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Case Study

Industrial saw maker gains precision, safety and serviceability with advanced, highly integrated Siemens fail-safe PLCs, drives and components

Pacific Trail Manufacturing

Customer: Oregon-based Pacific Trail Manufacturing, Inc. provides a wide range of cross-cut saws for processing milled and engineered wood products quickly and efficiently.

Challenge: Boost the precision performance, safety and serviceability of the company's flagship Accu-Cut industrial cross-cut chainsaw.

Solution: Upgrade the Accu-Cut control panel to a Siemens SIMATIC S7-1200 F PLC with integrated safety and remote diagnostics, plus SINAMICS drives and other components.

Results: Upgraded the Accu-Cut controls with advanced PLC technology to ensure precision cuts, while improving safety and serviceability.

Since 1996, Portland, Oregon-based Pacific Trail Manufacturing, Inc. has led its industry in providing a wide range of crosscut saws to help customers quickly and accurately process milled or engineered wood products with the least time and labor. Their powerful, industrial chainsaws can process full units of lumber, plywood and other wood types to length quickly and to a variety of tolerances – as precise as 1/64th of an inch or 0.4 mm. Their saws are in high demand around the world, even at a wood products depot in largely forest-free Kuwait. Typical customers include lumber remanufacturers and makers of pallets, as well as trusses and studs for residential housing.

"Any company using high volumes of cut-to-length wood products can benefit from our specialized saws," says President Tom Langton. "They produce consistently precise cuts despite variability in the wood feedstock, which can be dry or wet. If it's the latter, a palette of feedstock can weigh up to 20,000 pounds, but our saws can still position and cut to our customers' precise requirements."

Despite its success, the company has remained purposefully small. Its staff is just 10 people, including Langton, who also handles sales, and co-owner Bruce Wold, who manages engineering, installations and service.



Challenge: Boost the precision performance, safety and serviceability of the company's flagship Accu-Cut industrial cross-cut chainsaw

According to Langton, Pacific Trail's most sophisticated cross-cut saw is its Accu-Cut model, which today operates with the automated precision and control of a CNC (computer numerical control) machine. "The Accu-Cut is more like a CNC than it is some giant version of your backyard chainsaw," he says. "It can be programmed with up to 20 different recipes, each with 10 different cuts. Most of our customers average between 80 and 100 cuts a day."

One of the Accu-Cut's hallmarks is its gear-and-bar conveyance system that can precisely hold and position tons of milled lumber or wood products for exceptionally precise cuts. "Competitors use hydraulics or chain-drive mechanisms, but those can't match ours for speed, performance and reliability," Wold explains. "What might take three workers 45 minutes with other saws to process, takes just one worker 10 minutes with ours."

Langton further illustrates why consistency is so important to Pacific Trail customers: "With a unit saw, you can create 200-plus 92-5/8" studs in under two minutes. But if the cutting tolerance of the saw isn't consistent in holding 92-5/8", you've created a finished product very quickly that you can't use or sell."

Uptime is another hallmark of the Accu-Cut saw. "Since the Accu-Cut has fewer wearable parts, customers experience little or no downtime due to the saws themselves," Wold says. "That's important because downtime isn't an option with our saws being indispensable machinery in our customers' production. That's why we design, engineer and build our saws to be as reliable and easily serviceable as possible."

For their Accu-Cut saw's controls, they turn to long-time partner Charter Controls, Inc., a Siemens Solution Partner based in

Vancouver, Washington. "The saw has a chain-driven carriage system," explains Victor Gonzalez, a controls engineer with the company, who has worked closely with Pacific Trail for years.

"Because the long chain length is susceptible to stretching and slack, synchronizing the drive with the mechanical system was very challenging – especially when a palette of wet lumber can weigh up to 10 tons."

Gonzalez points out that the Accu-Cut saw's control system was due for an upgrade, having relied on aging third-party PLCs, drives and separately wired safety relays for more than a decade. "If any those components or supporting wiring would go out, a customer's production could be down for days, while the staff troubleshoots the problem with Pacific Trail and Charter Controls providing phone support," Gonzalez says.

"A big reason for that is the general wiring of safety relays, which can be complicated and confusing," he explains. "Meanwhile, the lost production can add up to tens of thousands of dollars a day, not to mention the missed delivery commitments and resulting order backlog."



The Accu-Cut cross-cut saw from Pacific Trail Manufacturing can be programmed with up to 20 different recipes, each with 10 different cuts. Most customers average between 80 and 100 cuts a day.

Solution: Upgrade the Accu-Cut control panel to a Siemens SIMATIC S7-1200F PLC with integrated safety and remote diagnostics, plus SINAMICS drives and other components.

