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What's New With Pulse Tools

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Machine Builder Masters Assembly Line Uptime, Flexibility

Like many machine builders, Fori Automation Inc. faces the daily challenge of building automation equipment that is competitively priced and meets its global customers' varied design requirements. These requirements often include a unique control platform, process traceability or scalability for future expansion.

Founded in 1984 in Shelby Township, MI, Fori designs and integrates state-of-the art automated systems for the automotive, aerospace and defense industries. It has built systems for assembling tires, wheels, motors, transmissions and headlamp aimers; and installing carpet, glass, doors, seats and cockpits.

One of Fori's most recent projects involved building a modular assembly line for complex front and rear automotive components. The customer wanted a line with standard controls architecture, along with the capability to handle the company's choice of platforms and networks.

The line consists of 30 workstations that may or may not be used, depending on the component being assembled. Assembly begins by placing a component frame on a pallet, which has an RFID tag containing process and traceability data.

The line consists of several 30- to 40-foot-long modular sections, each of which features a master I/O distributor with IO-Link interface. Made by Balluff Inc., the distributor is fieldbus independent and vendor neutral. It carries a digital signal over pin 4 of a standard cable and provides 24-volt power to a connected device in a standard configuration.

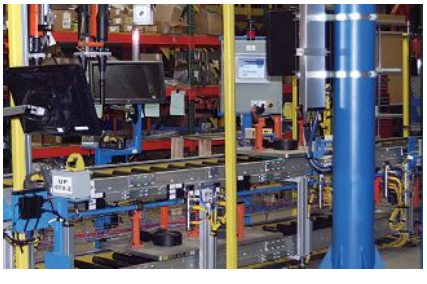
Garry Hagar, controls engineering supervisor at Fori Automation, says the distributors allow the use of a small control cabinet that only needs to house controllers, network switches, power supplies and safety relays. They also enable Fori to use standard M12 cables for sensors rather than special heavy cables and complex long wiring.

At each workstation, an antenna reads the tag to get work instructions for the assembler and configuration settings for tools and other assembly equipment. A worker then either mounts subassemblies onto the frame or performs some other manual assembly operation. Intelligent software and LED stack lights provide instant process feedback to ensure error-free assembly and maintain traceability throughout production. For example, at one station, bolts are fastened to torque limits specified on the tag.

The line handles the company's choice of platforms and networks.

According to Hagar, the distributors have saved Fori about 30 percent in labor and time related to building panels and wiring components far away from the panels. Workers now use quick disconnects to easily remove power, air and a network cable from each section's main panel. Reassembly of each section at the customer's factory is also done quickly.

I/O master distributors allow the use of a small control cabinet that only needs to house controllers, network switches, power supplies and safety relays. *Photo courtesy Balluff Inc.*



Fori Automation's latest assembly line consists of several modular sections, each of which features a master I/O distributor that is fieldbus independent and vendor neutral. *Photo courtesy Balluff Inc.*

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The distributors' built-in scalability allows future expansion or additional I/O points without the need for additional network nodes. For example, a distributor with eight IO-Link ports hosts up to 136 configurable inputs or outputs. Without the ports, Hagar says Fori would need up to nine network nodes to obtain the same amount of I/O points.

The distributors also ease connectivity and configuration of smart devices (such as RFID read-write heads and inductive couplers) directly through a PLC. All configuration data is stored on the PLC in case any device needs to be replaced. Add-on instructions and function blocks quicken programming.

"Standardization of equipment and controls cuts our engineering time by 50 percent," notes Hagar.

A master distributor also facilitates troubleshooting. That's no small thing, since unplanned downtime is costly in automotive assembly lines. "[For us] the ability to quickly troubleshoot is only possible with modular systems," says Hagar.

For more information on I/O distributors, call 800-543-8390 or visit www.balluff.us.

Test System Helps SNC Launch Dream Spaceplane

Barring any obstacles, the Dream Chaser spaceplane will make its initial orbital test flight on Nov. 1, 2016. The craft will launch on an Atlas V412 rocket from Kennedy Space Center in Merritt Island, FL—more than 12 years after it was first announced as a candidate for NASA's Vision for Space Exploration program.

Owned and operated by Sierra Nevada Corp. (SNC), Dream Chaser is a reusable, lifting-body vehicle that lands horizontally and can be operated with or without crew. It is designed as a space utility vehicle for orbital and suborbital (maximum speed below orbital velocity) flight to destinations such as the International Space Station.

Dream Chaser is a reusable, lifting-body vehicle that lands horizontally and can be operated with or without crew. ***Photo courtesy Sierra Nevada Corp.***

The vehicle carries from two to seven people and cargo, flies autonomously if needed and features a built-in launch escape system. Unlike all other spacecraft, the Chaser glides back to earth (typically experiencing less than 1.5 g-force on re-entry) and lands on any airport runway that handles commercial air traffic.

Because its reaction-control-system thrusters burn ethanol-based fuel, which is not explosive, the Chaser can be handled immediately after landing. The vehicle's thermal protection system is an ablative tile (rather than individual tiles) that is easily replaced after several flights.

In-orbit propulsion is provided by twin hybrid rocket engines that are fueled with hydroxyl-terminated polybutadiene and nitrous oxide. Both substances are nontoxic, easily stored and safer than liquid rocket fuels. They also allow the engines to stop and start repeatedly, and be throttle controlled.

Recently, SNC hired the Southwest Research Institute (SwRI) to design and build the Chaser's atmospheric flight control system. To verify proper operation of the flight controls, SwRI uses a customized DynoLAB test system.

Made by SAKOR Technologies Inc., DynoLAB determines the flight control system's response to physical forces typically experienced in standard and extreme flight conditions. The system simulates the Chaser's entire flight—from atmospheric interface to landing—and uses seven dynamometers to monitor the Chaser's seven control surfaces.

During simulation, the system sends test profiles to the flight controller and receives feedback data from each control surface via a bus that meets the MIL-STD-1553B standard.

DynoLAB comes in two standard versions. The PT series is specifically configured with the capability to fully automate all aspects of engine and powertrain dynamometer testing. It seamlessly integrates any type of dynamometer, sensor, instrumentation and support equipment into a test cell.

The EM version, when combined with one or more AccuDyne AC dynamometers, tests the mechanical and electrical characteristics of all types of motors, generators, inverters and electromechanical devices. It also is part of SAKOR's hybrid vehicle powertrain dynamometer test system for drivelines, subsystems and components.

SAKOR Technologies develops and manufactures automated test instrumentation systems for a wide range of applications. The company has provided products for companies in the automotive, military, aerospace, marine, heavy equipment, electric motor, performance racing and consumer-appliance industries.

For more information on test instrumentation systems, call 517-332-7256, or visit www.sakor.com.

Conveyor Speeds up SMAC's Growth Plans

Twenty years after making its first moving-coil electric actuator, SMAC Corp. has emerged as an industry leader in linear motor technology. The company manufactures a wide range of precision programmable actuators for high-production positioning, measuring, inspection and pick-and-place applications, particularly those that require 100 percent verification.

For the past several years, SMAC has grown at an annual rate of about 30 percent to become the largest manufacturer