Breathing **new life** into **Kingsport**

*Weyerhaeuser rebuilt its Kingsport mill essentially “from the ground up.” A gleaming new continuous fiberline from Andritz started up in August 2003. This, and a new paper machine, make Kingsport a world benchmark for low cost free-sheet production. “It’s as technologically advanced as any in the world,” says the fiberline manager.*

Kingsport is like a lot of small towns in America. Perhaps prettier than most, due to the surrounding Appalachian and Great Smoky Mountains. Also unique in another way — it has a large, yet virtually odor-free, pulp and paper mill near its town center.

The mill, an important part of Kingsport’s economy, was once owned by Mead, later Willamette, and, through acquisition, now Weyerhaeuser. Weyerhaeuser, one of the world’s largest integrated forest products companies, recently completed a major modernization that, according to all concerned, “rebuilt the mill from the ground up.”

A great deal of pride surrounds the “new” mill. The construction project logged 6.2 million work hours without a lost-time accident. It was completed on time, on budget. And, Weyerhaeuser’s investment breathed new life — and a stable future — into the mill.

The Kingsport story is one of hard-working employees “managing enormous change,” according to Jeff Chamberlin, Fiberline Department Manager. “It is also a story of becoming one of the world’s lowest cost free-sheet producers with a fiberline that is as technologically advanced as any in the world.”

But, the story might have had a much different ending.

“I have a lot of respect for the people who work here.” Jeff Chamberlin, Fiberline Department Manager, has seen the Kingsport workforce go through significant change. “They have a great work ethic. They care about what they do. They have experience, maturity, and good sense. We started up this new pulp mill without a single lost-time injury — and that is really amazing.”
The old batch mill

Not so long ago, things at Kingsport were not nearly as positive. The mill, operating since 1916, began to see hard times in the mid-1990's. Employees and the community knew that the mill might be closed any day.

"If you go through the old pulp mill, you'll see six ancient batch digesters with manual capping valves," Chamberlin says. "There were panels where operators had to turn dials to manually adjust the speed of a washer. Before they replaced the recovery unit, Kingsport had one of the oldest operating Tomlinson recovery furnace (circa 1948) in the world."

Enter Willamette Industries in 1995 when they purchased the mill from Mead. Chamberlin, a Willamette veteran, explains, "The strategy was to breathe new life into the mill with strategic investments."

Willamette began by making modest improvements. Then, in 2002, it announced its decision to invest nearly $500 million to bring the mill in line with its other low-cost and environmentally sound mills.

A pause — and renewed commitment

In November 2000, Weyerhaeuser made a bid to acquire Willamette Industries. There was considerable concern in Kingsport. Where did the mill fit into the new owner's future plans? Would the investment at Kingsport be cancelled? Everyone knew that, without modernization to make the mill competitive again, there was little hope for the future.

Thankfully, Weyerhaeuser strongly supported the investment decision — maintaining that Kingsport positions the company to capture and hold domestic market share even against imports from low-cost centers such as Brazil and Indonesia.

Responding to challenges

Chamberlin came to Kingsport from Willamette’s "Marlboro" (Bennettsville, South Carolina) mill in December 2002 when the fiberline project was in early stages of construction. "When I got here," he says, "it was tough with limited manpower to keep the old mill running."
At the same time, we were trying to get everyone trained to run the new mill.

“I really respect the people who work here. They have gone through an awful lot. I’ve seen how well they respond to challenges and stress. We have one of the oldest average age workforces within the Weyerhaeuser system — about 56 years old. All of a sudden, they had to grasp all this new technology. And, they had to do this while keeping the old mill running up until the final minutes before the switchover.”

A safe project, on budget, ahead of schedule

Over the years, Willamette earned a reputation as a builder of low-cost, efficient mills by managing project with internal resources rather than outside engineers and construction firms. This capability transferred seamlessly to Weyerhaeuser.

Design and engineering for Kingsport were provided by Weyerhaeuser Engineering Services (WES), with help from its construction management group. According to Howard Irwin, Area Construction Manager at the time, there were 1800 workers on site at the project’s peak. The project broke ground in July 2000 and was completed in four phases.

