successful project where wise use of motion control components made the difference.

Test Stand Helps Measure Print Quality

Spectra Inc., a leading manufacturer of large ink-jet print heads for billboards and other commercial applications, wanted a better understanding of the effects of print head motion on print head operation.

To meet that need, the Lebanon, NH company called on Axis New England, a value- added reseller of motion control products and systems for high-tech applications, to design a special test stand. Spectra wanted to look at how lateral acceleration of the print head at high speeds affected ink flow and ink output from the print head. In addition, the test system would help verify the quality of scan printing at high speed and would support print design verification testing and design manufacturing testing in a scan printing environment.



Axis New England designed a special test stand for assessing print quality of large commercial ink-jet printers. The servo system features linear motors and 0.5-micron encoders for position feedback.

Axis New England (Woburn, MA) provided Spectra with a two-axis, gantry-style motion system consisting of components from four vendors. The solution includes: a high-speed, 1,400-mm, travel X-axis for shuttling the print head, and a 300-mm, travel Y-axis for incrementing the print media. The system had to induce acceleration on a 4 kg print head up to 2G, reaching a velocity of 2 m/sec in 200 mm. In addition, to meet the positional demands of ink-jet printing, it needed a repeatability of 1 micron, an absolute accuracy of 10 micron, and absolutely no backlash.

To answer these stringent requirements, Axis specified Bayside Motion Group's Luge LM series linear motor on both the X and Y axes, with Renishaw 0.5-micron linear encoders for position feedback. The stages were mounted and laser aligned on a custommachined steel gantry to provide adequate stiffness. The designers then mounted this assembly to a Newport RS series optical-grade, isolation-damping table. The structure had a natural frequency greater than 100 Hz to eliminate any vibration disturbances that could interfere with the system's positioning and velocity smoothness and cause poor print media output.

For the central controller, Axis engineers specified a Delta Tau PMAC2A/PC104. It incorporates an 80 MHz 56300 series Motorola DSP to provide up to eight axes of motion. Communication capabilities include 10/100 Ethernet, as well as USB2.0 for exchanging data with the host PC software interface in the system. Dual-ported RAM for communications of the PC/104 bus is also an option.

The designers selected this control system for its outstanding servo loop closure and its ability to output a direct PWM (pulse width modulation) signal to Copley Controls' new Xenus series brushless servo amplifiers. These amplifiers can accept the controller's direct single-phase PWM reference signal, which represents the output current required by the motor. This pure digital solution eliminates any control system latency found in traditional analog output servo controls and analog input servo amplifiers.

In short, this control scheme, coupled with a high-resolution linear feedback encoder, results in an extremely responsive servo system that is capable of the demanding move profiles required in this application. *–Gregory Ellrodt, senior systems engineer, Axis New England, (781) 937-0411*

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