RED LIQUOR. GREEN POWER.

Tembec calls it a “game changing investment.” The new ANDRITZ sulfite recovery boiler and turbine-generator improve production costs and environmental performance while providing steady, long-term revenue for green electricity. The CAD 273 million (EUR 185 million) project also permits a future capacity expansion of specialty cellulose production.

The slogan for the Canadian forest products company Tembec is “Rooted in tomorrow.” This is an apt description of how a strong sense of history is blended with a forward-thinking strategy to find success in difficult markets.

To understand Tembec’s drive for success, travel back in time to 1973 in Temiscaming, Québec, a town whose livelihood depended on the pulp mill that was shut down as being unprofitable in 1972. The mill’s rebirth was made possible by four individuals who teamed up with former employees of the mill, the residents of Temiscaming, and government authorities to purchase the shuttered mill. Against an investment of CAD 2.4 million (EUR 1.6 million), the company’s first-year after tax income was CAD 9.3 million (EUR 6.3 million). A Canadian success story was launched.

The Tembec strategy has been to carve out a niche for the sulfite mill: tailor-made specialty dissolving pulps (ethers, acetates, nitrocellulose, and microcrystalline cellulose), chemicals (lignosulfonates), and coated bleached board. “This mill has been here for 100 years,” says Paolo Dottori, Vice President of Environment, Engineering, and Procurement. “The batch sulfite process gives us higher pulp quality and the flexibility to produce to buyer specifications.”

As Dottori explains, Temiscaming is actually a very complicated site from an energy perspective. “We have a board mill, a high-yield pulp mill, and a specialty cellulose mill here, with many swings in production,” he says. “We needed an extremely robust boiler to replace our old units that could handle our variability of liquor swings. We also needed certain fuel capabilities. The boiler had to be oversized by a certain factor. We wanted dual scrubbing capabilities (ammonia and/or caustic). Plus, we needed a flexible condensing turbine design to handle outages and shutdowns in a variety of ways.”

◀ (L to R): Michel Monet, Tembec; Paolo Dottori, Tembec; Bernd Zuschin, ANDRITZ; and Paul Cousineau, Tembec, in front of the new SulfitePower boiler.

Green electricity project

Tembec’s new CAD 273 million green electricity facility at Temiscaming is now producing steam for mill processes and generating power that it is delivering to the Provincial utility, Hydro-Québec, through a 25-year supply contract. The centerpiece is an ANDRITZ SulfitePower boiler and electrical turbine with a generating capacity of just over 60 MW. The boiler burns “red liquor,” which is a co-product of the ammonia-based sulfite manufacturing process at the mill.

The main drivers, according to Paul Cousineau, Corporate Manager of Major Projects (who stepped in to become Tembec’s Project Manager after the original project manager experienced health problems) were the age of existing boilers and the desire to reduce SO_2 emissions considerably – plus the ability to create a steady stream of revenue from the power agreement with Hydro-Québec.

Efficiencies of the new ANDRITZ boiler improve manufacturing productivity and reduce costs. Once fully optimized, the new scrubber and environmental control equipment will reduce the mill’s SO_2 emissions by 70%, which will be much appreciated by the local community.

Best available technology

ANDRITZ was selected to provide the engineering, the boiler itself, erection supervision (civil construction and erection were handled by Tembec), and commissioning services at Temiscaming.

“Sulfite mills are few and far between in Canada,” Cousineau says. “The last recovery boilers in North America for sulfite mills were installed in the late 1970s. ANDRITZ has done considerable work since then by installing sulfite boilers and chemical recovery units around the world. ANDRITZ has strongly promoted its design to the point that we believe it is the best available technology.”

ANDRITZ is unique in that it offers all three types of recovery boilers: black liquor (kraft), red liquor (sulfite), and sodium liquor (for example, sodium-containing effluents from the BCTMP process). “Our first sulfite boilers were installed in the 1950s,” explains Bernd Zuschin, ANDRITZ Project Manager, “so we have a long history and deep experience. We have continued to develop this technology and this is certainly recognized by our customers. For example, this is the first ammonium sulfite boiler we have ever built. Our deliveries up to this point have been for magnesium-based sulfite processes. We also delivered the world's largest sulfite boiler and chemical recovery unit to Sappi Saiccor in South Africa, started up in 2008."

Christoph Gruber, Commissioning Manager from ANDRITZ (standing), with Trevor Turner, Head Boiler Operator, in the control room. ▶

“We were looking for a highly flexible boiler to deal with the steam consumption swings at this site and not have our utilities constrain our pulp production processes,” Dottori explains. “ANDRITZ’s track record convinced us that they were the best supplier for this project. We were especially impressed with their capabilities in handling different and difficult fuels – even municipal solid waste, refuse-derived fuels, and various cooking liquors. We have two of their units at our sister mill in Tartas, France, which gave us a good reference.”

