



Cutting lumber drying costs

B.C.'s Southcoast Reman, a large custom lumber remanufacturer and kiln drying operation, is making use of an advanced new kiln control system that is delivering impressive savings on their power costs —in the neighborhood of 30 to 40 per cent.

By Paul MacDonald

Canadian lumber producers literally spend millions of dollars on electricity to circulate air in their dry kilns to dry lumber every year.

But what if a mill or lumber drying operation could significantly reduce its power costs?

There is a huge incentive to do so—with power being a significant variable cost and potentially controllable, any saving has a positive impact on a company's income statement. Even shaving 5 or 10 per cent off your power costs would result in a significant saving. And reduced energy costs naturally result in reduced cost per thousand board feet of lumber dried.

Add to that, if an operation can reduce drying time, it can essentially increase its drying capacity—without adding capital cost to build new kilns.

Southcoast Reman, a large custom lumber remanufacturer and kiln drying operation in Maple Ridge, B.C., just outside of Vancouver, is doing even better than 5 or 10 per cent. A new kiln control system operating in 2 of its 7 dry kilns has been able to achieve a combined savings of 30 to 40 per cent in electrical power costs. The new control system's contribution is based on the new principle of “listening to the wood”.

Chris Luke, general manager of Southcoast Reman, says their operation is always looking for innovative ways to be more cost efficient. The groundwork for the adoption of the new kiln control system goes back several years, when Southcoast initiated two feasibility studies with the help of BC Hydro, to identify opportunities to make their kilns more energy efficient.

“We believed we had opportunities to maintain and improve drying performance, while reducing our kiln drying schedules and the electrical and gas consumption the kilns require to operate, as well as reducing our maintenance and electrical service cost,” explained Luke.

As a custom operation, Southcoast is an independent privately-owned business, and provides lumber remanufacturing and kiln drying services only. It doesn't buy, remanufacture or sell its own lumber. Custom drying accounts for approximately half of Southcoast's service business. The company's focus is to provide its customers with superior custom processing, kiln drying and packaging services, accurate documentation, and on-time shipping. Their customers include the largest forest products company on the B.C. Coast, Western



Forest Products, and forest company Interfor, as well as a number of smaller independent manufacturers and distributors of higher value lumber from all the coastal wood species.

“We don’t own lumber,” says Luke. “Because we are exclusively a service provider, we have to be extremely cost effective and efficient, or we won’t be in business.”

Southcoast’s seven direct gas-fired side-loader kilns were installed in 2007. However, the drying controls technology needed updating. The control system had no Programmable Logic Controls (PLCs), or Variable Frequency Drives (VFDs) on the circulating fan motors or blower fan motors to control fan speeds to facilitate the management of electrical and gas consumption.

A completely new kiln control was essential to optimize the kiln drying schedule, to reduce both electrical and gas consumption, as well as lower maintenance and electrical service costs due to faults arising from the original control systems. Lumber drying expert Sita Warren had worked with Southcoast from the beginning, conducting BC Hydro-funded energy efficiency feasibility studies back in 2009 and 2010. Warren was retained by the company to develop, track and report on their kiln energy performance which formed the baseline.

“Long story short,” says Luke, “working with Sita, we sought her insight for internal improvements and identified what we considered to be the best kiln control company that could not only design, but also build the system we needed.”

“The ball was really put in our hands,” says Jim Parker, President of Vacutherm, of Warren, Vermont. “The challenge was to build a conventional kiln control system.”

As the company’s name implies, Vacutherm are experts at building and installing kiln controls for vacuum kilns, as well as building vacuum kilns themselves.

“When we first looked at this, it looked pretty straightforward—but when it came to implementing some of the sophisticated energy management controls that were necessary to save electricity and gas, that took an enormous effort by our engineers,” said Parker.

Vacutherm already had a very sophisticated control system which formed the basis for the software for the new kiln controls at Southcoast.

That said, there were still several years of development, much of it focused on developing very sophisticated computer modeling systems, and air flow and heat algorithms. But following that, the company was able to build a prototype, test it, tweak it ... and then designed, engineered and built the first production conventional kiln controls.

The new kiln controller systems have now been installed in two 80,000 – 90,000 board feet conventional direct



gas-fired kilns at Southcoast. The control system optimizes the drying schedule while maintaining the company's high quality standards—and even providing the opportunity to improve those already high standards. There has also been a big reduction in steam use for humidification purposes, thereby reducing gas consumption for the boilers that are used for conditioning lumber. Essentially, Southcoast is drying faster and with less energy, both electricity and natural gas from the direct gas fired burners used to heat these kilns, as well as gas required to fire boilers used to produce steam used in the conditioning process.

“Some of this seems counter-intuitive,” says Parker. “Reducing drying time usually means drying fast, and possible lumber damage. But we have proven that is not the case. It seemed hard to believe, but once we fully understood it, it makes perfect sense.”

The more gently you can dry the wood, the less likely you are to case harden or cause other defects, such as cracks and checks. “It's a more natural drying process,” says Parker.

