SEW EURODRIVE

Sawmill Automation: Going Where Direct-Stop and Hydraulic Technologies "Cant"

Exploring the productivity and efficiency gains of outfitting a sawmill's resaw line with VFDs, Ethernet and other automated electromechanical systems.

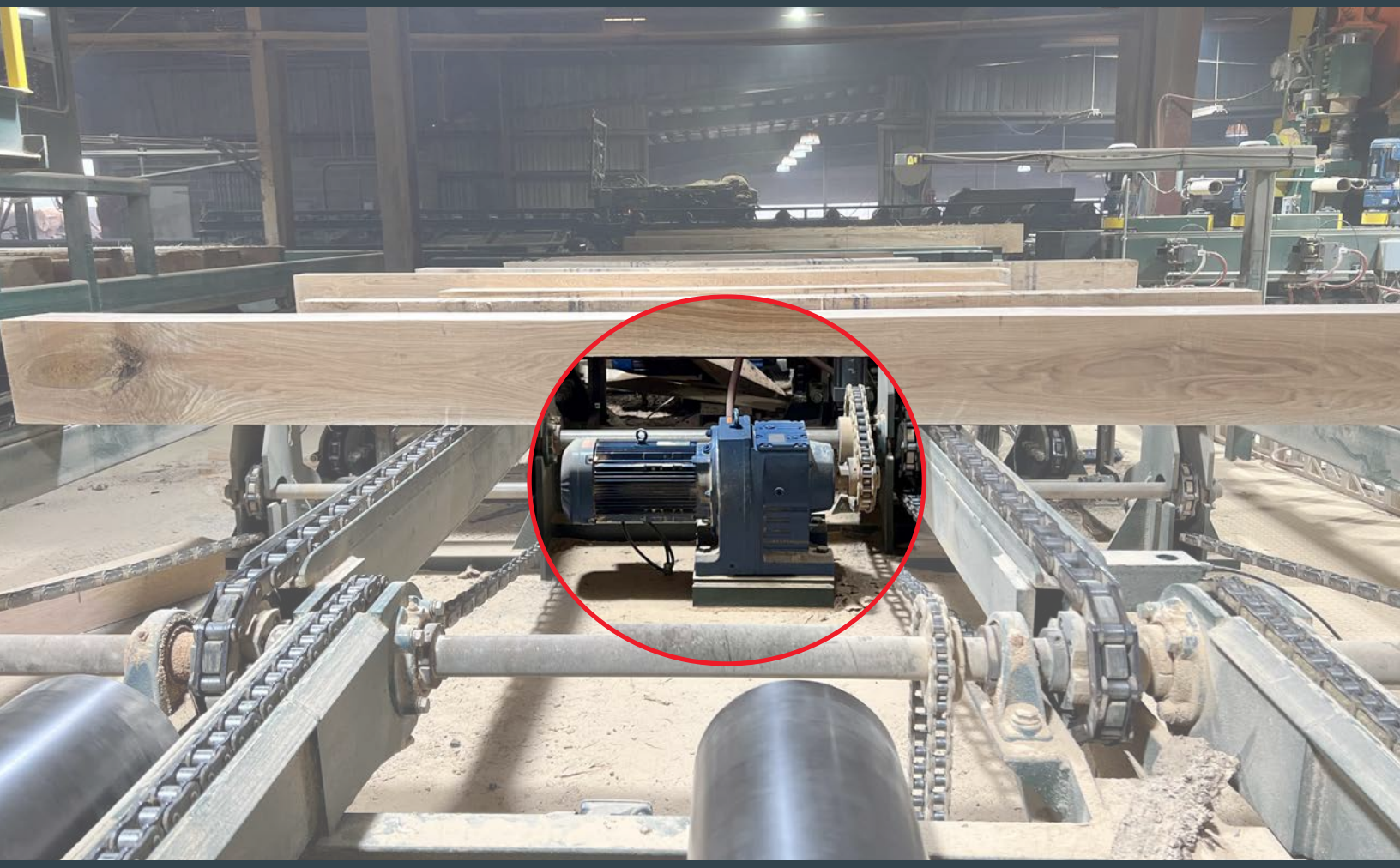
Client:

Mark Painter, Owner of Painter's Machine Shop - Lexington, VA

W.R. Deacon & Sons Timber, Inc. - Lexington, Virginia

Featured SEW-EURODRIVE solutions:

- Open- and closed-loop VFDs
- Asynchronous servomotors
- Electric cylinders
- Ethernet communication and motion programming



The redesign includes integral motor reducers for added efficiencies.

