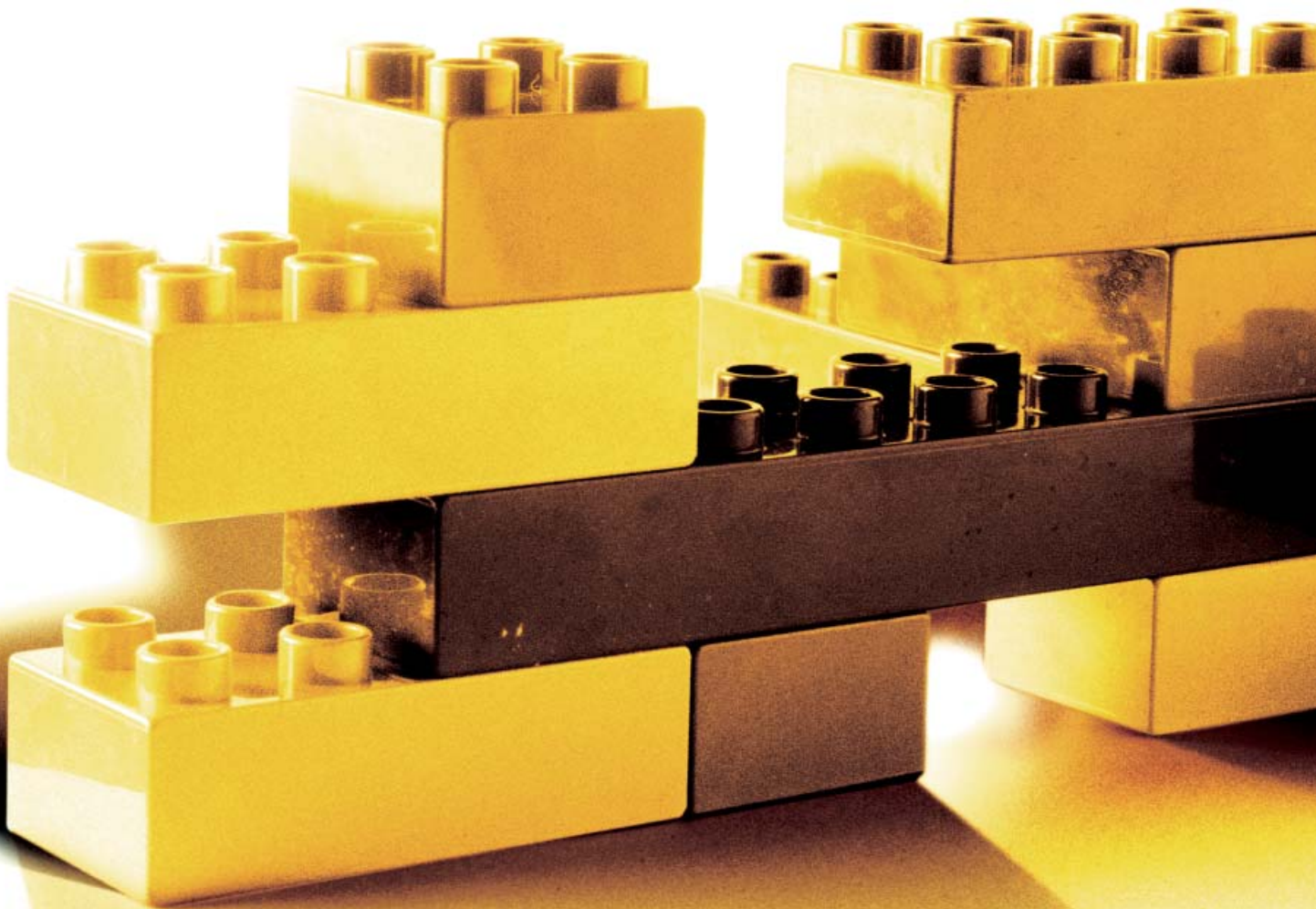



Build,  
Change...

# GO!



# The intelligence of DeviceNet takes On-Machine control to a whole new level for an OEM creating modular plug-and-play machines based on MicroLogix.

By Nancy Bartels, Contributing Editor, A-B Journal

 The light bulb went off in Dave Duemler's head in the middle of a meeting with a customer. The customer was lamenting the fact that automating his manufacturing and material handling processes was out of the question because his product lifecycle was too short. He said he simply couldn't afford to wait the year it would take to get an automated system up and running, and wouldn't it be cool if there was a tool station that could just slide in and out of a machine when you needed it?