Familiar with the latest line of Siemens SIMATIC PLCs, Gonzalez recommended that Pacific Trail invest in a major upgrade of its Accu-Cut saw's controls, drives, HMI and supporting components. Working closely with Pacific Trail's Wold and its design engineers, Charter Controls designed and built an entirely new control system for the machine, driven by a 20-horsepower AC motor. The local branch office of WESCO Northwest Automation, a Siemens distributor, provided components.

Core to the controls, which are enclosed in a single panel, is the Siemens SIMATIC S7-1214FC PLC, a compact, high-performance CPU with integrated safety functions. "Having fail-safe features already in the SIMATIC PLC greatly simplifies the panel's design,

on top of the PLC's already small size, both of which also saves space," says Gonzalez. "And by eliminating safety relays, which require a lot of complex wiring, it also makes panel manufacturing much easier."



Troubleshooting is much easier, too, Gonzalez reports. Although the Siemens SIMATIC PLC product families, such as the S7-1200 series, are widely known for their reliability, he prizes the integrated diagnostics that can be remotely tapped if necessary. "In the past, if a customer had a problem with their saw, such as a safety relay gone out, they'd call Pacific Trail, who would escalate it to us, if necessary," he recalls. "All that would consume loads of time while production has ground to a halt. Now we can dial into the PLC remotely and know exactly which circuit needs attention, saving all kinds of time."

In addition to the SIMATIC PLC, the full solution from Charter Controls also highlights the following Siemens components:

- **SINAMICS S120 and G120 variable drives.** A SINAMICS S120 drive is used to control the accurate and precise positioning of the Accu-Cut saw's carriage, even under tons of weight, while a compact SINAMICS G120 drive controls the saw bar. "The combination of these two drives can't be matched," Gonzalez says. "The S120 is designed for high-performance, motion control applications. And G120 saves space and has its own safety-integrated features to complement those of the SIMATIC Safety PLC."
- **Comfort Panel HMI.** Outside the Charter Controls cabinet for the Accu-Cut saw is a nine-inch Siemens Comfort Panel HMI display. Its color touchscreen provides plenty of area for operator information and controls interaction. "The more information we can provide operators via the HMI, the better they can manage the saw and, frankly, the less support calls they make to Pacific Trail," Gonzalez says. "But, if the issue is escalated to us with questions, the HMI's clear display of operating information makes it much easier and faster to help the saw operator resolve whatever issue is holding them up."

The Charter Controls solution team used the Siemens TIA Portal, a common software engineering framework for its Totally Integrated Automation (TIA) portfolio, to program the SIMATIC PLC with the Accu-Cut saw's many recipes and safety features. The saws use Safe Torque Off to stop the motors during emergency stops.

"The TIA Portal dramatically reduced our PLC and HMI software programming time by as much as 30 percent, saving us days if not weeks," Gonzalez says. "The function libraries that come with the TIA Portal along with the programming diagnostics are big time savers. We can also save our own code for reuse in other applications, which extends the value of time invested in original software development."

Results: Upgraded the Accu-Cut controls with advanced PLC technology to ensure precision cuts, while improving safety and serviceability.

If Pacific Trail's Accu-Cut saw is anything, it's precise in its cuts. Wold points out that while the saw's specifications state that it can cut to 1/32nd of an inch or 0.8 mm, actual performance can be accurate to half that, as previously mentioned. "But just as important as precision is the consistency of that precision," he says. "Our customers' feedstock can vary a great deal, not just from one palette load to another, but also from board to board or sheet to sheet."

"That's why the combination of the Siemens SIMATIC PLC and SINAMICS drive is so valuable. By working together, they can monitor motor current as an indicator of wood conditions and adjust the blade speed to those conditions."

For example, if the motor starts drawing over 15 or 16 amps, the saw can slow down by as much as 50 percent, adjusting the cutting speed automatically to keep the cut precise."

For Charter Controls, having Siemens as its "one-stop-shop" for the SIMATIC S7-1200, the Comfort Panel HMI, the SINAMICS drives and other Siemens components greatly simplifies procurement, manufacturing, commissioning, service and support. Gonzalez also values the open standards Siemens uses in designing and engineering those components, which he says helps integration with needed third-party components.

"Not only do all the Siemens components 'work seamlessly among themselves, but also with others," he says. "What's more, inside the panel, everything looks like it belongs together."

Overall, the Accu-Cut's new control panel from Charter Controls has helped improve the safety and serviceability with the SIMATIC PLC's integrated safety and remote diagnostics. While the former is critical for the Accu-Cut's safe operation, the latter is important for both Wold, as first-line support, and Gonzalez, as the escalation point. "Being able to dial into a customer's saw wherever it is in the world is a big advantage for us and for our customers," Wold says, noting that Siemens worldwide presence is also a competitive advantage for Pacific Trail.

On this, Langton agrees wholeheartedly.

"Having Siemens components inside Charter Controls' panels help make our Accu-Cut saws sell themselves," he says. "And, like any sales person, I'd rather be taking orders for our saws versus 'making sales' any day."

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