NEW POSITION SYSTEM ENHANCES RESAW

Smart Gate with RMC150 improves precision and productivity at recent installation.

By Brad Smith

When a log first enters a hardwood sawmill, it is debarked and frequently sawed into a long, square 24 in. block. The block then makes its way to a vertical resaw. An operator feeds the block past a saw blade, shaving off a board of desired width. The board comes off the line while the block remainder cycles back around to travel through the resaw again. In this way, the block gets whittled down until entirely converted into boards.

When done on conventional vertical resaws, though, this process can be very hard on the machinery. The block moves past the saw blade through a narrow channel, with a movable linebar on one side and a series of three press rolls on the other. The press rolls move into position to press against the block, keeping it flush against the linebar for straight cuts. Traditional vertical resaws adjust press roll positions with pressurized air cylinders. Depending on the width of the block as it approaches, press rolls might have to travel 20 in. as quickly as possible to close the gap with the block and force it against the linebar. Because of the weight of the block, the cylinders' high pressure, and time demands of the resaw line, it's common for the block to smash into the linebar. This happens time after time, year after year, until the resaw can no longer be repaired.

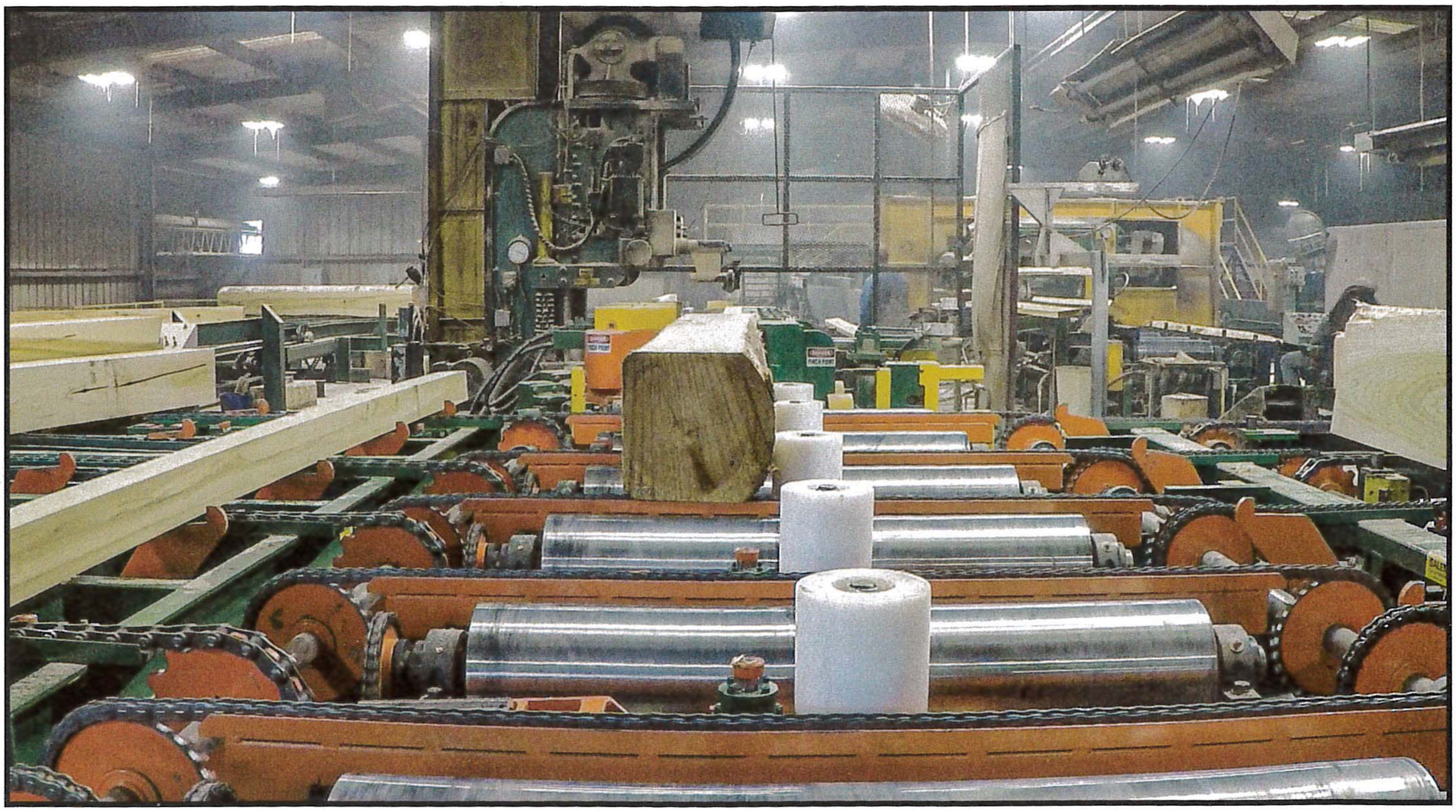
Back in 1988, Salem Equipment helped to install just such a resaw at one of its client's mills. The machine had plenty of life left in it but desperately needed an upgrade to this critical part of its workflow. The client already had a motion controller in its system, but it needed more. Salem Equipment turned to Delta Computer Systems and its RMC150 motion controller.