Automated, Motor-Driven Systems Provide Unparalleled Control

Modernization is gaining ground in sawmills — a trend that comes on the heels of mounting pressures to meet ever-rising productivity, throughput and efficiency demands. As a result, machine builders are increasingly turning to variable frequency drives (VFD) and other electric components and systems to replace traditional pneumatic, hydraulic and direct-stop systems.

One important aspect of this modernization movement is the need to provide motor-driven systems with greater control. Despite the benefits of VFDs, many sawmills still rely on direct on-line (DOL) motor systems, which create shock loads that can damage equipment. A second aspect of the modernization movement is the electrification of equipment — in particular, hydraulic axes.

THE RESAW PROCESS

The cant is the starting point for creating various lumber products used in many industries. In terms of the process, the cant is transported from the main saw line and then positioned for cutting on the resaw line. An operator inputs the cut selection into the controls and queues up the cant.

The resawing process reduces the size of the cant around the heart until it becomes the desirable board size, a post or a beam. New cants are added during this resaw loop, and the process continues until the correct number of cuts is made.

THE DRAWBACKS OF PREVIOUS TECHNOLOGIES

While lumber processing facilities do include highly automated areas, resaw lines and other front-end processes are still in the Dark Ages. In place of VFDs, encoders and other positioning equipment, these lines still heavily rely on hydraulic systems, whose imprecision often impacts the accuracy of cuts and the quality of finished products.

In addition to hydraulics, many resaw lines employ DOL motor systems due to their simplicity and cost-effectiveness. However, these systems cause large spikes in current and torque the instant the motor is activated.

For heavy-duty loads — such as the ones involved in sawmills — the sudden inrush of current during direct starting can stress the motor and connected mechanical systems, shortening the motor and gear reducer lifespans and damaging downstream components.

MODERNIZING RESAW LINES

One area of the sawmill that is particularly ripe for change is the resaw line, an area in which machines cut cants into thinner pieces of lumber. Squared off on four sides, the cants are ultimately processed into boards, planks and other smaller pieces of lumber for use in industries like construction and furniture-making. In addition to bandsaws and edgers, typical resaw lines include conveyor systems to transport the heavy cants, which can weigh as much as several thousand pounds.

To more precisely control and position these heavy cants and boards on a resaw line, one sawmill recently integrated simple and advanced VFDs, electric cylinders, communication modules and other products from SEW-EURODRIVE.

Compared to previous technologies — which included some analog equipment, an outdated machine architecture and hydraulic systems — this more unified and modern control system would go a long way toward maximizing cant yields for each log, providing the sawmill with **greater control, safety, and energy savings.**

AUTOMATING A NEW RESAW LINE

Mark Painter, a local machine builder and systems integrator, believed that automating a new resaw line for W.R. Deacon & Sons Timber, a sawmill in Lexington Virginia, would be the best way to meet the company's goals of greater throughput and efficiency.

Painter approached SEW-EURODRIVE to help him deploy an automated solution that provided smooth, controlled motion on the resaw line to maximize equipment life. He also wanted to meet the sawmill's goals, which included the following:

- The sawmill wanted to optimize the way each log is cut and graded, ensuring customers received their lumber according to their specific requirements.
- Adding automated controls, such as VFDs, would enable a single operator to manage and control the lumber beyond just simple yet damaging starts and stops.
- These capabilities would improve personnel safety; no one would need to be physically near the blades in order to operate the equipment.

> "Mark has a lot of experience working with sawmills," says Todd Bauer, District Sales Engineer at SEW-EURODRIVE. "He saw what the industry had always done — and was still doing — and felt most operations weren't maximizing the equipment. They were actually abusing the equipment — but that was just the accepted industry way."