“Liquor incinerators”

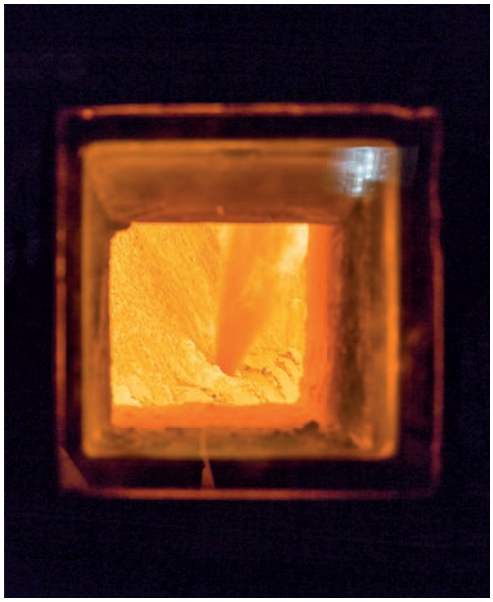
The new boiler replaced three operating boilers and one boiler that had been shut down. As Cousineau explains, “Our three old recovery boilers were what I like to call ‘liquor incinerators’ since they were converted coal-fired boilers operating at low pressures and temperatures. They had reached the end of their useful life. Fouling was one of the biggest issues. This led to corrosion issues and made maintenance more intensive.”

Tembec began talks with then Austrian Energy & Environment (now ANDRITZ) in 2010 and sent out tenders the following year. “We began to talk in detail in 2011, and provided some budget estimates and calculations,” says Zuschin. “We signed the contract with Tembec in March 2012.”

ANDRITZ delivered all the boiler components to the site by mid-2013. “This was a relatively fast-track for delivery, especially considering the sea transports from Europe to Canada, but we made all of the milestones,” says Christoph Gruber, ANDRITZ Commissioning Manager.The boiler was started up early 2015.

Tembec’s new CAD 273 million (EUR 185 million) green electricity facility at Temiscaming is now producing steam for mill processes and also generating power that is delivered via a 25-year supply contract with the Provincial utility, Hydro-Québec. The centerpiece is an ANDRITZ SulfitePower boiler and electrical turbine with a generating capacity of over 60 MW. ▼

▲ The ANDRITZ boiler has capacity to burn 78.5 t of wet liquor at 50% dry solids each hour, equating to 942 tds/d producing 222 t/h of high-pressure steam.



▲ Inside the boiler: liquor being sprayed into the furnace, atomized by steam.

Simplified operations and maintenance

Life for Tembec's boiler operators is now simplified. "We now run two boilers – a high-pressure bark boiler which had a small 8 MW turbine, and the new ANDRITZ boiler," says Trevor Turner, Head Operator. "With this project, we shut down the small turbine since it was only back-pressure and now have all the steam flowing through one high-efficiency turbine with a condensing unit."

Fouling is considerably reduced with the ANDRITZ boiler. According to Michel Monet, Steam Plant Superintendent, the arrangement of the heat transfer surfaces in the SulfitePower boiler allows his operators to optimize temperatures in specific zones to reduce fouling and potential corrosion. "This, coupled with the horizontal configuration of the economizer and superheater, will hopefully help us extend the time between major outages," he says.

About 78.5 t of wet liquor at 50% dry solids can be burned each hour. This equates to 942 tds/d producing 222 t/h of high-pressure steam. Ammonium bisulfite is recovered in the flue gas cleaning plant. Currently, due to limitations in the fiberline and evaporation plant, the red liquor is responsible for about 80% of the capacity of the SulfitePower boiler. Natural gas is now the supplemental fuel to achieve the steam capacity needed, but the boiler is designed to burn red liquor without supplemental fuel and sized to allow for upgrades in pulping capacity.

"We have room for expansion in our pulping operation," Dottori says. "We started replacing our refractory-lined digester vessels with duplex stainless steel, which will give us additional capacity in each of the 11 units."

Much-needed project

Trevor Turner and Dan Guénette, now both Head Operators, were appointed Operating Commissioning Coordinators and were involved with the project from the very beginning. The fact that the ANDRITZ boiler replaces three units creates a new mindset, according to Guénette. "When this boiler is down, the mill is down," he says. "So, we are training every operator to be at a high level to match our best people."

"Any large project requires a little time for the operators to get accustomed to it," Turner says. "But our operators have been up to the challenge. We are making adjustments day-to-day to further improve the boiler's performance. Now that the operators are learning the boiler, we are giving them more flexibility."

Turner and Guénette agree that the boiler is a much-needed addition. "The SO_2 emissions from any sulfite mill must be tightly controlled," they say. "This boiler does that superbly. This is a great thing for the environment and the local community. The boiler runs well and stabilizes quickly. We can adjust liquor flows and air ratios based on pulp mill needs, with most of the operation in automatic mode."

"The entire steam plant team was involved in making this project a success," says Marc Barrette, Mill Manager of the Specialty Cellulose mill. Barrette was Project Owner for the boiler project, responsible for commissioning and start-up. "Our operators and the commissioning team worked long hours on many consecutive days during the training and commissioning phases."

Turn the page

"The project is over; the boiler is built," Dottori says. "Now it is Operations' job to turn the page and look forward to the next 30 years. That is how we are working with ANDRITZ – shifting from project mode to operating mode: maintaining, optimizing, and then looking at future opportunities."

Dottori says the team made a lot of very good decisions in terms of equipment selection. "You can see that in the way that the mill is operating today," he says. "Our digesters and the board machine are performing better because of the solid and stable steam supply we are delivering to them. The boiler is big and robust, with spare capacity at the moment. It burns difficult liquors quite effectively. We're still optimizing, but overall we are happy."

Cousineau agrees. "I would definitely do another project with ANDRITZ," he says. "That's the bottom line."

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