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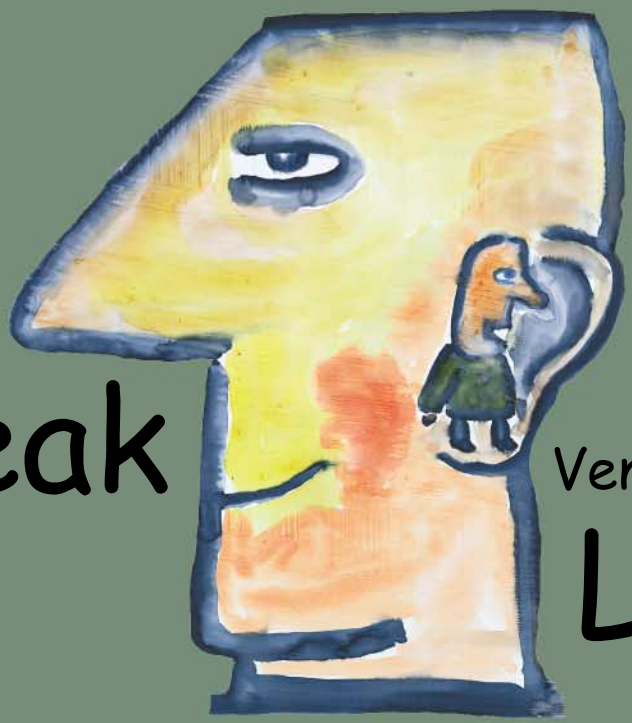
Machine Builders Speak Vendors Listen



YOU CAN INFLUENCE THE WAY SUPPLIERS DESIGN THEIR CONTROL SYSTEM PRODUCTS

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There are thousands of control system hardware and software products on the market, says the machine builder, but none of them meets my specific requirements. Sound familiar? Machine, robot, and skid builder OEMs are often frustrated because products designed for the mass market don't meet their particular needs, and there's a big emphasis these days on making do with off-the-shelf commercial components.

It turns out that smart industrial OEMs definitely can influence how vendors design control systems. In fact, in many circumstances, industrial OEMs have unique power over vendor product design.

As a result of this influence, machine builders can design control systems that work well, are successfully received by customers, and provide opportunities for a continuous infusion of performance features.

"OEMs can exert a powerful influence on vendor product design because of enormous purchasing potential and because of stable, repeatable procurement rates," says Brian Prescott, senior engineer in advanced development with machine builder Cookson Electronics Equipment (www.cooksonelectronics.com), Londonderry, N.H.

OEMs have purchasing power because many of them buy in larger quantities than end users, adds

Sometimes it is necessary to modify not only the motion controller firmware and functionality, but also the packaging and the form factor.

Dave Umland, PE, senior controls engineer with the Energy Services Div. of General Electric (www.ge.com), Loveland, Colo.

"The true Holy Grail for product vendors is an OEM application," says Karl Leeser, vice president of engineering for a materials processing equipment builder. "These applications often require higher levels of technical support than end user accounts, but the rewards come in the form of serious repeat business for the same product, in the same configuration, over and over again."

Many industrial OEMs are content to maintain these relationships for long periods of time. "If a control system component designed into an industrial machine maintains reliability and cost, there is no reason to spend engineering resources to change it," says David Lee, manager of product development with Automated Assemblies Corp. (www.aac-robot.com), Clinton, Mass. As a result, "OEMs have a bigger voice in product design than they realize."

OEMs not only have tremendous buying power, they are also one of the best sources of feedback for control system vendors. "OEMs often become the end user's messenger/representative," says Greg Borsos, electrical engineering manager with Weiler Labeling Systems (www.weilerls.com), Moorestown, N.J. "They get feedback from all their customers, and they channel this input back to [device and component] vendors."

Smart vendors will bend over backwards to win and keep a good OEM account, and that often includes a high degree of product customization based on OEM needs. While vendors design to a common denominator to pump up volumes and reduce costs, OEMs want only what they need and no more.

Many vendors recognize this and are addressing requirements by using industrial OEM input when designing their products, building products that can be easily customized, and building full-custom products. OEMs have perhaps more power and influence over vendors than any other customers, and we'll show how savvy OEMs use this influence to get the best products for their applications.

Yes, They Do Listen

Nearly all vendors claim to use customer input when designing new products, but some demonstrate more of a commitment than others. Parker CTC (www.ctcusa.com) has a formal software design process that ensures thorough consideration of machine builder input. One of the methods used to get this input is a user story. Each story consists of a few sentences describing the use of the product by a customer.

Weiler Labeling Systems was one of the key participants in the design of Parker's InteractX opera-

tor interface software. Weiler designs and manufactures labeling machines for the personal health care and pharmaceutical industries (Figure 1). Its user story led to the inclusion of features that facilitated FDA compliance with electronic signatures.

"With InteractX, our pharmaceutical customers now have the option of meeting the requirements placed on them by 21 CFR Part 11, which deals with handling of electronic records on computer systems," says Borsos.