"Luckily, there were two of us in the meeting," Duemler remembers. "I just started scribbling notes on how they could do it."

The result of all the scribbling is the patented DEMCO Wedge, a modular machine platform for small parts assembly, inspection, testing and packaging made possible by DeviceNet and Allen-Bradley MicroLogix PLCs.

Duemler's company, DEMCO Automation of Quakertown, Penn., has customers in industries including electronics, automotive, pharmaceutical and medical devices. The Wedge system gives those customers a modular, reconfigurable system that is as easy to change as the ink cartridge on a printer.

The compact size of MicroLogix puts the controls on the machine, rather than in some remote cabinet. Industrially hardened FLEX Armor I/O and ArmorBlock Maxum I/O modules further allow an On-Machine controls architecture. The intelligence of DeviceNet, combined with savvy programming by Demco engineers, allows the plug-and-play capability. Together, the Rockwell Automation components are helping Demco create a wedge of success in a competitive field.

## The concept

Think of a set of Lego brand building blocks. Legos fit together easily, can be reconfigured at will and additional sets can be added with ease all because of their common basic structure. The same approach supports the Wedge system, which gets its name from the shape of its modular pieces.

The system allows the swapping out of any one of 48 different Wedges, which can perform functions from picking and packing to UV curing to product inspection.

Each Wedge sits on a metal plate that looks like a piece of pie. On that plate sits the tooling for a specific mechanical operation—such as packing, inspection or testing—and a control box that contains a MicroLogix 1200 controller.

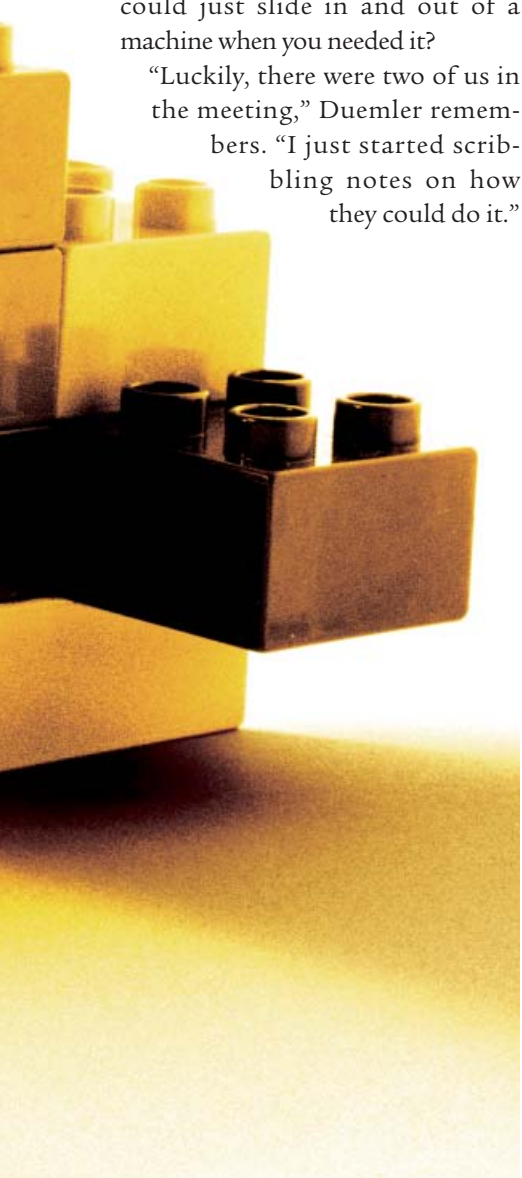
The Wedges fit into a base machine, which itself runs a MicroLogix 1500. "You slide these stations into the base machine, plug them in, and the machine goes into a plug-and-play mode," explains Duemler. "It basically reconfigures itself to run with that new tooling. What that allows you to do is take a station from one machine and move it to another, or move it to another position on the same machine, without reprogramming the base machine."