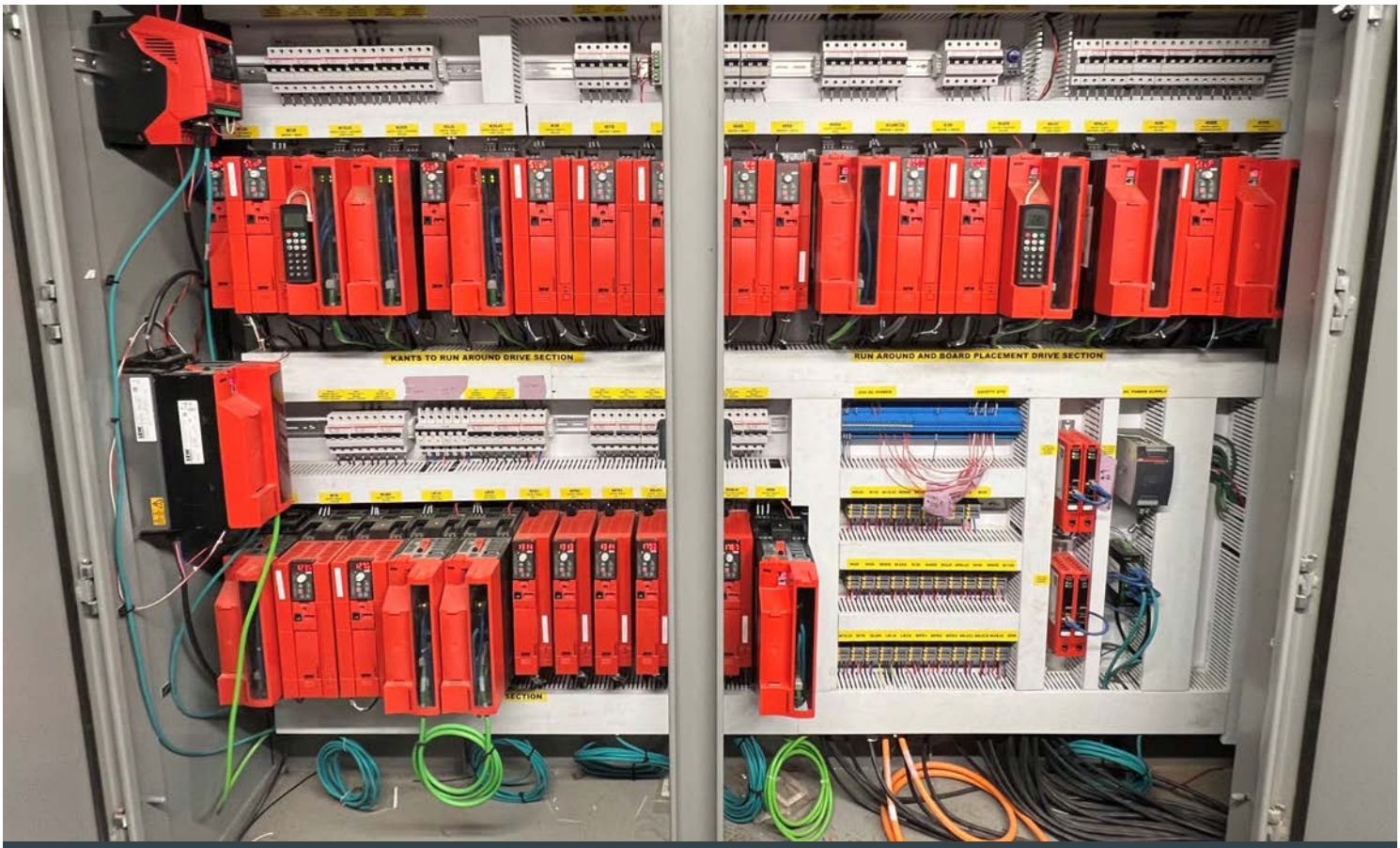
The addition of electromechanical synchronized electric cylinders and synchronized integral motor reducers ensure increased precision for less waste.

W.R. Deacon & Sons Timber estimated that the automated resaw line would improve throughput, enabling the sawmill to run less cants through the gang saw and increasing the yield per log by one additional board. Thanks to this increase in cant throughput, the sawmill would improve its overall production.

To achieve these goals, Painter and the SEW-EURODRIVE team worked together to outfit the new resaw line with a comprehensive automated solutions package consisting of many components and systems that were new to the sawmill, including:

- DRL asynchronous servomotors.
- MOVIDRIVE B, MOVITRAC 07B and MCLTP open- and closed-loop VFDs.
- CMSM electromechanical electric cylinders.
- Internal Ethernet communication and motion programming within the VFDs — not just the PLC.

