

CONTROL DESIGN Innovator Awards 2006

The winners of our 1st Annual Innovator Awards all built machines that represent significant departures from the past, and their customers bear witness to how these innovations improve their applications.

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By [Jim Montague](#), Executive Editor

THOMAS EDISON was correct as usual when he said genius is 1% inspiration and 99% perspiration. But without that 1%, you might as well be flipping burgers or X-raying bags at the airport. If it's such a crucial catalyst, however, where does inspiration come from, and where can we get more?

Necessity is invention's traditional mom, but fatigue is no doubt its dad. "A need or problem encourages creative efforts to meet the need or solve it," states the dialogue in Plato's Republic. After yet another long day's labor, every wage slave eventually says "there's got to be a better way," though only a few actually seek it.

The fact is that good ideas can come from anywhere. In machine building and other endeavors, innovations logically grow from the experience of builders, integrators, and end users. They also come from repeatedly talking to customers, genuinely listening to what they have to say, and taking the too-rare step of acting on it.

Innovations also come from technical professionals exploring areas they don't usually work in, such as an IT person getting onto the plant floor, or vice versa, and occasionally blurting out an idea that everyone will soon say was obvious all along.

Sometimes ideas just click in, seeming to appear from nowhere like that proverbial bolt from the blue. You might be looking at a component or device you've used for years, when suddenly you see something about it you hadn't before. It's as if a mythological muse whispers a new way to use it, or as if an occult hand points to a new solution. Other times, ideas are the culmination of a long process of preparing and waiting for technical, economic, or other conditions to allow a long-sought goal to become possible.

Whatever the spark, it burns brightly in the mind, and waits for all that well-known sweat to make it a reality. And whether you're inventing the lever, Archimedes' screw, chronometer, steam engine, lightbulb, semiconductor, nanotube-based circuit, or whatever comes after, that reality will be different and hopefully better as a result. Sure, agriculture's hard, but it beats hunting and gathering. Certainly, my PC and the Internet might crash, but it's better than buying typewriter ribbons and looking up Plato's quotes at the library. In short, innovations large and small create organizational change, unlike offering the same old PLC in tropical colors!

These are some of the attributes shared by the three winners of CONTROL DESIGN's First Annual Innovator Awards. These companies and their machines represent significant departures from how their processes were done before, and their end users bear witnesses to how these innovations improve their applications.

So, check out their stories because, while nothing succeeds like success and you need money to make money, present innovations can fuel future inspiration. That's good news because we're going to need more nominees and winners next year.

Packer Treats Dough with Care

SPEED AND gentleness don't often go together willingly, especially in case-packing applications. Employees at Mamacita Inc. in Vineland, N.J., had used [Sabel Engineering Corp.](#)'s all-in-one case erecting, loading, and sealing machines to run plastic tubs of salsa, and recently wanted to use the same or similar equipment to pack 15 and 21 oz. bags of empanada dough in 24-bag cases. However, these 6-in. stacks of basically fluffy tortillas or pancakes were far more delicate, and would need a much lighter touch than the tubs, especially at Mamacita's desired 90 bags per minute.

"We'd worked with Sabel before, and were very happy with their previous generation loader, but the new product couldn't run on the usual technology," says Jon Mangel, Mamacita's vice president. "The dough needed to be handled carefully, but at high speed." Coincidentally, Sonoma, Calif.-based Sabel was already working on a packer with a servo-driven positioning base and a robotic, vacuum pickhead, according to Noel Barbulesco, general manager, and Hitan Patel, controls and R&D manager.

Because the most critical task for such a machine's process is precisely staging the bags for loading, Sabel's TL-10 9 x 8 ft footprint, robotic, top-load, case packer uses three conveyors driven by B&R Industrial [Automation Corp.](#)'s Acopos servo drives. Packmation Inc., a B&R distributor, helped implement and program TL-10 and its drives.

The first conveyor is a random-feed, in-feed conveyor that transports the bags toward the loading station, and guarantees adequate spacing between individual items. The second is a positioning conveyor that indexes the 5-in. and 6-in. diameter bags forward, and forms groups of four in a predetermined pattern. The third is the loading position conveyor, which quickly advances the group to the pick station, where the bags of dough are loaded into cases or bags with [Fanuc Robotics'](#) six-axis M-6iB arm.

Though the three conveyors perform different tasks throughout this process, they're synchronized with each other at all times. TL-10 uses [Ethernet Powerlink](#) communication protocol to broadcast positioning information from one servo drive to the other via standard Ethernet cables. Less than 400 μ s cycletimes allow fast updates of information between the drives, and eliminate the need for added encoder wiring between the drives. This simplifies and reduces troubleshooting, which also can now be done via the Internet.



Sabel Engineering's TL-10 robotic, top-load, case packer uses three conveyors to index bags of Mamacita's empanada dough, simultaneously build cases, and pack 90 bags/min. with less errors, wiring, and repetitive motion.

In addition, Sabel decided to use an independent valve manifold connection to simplify connecting pneumatics to TL-10. This function used to require multiple large cable harnesses, but it now needs only one cable to connect all points via a remote backplane. The machine's two control cabinets, one for controlling the robot arm and one for the rest of the controls, also are connected by one cable. TL-10 further reduces wiring and terminal blocks by connecting its sensors directly into a slice I/O system, which saves space and reduces costs.

The machine's HMI is integrated with the I/O and a 10-in. touchscreen that serves as the main control unit. It displays drive positions, speeds, error messages and other data, which makes it easy for operators to make setting changes, and inform the OEM of standardized error messages for easy troubleshooting over the phone.

"Ethernet and the integrated controller allows us to do HMI, motion, control logic, and communications all in one device," says Barbulesco. "This helps because, as an OEM, we don't have to marry so many types of equipment, and make sure they work in sync. It also saves time and labor for the end user."

The machine's second critical process is presenting erected cases at the loading station. "There are other top-loading machines, but they don't have good case-erecting and transport systems," adds Barbulesco.

TL-10 uses a servo-driven, walking-beam mechanism to present the cases properly at the bag-loading station. Acopos servo drives were combined with Bosch's actuators to provide smooth, accurate positioning of the cases for loading. Flat cases are dispensed from a magazine, erected, and, after sequentially folding the bottom flaps, moved into loading position. Once a case is loaded, it's discharged, and moves to the tape-sealer station.

"TL-10 allows us to operate a lot more efficiently, prevents errors, and eliminates a lot of repetitive motion tasks for our employees," says Mangel. "The staff was apprehensive because this was our facility's first robot. However, when they saw that it's designed to work with them and not replace them, they even nicknamed it 'Little Mickey' after our line supervisor."

Mangel adds that TL-10 also is very adaptable, and can handle any product line changes quickly. "In the past, our configuration was set, but now we can change over to other product parameters easily. TL-10's controls, Ethernet, and servo capabilities really take previous PLC-type functions to a different level."

As a result, other applications, such as dairy and bakery, that hadn't been able to use robots in the past, may be able to use TL-10 for packing. "Integrating the three conveyor modules for food processing enables users to easily change between a lot of different products," says Patel. "The robot and interface allows packing parameters to be changed onscreen in five minutes or less, instead of the 20 minutes it would take on older machines that need to switch out much more equipment. In fact, this easy changeover means TL-10 can be moved to an entirely different application or plant, and only have to make programming changes and 10% fewer mechanical changes."