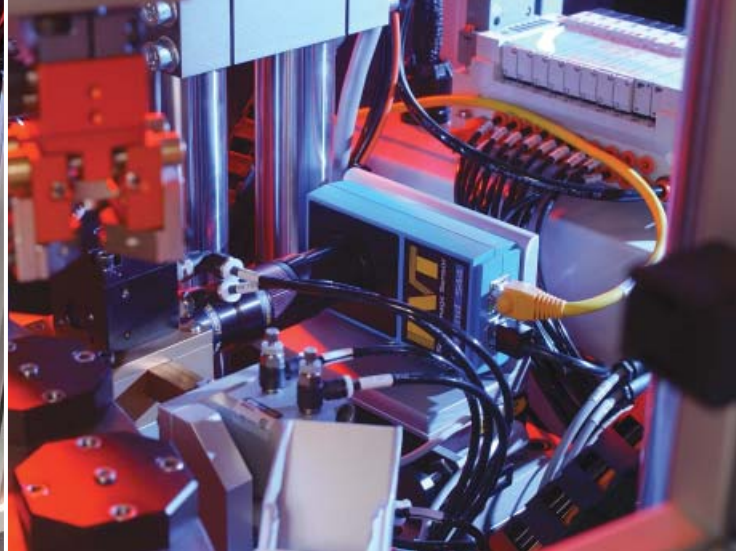
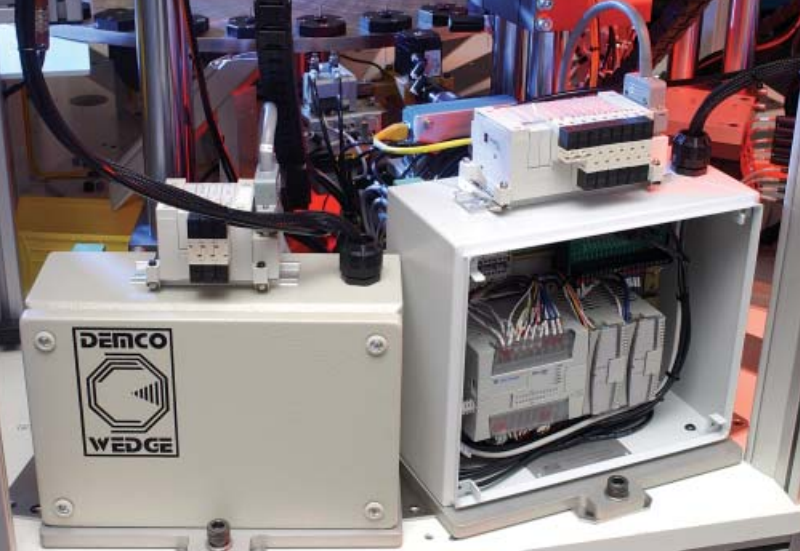
To disconnect a Wedge, you simply pull it out and put another one in. The switch can be made in as little as 10 seconds, according to Tom Garrity, DEMCO's president.

The flexibility goes even farther than this. The system allows companies to start small with a single tabletop station and then grow their automation platform as their business changes. Base chassis are available in In-line systems of two- and four-station configurations and in multiples of four. They are also available in Rotary Dial configurations of six, 10 and 16 stations. For even larger operations, the stations can be linked to one another via standard conveyor belt systems.

## SuperWedge software

No matter how clever the basic idea behind the Wedge system, it would never have worked without DeviceNet.





Users slide the Wedges into a base machine and the machine goes into a plug-and-play mode, basically reconfiguring itself to run with that new tooling. The switch can be made in as little as 10 seconds.

DVT's smart camera is a complete machine vision system contained in a single, palm-sized unit. Because the DVT camera is small and self-contained, it worked well with DEMCO's plug-and-play design.

When DEMCO was prototyping the product, says Duemler, the biggest obstacle was the communications protocol and the ability to have true plug-and-play functionality. "We had a couple of prototypes that worked, but they were very cumbersome. The biggest thing that pushed us to using Allen-Bradley was the DeviceNet communications architecture, because that allowed plug-and-play," he says.

Duemler describes the base machine as "the traffic cop." It coordinates all the Wedge stations on the base and handles the parts transfer through the machine. On the other hand, the process program lives on the Wedge station. "That's what allows us to take these stations and move them around at will. The base machine doesn't know what the station is doing," he says.

Each Wedge station is programmed with the SuperWedge software (patent pending), a graphical utility developed by DEMCO to communicate with the MicroLogix unit on each station. The SuperWedge software allows all communications and alarm handling to be running in the background without fail. It also provides a simple way for end users themselves to program the individual Wedge sta-

tions without needing extensive training.

"You click on it, hit 'update,' and it tells you exactly what it's trying to do," explains Garrity. "It's very easy for maintenance guys to use, so you don't need to have people with extensive ladder logic knowledge to maintain your machines." It allows people with limited knowledge to program, modify and debug the individual stations with as little as a half-day of training, he adds.