Salem Equipment developed its first bandmill and resaw line in 1951, five years after its founding. In the time since, Salem recognized a need for serial controls in lumber machining tools, but no such thing existed at the time—so the company created them. This desire to innovate and consistently improve on its sawmill equipment, generation after generation, ultimately led Salem's controls and hydraulic specialist Kevin Eberhardt to Delta. He knew that the traditional air pressure approach to vertical resaws lacked the functionality and precision needed to evolve the tool's performance and durability.

One key issue was the constant variability of block width with each pass. One block might be 24 in. wide, the next 6 in., and the next anything in between. To cope with this variability under the original resaw design, air cylinders were open or closed. Air pressure needed to remain constantly high to make contact with the block and press it to the linebar in the shortest time. Moreover, that pressure had to keep the block solidly in position against the linebar as it moved past the saw.

"Say I know the block width is 12 inches and I'm using a standard servo cylinder, which will be position-driven," notes Eberhardt. "If I tell the press roll to go to 12 inches and my measurement is slightly off, there's no way to make sure that I'm fully up against it unless I continue to drive towards that linebar. And when you do that, you end up over-pressuring."

With a move to hydraulics backed by the Delta RMC150, though, things changed. Because block width can be detected with a sensor, press roll positions can be pre-staged. In other words, the rollers can be advanced to a position very close to where the block edge will be just in time for its arrival. (Eberhardt notes that a 2 in. distance is often optimal.) For example, if the resaw detects a



On the sawline, white line-up rollers align to orient the block for feeding between the Smart Gate's press rolls and linebar (located behind the block shown at center).

Salem Equipment's new Smart Gate resaw positioner—the yellow and orange elements are press rolls that hold the block against the linebar.

12 in. block approaching, it can position the press roll waiting 14 in. from the linebar, so it only needs a nudge to close the gap. Once the block exits, it only retreats to its pre-staged position, not completely open, and the pre-staging process can begin again for the upcoming block.

However, position is only half of the process. Salem Equipment installed MTS Temposonics position transducers in the cylinders and Bosch pressure transducers to sense cylinder pressure. By integrating with Delta's RMC150, Salem's team could monitor position and pressure simultaneously in real time. In the above situation, that 12 in. block would approach, and the press roll would pre-stage to 14 in. As the block rolls through, the press roll clamps down to 12 in. The RMC commands the cylinder to go to zero against the linebar, but if a given amount of pressure (250 lbs., for example) is detected, stop and maintain that pressure until the block exits.

The ability to control position and pressure with microsecond-level accuracy through the RMC150 made all the difference, and so, through this client upgrade, Salem Equipment created its new Smart Gate offering.

NO GUESSWORK

Smart Gate was not Salem Equipment's first attempt at using a servo cylinder in this way. In a prior effort, the company kept pressure at roughly 1800 psi until the block entered the cut, whereupon pump pressure would drop to 200 lbs. at the valve. However, position control with Salem's then-current RMC was extremely hard to control. Eberhardt states that not until Salem implemented Delta's RMC150 did they have an effective solution.

The RMC150 supports up to eight motion axes, of which Salem Equipment used five in its resaw design. One controls the linebar position. A second syncs with the first axis to control a series of line-up rollers that align to the linebar. The remaining three axes link to three 6 in. cylinders mounted on a pivot that controls the press roll position, which can achieve a full 24 in. open.

"Because I know what the pressure is on each side of the piston, we can take the differential and calculate how much force is being applied," Eberhardt says. "If you were to do this in a PLC, it would be very complicated, because there's so many things happening at once. PLCs would have a lot harder time trying to get your position and then maintain a pressure with any real accuracy. The RMC150 runs considerably faster than a PLC would ever process that."

Salem Equipment also found the software tools that accompany Delta RMCs made development and deployment remarkably easy. Delta's pre-installed tools and plots streamlined troubleshooting, including providing an event log to see step by step how the RMC handles PLC instructions. Delta had already provided a host of shortcuts, such as automatically calculating applied force from transducer input and handling scaling through RMC wizards available in an intuitive graphical menu interface. Additionally, Eberhardt notes that both the help files and Delta's tech support "is by far better than anybody I've ever dealt with—and I've been doing this for 20 years. If I don't understand it, or if I want to do something a little different, they're real good at helping me."

PERFORMANCE

Salem Equipment's client often wanted to feed 300 block feet per minute. With the old resaw system, when an operator saw that a block wasn't flush with the linebar, he would have to slow the line to give the block time to get square. Now, with the precision of the RMC150 and its position force control capability, there's far less need to command speed changes. The operator can then spend his time confirming that he's cutting on the right face and getting the right grade out of the log.

In throughput terms, Salem's client typically got eight block cuts per minute. With the new Delta-driven Smart Gate system, the client sped up to 10 or 11 cuts per minute—at least a 25% improvement in productivity.

"With our new Smart Gate system our customer drastically improved performance as well as the overall maintenance of their line," Eberhardt explains. "And with the Delta controller, I can see uses well beyond what we're using it for the sawmill industry. There are a lot of areas where we can use it, pretty much any machine with press rolls. This will help Salem Equipment continue to innovate and do what we do best." TP

Article and images provided by Delta Computer Systems and Salem Equipment. Brad Smith is Regional Sales Manager for Delta Computer Systems Inc.