

Modular design shrinks big machine problems

Ease of installation and simplified configuration changes outweigh initial design costs.

Chopping up a machine

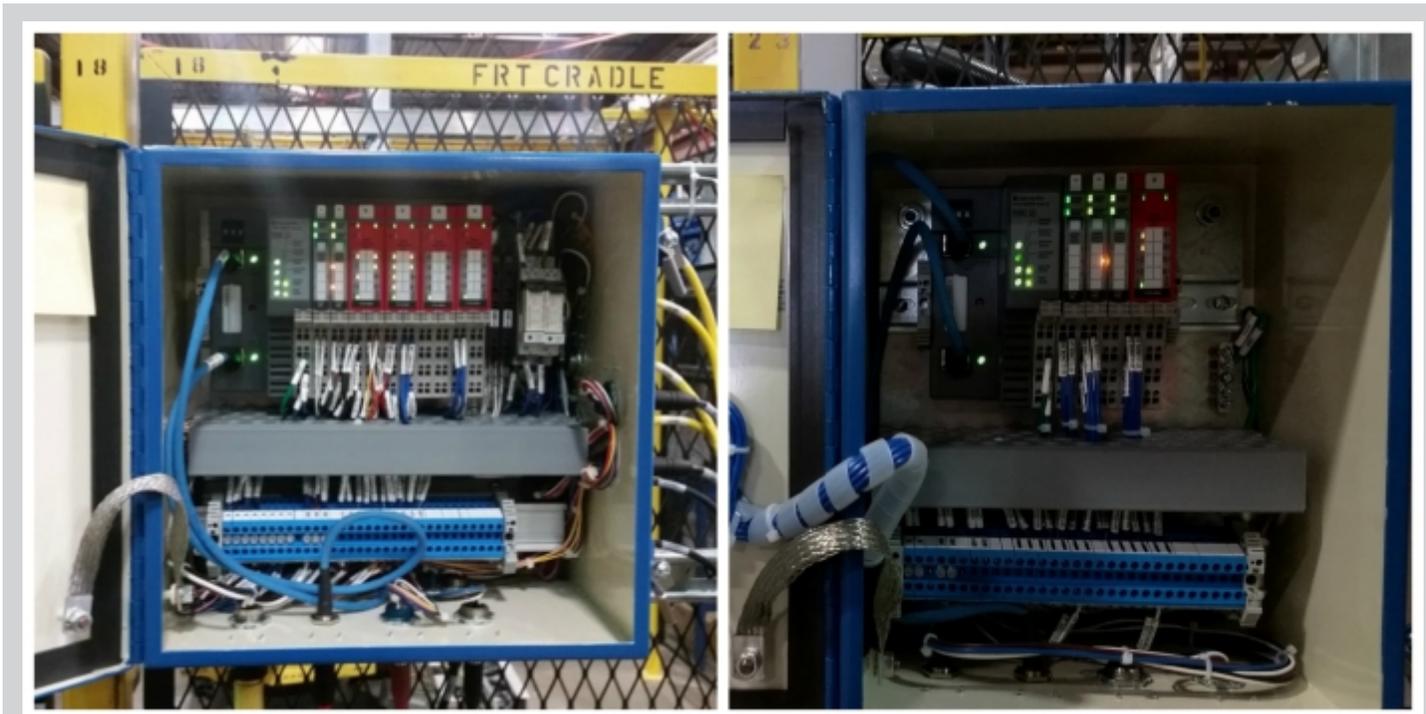
By Hank Hogan, contributing editor

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Yet another illustration of modular machine design comes courtesy of Fori Automation of Shelby Township, Michigan. Among other things, the company makes automated assembly lines, and these have to be shipped to customer locations. This means the machines are assembled, tested, taken apart, transported and then reassembled on-site, where customers, quite naturally, expect everything to work.

The company decided in late 2014 to go with a modular approach, breaking lines down into 30-to-40-ft sections. Each section was made self-contained through the use of machine-mount I/O blocks. The company also developed standardized boxes for light curtains, safety gates and servos (Figure 6). The creation of modular components hasn't stopped there.

"We are now generating a standard electrical enclosure for robot electrical interface. We're going to generate a junction box, and it's going to incorporate the safety e-stops, gates and circuits," says Garry Hagar, controls engineering supervisor, Fori.



Modular control boxes

Interior of light curtain and safety gate boxes that enable modular machine design.

Source: Fori Automation

The driving reason for this switch to a modular philosophy was a desire to save labor costs. The new approach saves in excess of 25% of engineering, estimating and installation time and associated labor, Hagar says. If problems arise, the modular nature of the system makes troubleshooting easier, he adds.

For its modular machines, Fori has used IO-Link-enabled products from Balluff. Shishir Rege, Balluff marketing manager for networking and safety, says that labor cost savings in the 30–50% range are typical when a modular approach is used. Engineering savings can also be substantial, due to the ability to reuse designs and reduce terminations.

The labor cost savings appear immediately, but the benefits of easier controls engineering may only show up after several jobs are done, Rege says. There also can be savings due to the elimination of time spent debugging cable problems, a consequence of having fewer cables and cable types overall.

The result of going modular shows up in productivity gains. “Today, if you’re producing 12 to 13 machines a year, without investing in additional resources and additional buildings, you’ll probably produce a few more machines a year,” Rege says.

Bill Sutton, market development manager for motion control solution provider Kollmorgen, has worked with a variety of machine builders looking to improve modularity of their products. One he points to as a good example is a rotary converting platform from Preco, a Lenexa, Kansas-based provider of materials processing solutions.

The machine can accommodate up to seven converting stations, each of which can be configured for die cut, laser cut, laser heat treatment, laser marking and multiple web assembly operations. Consequently, end users can quickly change over from one product to another.

Modular machines in general offer production flexibility, as demonstrated by the Preco machine. They also can save space, require less training of production personnel and offer a better return on investment on equipment.

Modularity and flexibility do have their drawbacks, however. “Long-run, purpose-designed machines allow for narrow focus on accuracy, speed and size. When a machine is modular and flexible, some capabilities in those areas may be compromised,” Sutton says.