USNR (www.usnr.com), Woodland, Wash., makes sawmill machinery, and its Perceptron division is responsible for optimization and controls. Wade Hendrix, Perceptron's electrical engineering manager and product team coordinator, participated in an in-depth product development survey conducted by Delta Computer Systems (www.deltamotion.com). Delta says the survey was used to develop design specifications for a new motion controller.

Hendrix was both surprised and pleased by the depth of the survey. "Delta visited our facility and we went through several pages of pointed, leading questions about how its products could be improved for the future," says Hendrix. "This is the first time I've participated in this level of a survey regarding a new product design."

These types of focused interviews often reveal weaknesses in a vendor's current product line and are thus sometimes avoided. "Other vendors just usually ask me what other features we need, but Delta instead took the time to lead me toward things it was already thinking of implementing," adds Hendrix. "Delta wanted to develop a consensus that its customers really needed these improvements."

Valued Software Advice

Software products lend themselves to continual customer input and feedback because these products are usually easier to modify than hardware products. Tegron (www. tegron.com) in Longview, Texas, is a system integrator serving OEMs and other clients. Rockwell Automation (www.software.rockwell.com)

FIGURE 1: CONVERSATION CODIFIES COMPLIANCE

Weiler

Weiler Labeling Systems' participation in the design of new operator interface software led to the inclusion of features that facilitated FDA compliance with electronic signatures.

views Tegron as a particularly innovative firm and listens closely to its input when designing and modifying RSLogix PLC programming software.

According to Daniel Parrish, Tegron vice president of engineering, Rockwell Automation worked with his company and explored the process used by Tegron to develop software applications. This led to a host of product improvements, including a new feature that automates the input and reuse of tag-description information. "This feature will save us hundreds of man-hours over the development cycle of many projects," says Parrish.

Like many system integrators and OEMs, Tegron often adds custom code to vendor software products to improve performance. Rockwell Automation examines custom improvements made by customers and then incorporates the best and most widely needed improvements into the subsequent revisions of its products.

HMI software is another product that lends itself to improvement through industrial machine builder input. Cutler-Hammer (www.cutler-hammer.com) made significant upgrades to its operator interface products based on input from companies, including Minster Machine Co. (www.minster.com), Minster, Ohio. The company makes mechanical power presses and related auxiliary equipment for the material-forming industry (Figure 2).

Two of the most significant changes for Minster were quick screen updates and expanded memory. "We were running old Panelmates to the limit of their memory, forcing us to scale back on the number of objects on a screen," reports Dave Schmitz, senior electrical engineer with Minster. "We now can run large applications in multiple languages with desired numbers of objects. We also had screen repaint times in the 10 sec. range that are now almost instantaneous."

In addition to incorporating requested features in new products, Cutler-Hammer also provides cus-

FIGURE 2: MEMORABLE MEETINGS

Minster

A meeting of the minds of Minster Machine Co. and its operator interface vendor justified design enhancements to increase memory for the OI on its mechanical power presses and related auxiliary equipment.

tomization services to Minster. "They private-label products for us, allowing Minster to customize the outward appearance," adds Schmitz. "Cutler-Hammer also preconfigures its products to our specifications. This saves time when the product is commissioned, as all the correct drivers and executive software are preloaded on the units."

When a vendor develops a product for a new market, industrial OEM input is critical in the product development process. National Instruments (www.ni.com) has a long history in lab-based test and measurement, and many of its customers in these areas are industrial machine builders. One of these customers builds materials-processing capital equipment.

The machine builder, requesting anonymity in this article, had substantial previous experience with NI products and recognized the time savings that could be realized by developing the next-generation machine control systems with LabView. To accomplish this, the company needed a compact, field-mounted controller with integral I/O. Its need, along with similar requests from other OEMs, led to the introduction of NI's Compact FieldPoint product.

According to engineers at the OEM, they pressed NI for a long time to get a true embedded solution with multiple serial ports, and they finally got what they wanted. Cost per I/O point remains higher than they would like, but they believe that can be sorted out through judicious use of supplier agreements.

Designed for Customization

While vendors that incorporate customer input into new product designs are enormously helpful, machine builders often can't wait for next year's model to get the features they need. Other industrial OEMs require features unique to their machinery and cannot count on vendors to add these features to their products. In both instances, vendors can satisfy these requirements by designing products that can be easily customized.

Custom modification of standard products is often preferable to full custom designs. Full custom designs have high up-front costs, frequently have long lead times, and often have questionable reliability due to their one-of-a-kind nature. Vendors and machine builders find customized products based on standard designs can alleviate these problems.

Cookson Electronics Equipment manufactures and sells machines that automatically dispense adhesive, encapsulants, and sealants for printed circuit board and semiconductor packaging applications. Its systems include gantry mechanisms carrying specialized liquid-delivery systems. Motion controllers are responsible for controlling the axes of motion, the delivery systems relative to gantry motion, and the I/O and motion associated with the transport of product into and out of the machine.

"We asked the controller supplier, Galil (www.galilmc.com), to supply different pull-up resistors for our inputs, and this was easily and quickly handled," says Cookson's Prescott. He reports Galil made a number of product changes for his company, and firmware changes have been equally easy to facilitate. "On older board designs we requested changes to the minimum on-time capability of digital I/O," adds Prescott. "On newer systems we needed additional phantom axes to allow electronic gearing of multiple pumps."