> “Adding Ethernet capabilities improved overall control and flexibility, while the VFDs unlocked motor soft-start, soft-stop and positioning capabilities,” explains Stephen Sproule, Motion Control Product Engineer at SEW-EURODRIVE. “The VFDs work by gradually ramping up acceleration and deceleration forces, resulting in much smoother movement compared to the hard-stop, continuous chain movement that was previously the norm.”



With built in Ethernet communication and varying-performance VFDs, SEW–EURODRIVE unlocks motor soft-start/soft-stop and positioning capabilities, resulting in reduced mechanical stress on the driven equipment.

With the addition of SEW-EURODRIVE products, controlling the automated resaw line only requires one operator who can work safely in the cab.

UNLOCKING PRODUCTIVITY AND EFFICIENCY BENEFITS

The SEW-EURODRIVE electromechanical solution led to a number of benefits for the new resaw line — and for the sawmill at large.

- **Modern Ethernet controls.** Products like the VFDs and inverter technologies support fieldbus communication, culminating in a EtherNet/IP™ control system that has enabled vertical data communication to the control level with high bandwidth. SEW-EURODRIVE components play particularly nicely with Siemens and Allen Bradley controllers, creating a modern control architecture within the sawmill for the first time.
- **No more hydraulics.** Some of the SEW-EURODRIVE components — such as the linear electric cylinders — replaced previously hydraulic axes on the resaw line, eliminating the drawbacks of hydraulic systems. For example, hydraulic systems are noisy, require regular maintenance to function properly, consume a lot of energy and can leak or spill harmful fluids into the environment.
- **Improved indexing, precision and yield.** The new control system enhanced the accuracy of cant positioning and cutting. It also unlocked new indexing capabilities, enabling operators to more precisely align the ends of the cants using the PLC. This precision, along with the improved cut quality, enabled operators to get more lumber out of each log while minimizing the amount of scrap. The company was able to get more "board for its buck" instead of losing extra material to sawdust.
- **Less shock loads and longer equipment life.** Thanks to their soft-start and soft-stop capabilities, the VFDs reduced the amount of mechanical stress on the motor and its components. They also protected the gear motors by limiting the amount of torque. The smoother movement also had a positive effect on how the cants and boards were handled, eliminating the "clanging and banging" of lumber and minimizing the resulting shock loads on equipment. Operators could also start running very heavy cants more slowly, avoiding faults and damage to equipment.
- **Reliable equipment feedback.** Some of the installed VFDs could provide valuable feedback via the new Ethernet capabilities, relaying valuable information about motor current, torque and speed. These metrics have enabled operators to stay ahead of maintenance issues — such as when a blade may need to be changed. "The previous technologies in place didn't provide any information — only that the system is working or that it isn't," says Sproule.
- **Operator safety.** Not only did the addition of Ethernet connectivity enable remote equipment access, further supporting production efforts, it also eliminated the need to have operators near the heavy-duty machinery during operation. Controlling the resaw line only requires one operator, who can work in the cab away from the process.

Space Savings

The new Ethernet connectivity **reduced the sawmill's wiring needs by 90 percent**. In fact, only one control cable was required to run the entire resaw line.

90%
less wiring

COMPLETE DRIVE TECHNOLOGIES AND SERVICES

Bauer and Sproule, the SEW-EURODRIVE team, aided Painter in the deployment of the resaw line's new automation system. Integral to this project's success was the customer support Painter received, as well as SEW-EURODRIVE's role as a one-stop shop for all the required components and systems.

"Besides the PLC, everything in the resaw line's drive system came from SEW-EURODRIVE. If something were to go wrong on a project like this, imagine trying to coordinate all the suppliers and manufacturers on a single call to solve the problem. It'd be impossible," Bauer says, highlighting an advantage of working with a company with a broad electromechanical product portfolio.

"Our work on this sawmill has enabled Mark to go out into the field and start bringing these types of automated solutions to other lumber facilities," Sproule adds. "The seed is out there, and now it can grow."

GETTING STARTED WITH SEW-EURODRIVE

Since the implementation of the new, automated resaw line, W.R. Deacon & Sons Timber has achieved its end goal of getting more product out the door as efficiently as possible — and then some. The company is pleased with the additional benefits related to longer equipment life, a smaller footprint and greater operator safety.

"The automation process wasn't just about putting things together, but how we could make everything work together in the best way," Painter says. "Thanks to the team at SEW-EURODRIVE, we're up and running now — and with great success."

To learn more about electromechanical solutions for sawmills and other industries, please visit: seweurodrive.com.

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