What the system does, says consultant Sita Warren, is listen to the wood, and the information the wood is providing.

“We're listening to where the wood is at, and when it is willing to give up moisture, and then pushing it to give up that moisture at just the right time,” explains Warren. “Getting the water out of the wood now requires less energy, and takes less time. And that's why we have been able to accomplish the energy savings numbers.

“I've always wanted to see this happen,” says Warren, who has worked in the lumber drying area for decades. “In the past, with kiln systems, we have been telling the wood what we want it to do. But with the new control system, the wood is telling us what its characteristics are, its initial moisture content, how much heat it needs, how much air flow it needs—essentially, what it needs and when it needs it, so there is no checking, case hardening or warping.

“The wood is telling us, through the system, what it needs and what it doesn't need. And through computer modeling, the control system reacts to that.”

The system Vacutherm has developed can replace aging, outdated, or even just underperforming kiln controls. It was also Vacutherm's goal to provide efficient and powerful controls without being overly complicated. Its TOUCHDRY operator interface is easy to use and simple to understand, and provides operators with the opportunity to optimize the kiln schedule. “The kiln operator can be trained on the system in an hour or two,” says Parker. “We can't be Apple, but we've made the system fairly simple.”

The energy management features on the Vacutherm system use several proven algorithms to optimize airflow and reduce energy costs. Customers with 600FPM or more air velocity in their kiln and no existing speed control on their fans can see significant electricity savings, and thanks to the system's smoother control, reduced



steam demand if that is used for conditioning.

A remote control feature, along with the ability to alert operators by e-mail or text message, also offers real time awareness of mechanical problems in the kiln. No longer does a kiln run for months with fans out of service or vents malfunctioning, causing increased steam demand, longer drying times and poor drying quality.

“When the Southcoast kiln supervisor fired up the kilns with the new control system, they started drying wood like they always have,” says Parker. “But the sophistication of the new system offers the opportunity to achieve major energy savings.”

Where to from here for the system?

Vacutherm is ready to roll it out at other drying operations, sawmills—and other forest industry plants. A similar system is being designed for installation at Coastland Wood Industries’ veneer drying plant in Delta, B.C., Southcoast’s sister operation. Veneer drying is a different process, with feeding of veneer being done continuously, rather than the batch drying that is done with lumber. But the computer modeling principle remains the same.

And instead of listening to the lumber, the system listens to the veneer, as to what is required to dry it properly. The system has to be even more responsive to the information it gets due to the different types and thicknesses of the veneer.

With operations such as Coastland and Southcoast Reman, Vacutherm’s overall approach is to evaluate conventional kiln applications for both energy savings and time savings opportunities. With the company’s evaluation tools, it can quickly determine opportunities for power utility incentive programs, such as those offered by BC Hydro or other utilities, or optimization opportunities. The company says this conservative approach helps customers make decisions based on solid financial payback numbers.

And there can be substantial savings for sawmill operations, and their drying systems. Often, the focus in sawmills is looking for productivity improvements, hence lower operating cost in the primary manufacturing and lumber sorting areas. But as the Southcoast experience shows, there can be significant savings on the kiln drying side of the business as well.

Vacutherm will also be looking for ways to further improve the system. “The more we learn, the more feedback we get, we’re only going to get better at squeezing more out of these energy systems. I want us to be able to turn that VFD down one hertz a little bit longer, if we can. But we’re not going to know when and how we can do that until we have more experience.”

BC Hydro notes that while the Southcoast experience has delivered energy savings of 30 - 40 per cent, savings of 15 to 25 per cent will be more typical. “The potential is site and wood specific,” says Kal Sahota, senior key



account manager for BC Hydro.

Southcoast is a custom operation and primarily dries high value coastal wood. There are variables that they cannot control resulting in drying schedules being different with many interruptions that are just part of this custom service business. The SPF lumber being dried in the B.C. Interior sawmills that own and control the lumber being dried, is more standard, with typical drying times of one or two days.

Markus Zeller, specialist engineer at BC Hydro, noted that each kiln load of lumber is unique, in terms of what its energy needs are. “Each tree is different—every tree has its own fingerprint,” says Zeller.

“If you can get feedback from the lumber, then you can get the final moisture content to exactly where you want it.

“If a lumber customer is looking for 14 per cent moisture content, BC Hydro wants our customers to achieve that level of service for them with the lowest amount of energy—not 11 per cent with more energy or 18 per cent with not enough energy.”

Sahota and Zeller said that BC Hydro is assisting customers, such as Southcoast, to achieve sustainable energy savings with its incentive programs. “We want to help customers achieve real, long term savings.

Both Sahota and Zeller praised Southcoast Reman for being a trail-blazer, and being willing to try new technology.

“With new technology, there can be plenty of companies that want to be first to be second, so to speak, in terms of employing new technology,” said Sahota. “But Southcoast has taken a leadership position, and was the first to take this on.

“BC Hydro played a role with some incentive funding, but the risk and the ownership and system responsibility was borne by Southcoast,” he added.

And now the company is reaping the benefits and savings..