TOP FIVE REASONS THAT DRIVE VENDOR PRODUCT DEVELOPMENT
1 High volumes
2 Predictable and repeatable procurement rates
3 Tendency of machine builders to stick with good vendors
4 Intimate knowledge of the product and application
5 First-hand contact with large numbers of end users

Cookson also worked with Galil to develop a highly integrated controller/ amplifier package for distributed control over Ethernet. "We needed to set the polarity of home inputs individually rather than globally, and Galil created a new command to allow us to do this," says Prescott.

Motion control applications tend to generate a host of special requests from OEMs, as illustrated by USNR in its use of a Delta Computer Systems motion controller in its shapesaw. The shapesaw consists of 10-plus axes of motion control. "Delta added an option to their motion controller to allow the motions of two log-transfer chains, which are normally geared in lock step, to be temporarily decoupled," says Damon Clinch, controls engineer with USNR. "Using this feature, the throughput of the machine was increased from 11 logs per minute to 15 logs per minute."

Delta made other changes that benefited USNR and others. "Delta added the capability to do pressure and position control at the same time. This was a great addition to our Planer line," adds Clinch. "They also added a new command that let us achieve command speeds greater than 65.535 in./sec. while maintaining 0.001-in. resolution, and this allowed us to increase our Board Edger [Figure 3] output to 55 parts/min." The design of the Delta controller is such that most of these changes can be quickly made in firmware at minimal cost and with short lead times.

Delta also modified its motion controller firmware for the Miller division of Parker Hannifin (www.parker.com). This division provides system integration services to OEMs and manufacturers, particularly in hydraulics applications. "For a spring-winding machine project, Delta provided a special teach-mode command," says Bruce Besch, hydraulic systems engineer with Parker Hannifin, Troy, Mich. "This command allows machine operators to manually jog the hydraulic axis to desired initial positions prior to the start of automated motion." Once developed for Parker, this new feature was made available to other Delta customers as part of a new product release.

Sometimes it is necessary to modify not only the motion controller firmware and functionality, but also the packaging and the form factor. Nanometrics (www.nanometrics.com), Milpitas, Calif., builds metrology systems used by semiconductor manufacturers in wafer processing tools. These systems make fully automated optical measurements on the surface of semiconductor wafers.

Nanometrics needed a very small, precise, and reliable motion controller for its three-axis metrology system. No standard product would work for the application, and internal development of such a product was daunting, so the company turned to Agile Systems (www.agile-systems.com) for a custom solution. Agile made a number of modifications to an existing product in order to satisfy the Nanometrics requirement.

The result was a compact, high-performance controller that was an exact fit for the metrology system. “No one other than Agile could supply us with a controller that had sufficient power, control precision, and bandwidth, not to mention that this all comes in an approximately 3x5-in. package,” says Blaine Spady, director of automation products at Nanometrics.

Made to Order

Custom modifications to standard products are sufficient for many applications, but some industrial OEMs must have full custom designs to meet their requirements. Custom-designed products contain only the features needed for the application. This reduces the form factor and the complexity, and can often reduce per-unit cost with enough volume.

Control system retrofits tend to be unique projects, so these often require full custom components. This was the case when Phoenix Contact (www.phoenixcon.com) designed field termination modules (FTMs) for GE’s Energy Services division.

These DIN rail-mounted FTMs provide a termination point between the control system and the remote devices. The FTMs have components for protection (fuses, rectifiers, etc.) and signal conversion. “We provide custom control systems that replace old and often obsolete control systems on existing gas, steam, and hydro turbines,” says David Umland, PE, GE senior controls engineer. “These new custom controls must be interfaced to existing field devices, and that is where the FTMs are needed.”

FIGURE 3: REMOVING AN ALGORITHMIC LOGJAM

USNR

Motion control applications generate many special requests from industrial OEMs. USNR prevailed upon its controller supplier for a design change to allow the motions of two log-transfer chains, which are normally geared in lock step, to be temporarily decoupled. This led to a 36% throughput increase.

Automated Assemblies Corp. also needed a full custom wiring termination product. Automated Assemblies designs, manufactures, and sells products ranging from simple sprue pickers to high-speed robotics and automation workcells. The company worked with Wago Corp. (www.wago.com) to develop custom printed circuit boards using cage-clamp technology.

According to Lee, Wago’s double and triple PC board-mount terminal strips helped maintain the space requirements needed. “Wago did the board layout and also worked with the relay manufacturer to improve the redundant safety circuit implemented on the board,” he says. “They did an excellent job achieving the form factor and managing the cost of the requested custom board solutions.”

The custom board let Automated Assemblies locate all the input connections to the board on one side and the output on the other side. The terminals were grouped by source to speed wiring time. The new board design also accommodated mating connectors for cables, so the cable assemblies could be fabricated and tested prior to installation. “These custom boards have allowed us to reduce wiring, improve consistency, and reduce startup times,” adds Lee. ▲