The SuperWedge software has become so popular with users that they are taking a page out of DEMCO's book and adapting it to other machines. Duemler discovered this at the facility of a telecom customer, where the maintenance team had taken the control boxes off unused Wedge stations and attached them to other equipment because they were so easy to use.

Duemler went back to DEMCO with the knowledge and soon the company was offering Controls-in-a-Box—which he describes as a repackaged Wedge station. "It's more stand-alone and has its own power supply and its own operator display, but it's exactly the same software that's on a Wedge station."

The Controls-in-a-Box enables small operations to build their own

automated machinery without having to hire a control expert to design and build a panel, and then program and debug it. "They can buy Controls-in-a-Box from us, bolt it on to their machine, wire the sensors up and they're ready to go," says Garrity. "It's all self-contained and the unit they bolt on is programmed with the SuperWedge software."

### A needle in a pie slice

One type of sensor Demco uses is machine vision sensors from Rockwell Automation Encompass Partner DVT Corp. of Norcross, Ga. DVT's sensors played a key role in the solution for one of Demco's medical device customers.

A manufacturer of precision surgical instruments needed a way to make sure its products—needles used in retina surgery—were 100-percent inspected and had zero defects. The needles needed to be flared and bent to a precise angle with a required accuracy of 1/1000 of an inch. There was no margin for error.

The company had been bending and flaring the needles by hand and then hand-inspecting them under a microscope. The process meant each needle was handled by four or five workers in a tedious and labor-intensive process that created a lot of scrap.

The company came to DEMCO hoping to automate their manufacturing process and include an inspection system that could guarantee accuracy. DEMCO and DVT partnered to build a Wedge unit that contains a DVT "smart camera" to do the quality control.

DVT's smart camera is a complete machine vision system contained in a single, palm-sized unit. Because the DVT camera—in this case the Model 544 with 1280 x 1024 pixel resolution—is small and self-contained, it was a good fit for the application.

"We're cable-less and cordless while operating," explains Bob Settle, DVT's director of marketing. "We don't have a separate processor, cables, cords or remote heads, so it was easy to mount the Model 544 strategically to the system."

Adding to the ease of integration is the fact that all DVT's units have plug-and-play capability with all Logix controllers, including MicroLogix. The machine vision system and the DEMCO Wedge were linked via DeviceNet.

The new machine not only solved the manufacturer's initial automation problem, but also improved the product by bringing to light another issue: contamination on the needles themselves. Coating on the metal was flaking off in microscopic pieces that were only noticed by the DVT high-resolution camera. Once the discovery was made, the company worked with its supplier to resolve the problem.

Intelligent networks, smart cameras, plug-and-play components, machines that configure themselves— isn't it cool when machines solve problems you didn't even know you had? Rockwell Automation, Demco and DVT certainly think so, and so do their customers.

ABJ

Circle 605

**DeviceNet:**

[www.ab.com/networks/devicenet.html](http://www.ab.com/networks/devicenet.html)

**DVT Corp.:**

[www.dvtsensors.com](http://www.dvtsensors.com)

**MicroLogix 1200:**

[www.ab.com/plclogic/micrologix/1200](http://www.ab.com/plclogic/micrologix/1200)

**MicroLogix 1500:**

[www.ab.com/plclogic/micrologix/1500](http://www.ab.com/plclogic/micrologix/1500)

## What Do CompactLogix and ControlLogix have in common? AMCI STEPPER CONTROL

### CompactLogix™

Finally, a powerful stepper control solution for the CompactLogix user who requires functionality beyond the simple "on-board" pulse train output. AMCI is proud to announce the 3601 single-axis stepper controller module. Engineered for peak performance, this module is capable of performing a complete range of stepper commands reliably. Encoder verification and a variety of motion profile parameters ensure plenty of functionality for any application.



3601 CompactLogix Stepper Controller

### ControlLogix™

Stepper motion and ControlLogix have arrived. AMCI proudly



3202 ControlLogix Stepper Controller

announces the two-axis (3202) stepper controller. A wide range of available stepper commands and benchmark dependability come standard on this high performance controller. When your application calls for stepper motion solutions, call on AMCI.

3204 Four-Axis coming 2003

### More Information

For more information on our complete line of stepper motion products, including drives and motors, visit us online at [www.amci.com](http://www.amci.com).



860-585-1254 ◀ Call or Click ▶ [www.amci.com](http://www.amci.com)

**AMCI** ADVANCED MICRO CONTROLS INC.

For FREE information, Circle 506