The woodyard was relocated and upgraded first. The new paper machine started up in August 2002. A new recovery boiler started in October 2002. A lime kiln (relocated from another mill) and recastictizing equipment started in May 2003. And, the new Andritz bleached hardwood fiberline and rebuilt ClO₂ plant, started up August 7, 2003 — two weeks ahead of schedule.

“By the time we got to the fiberline, we had tuned ourselves up very well,” Irwin says. “We picked the best subcontractors and labor.”

Although the equipment it uses is the same as that in a kraft pulping and
bleaching process, Kingsport’s adaptation of the cooking technology is one of the industry’s first and is thought to be the only one of its kind in North America. “The chemistry enables us to be different and better,” says John Sanders, Assistant Fiberline Manager.

“From day one of my career, I always wanted to go through a start-up and see everything from breaking ground to the finished plant,” says Sanders. “We all were aware of the time-commitment required during a project of this magnitude. Basically, we were all working 80- and 90-hour weeks for a year leading up to start-up. We had heard horror stories from other mills about this continuing for months after start-up. But, that didn’t happen here. Things went that smoothly.

“The plan was to keep the old mill running until the new fiberline could consistently make 400 t/d. We tried to prepare ourselves for having half the crew in the old mill and half the crew in the new mill. In the end, we knew we could not staff both mills. So we shut down the old mill and immediately came over and started the new fiberline. And, we never looked back.”

Sanders was impressed with the teamwork. “The Andritz guys we worked with on this project were very knowledgeable and focused on our success,” Sanders says. “I don’t think we would have started up on time if it wasn’t for them working as hard as they did. The pushed us and did an excellent job.

“This start-up is an experience that I will value forever.”

The hardwood fiberline
The hardwood fiberline has a design capacity of 925 adst/d. The digester uses single-vessel hydraulic cooking technology. There are control strategies to compensate for the fact that lignin removal is not as aggressive with Kingsport’s cooking chemistry.

The chip feeding system is based upon Andritz TurboFeed® technology (see box to right). A Diamondback® chip bin is used for uniformly pre-steaming the chips.

The screen room consists of a primary knotter close-coupled to three stages of screening and one high-density cleaning stage. Knots and rejects are washed of good fiber before removal from the fiberline system. Accepts from the primary screens are sent to a pre-thickener and washed in a two-stage DD Washer before moving to a two-stage oxygen delignification system. Another two-stage DD Washer performs post oxygen washing before the bleach plant. The three-stage bleach plant also uses DD Washers for interstage and final pulp washing.

“The differences between the old mill’s pulp and our current pulp is that now it’s cleaner and around one point brighter,” Sanders says. “The fiberline produces a strong fiber that mixes well with the softwood kraft pulp used in the paper machine’s furnish.”

Feedback from the paper mill.
“Turbine from the paper mill.
“I talk with the paper machine people every day,” Chamberlin says. “That’s a big part of my job. The new paper machine has not produced a single ton of off-spec paper that could be attributed to pulp mill quality.”

The new paper machine, dubbed K-1 by the mill, replaced three older paper machines and started up in August 2002. It produces uncoated free-sheet in a variety of roll sizes, brightness, basis weights, and recycle contents.

“This machine has the potential to be the flagship of Weyerhaeuser,” Chamberlin says. “It has tremendous availability and efficiency. Its production is already among the highest in the company. Our pulp is certainly a factor in its success.”

TurboFeed® transfers chips from the chipmeter directly to the top of the digester using specially designed pumps instead of the traditional High Pressure Feeder (HPF). Based upon the success at Albany, the Kingsport mill installed a TurboFeed® system, with three chip pumps in line.

“I was very skeptical when they told me it would pump chips all the way up to top of that digester,” says Scott Tipton, who many years ago was the chip filler for the old batch digesters at Kingsport. “I’m a believer now. They pump with no problem.”

By eliminating the HPF and other equipment, mills obtain significant savings in capital, installation, operating, and maintenance costs. Recently, mills in Brazil and Chile have also ordered TurboFeed® systems — including the world’s largest single-line continuous cooking plant (3000 t/d capacity).
"A great pulp mill."

What is Chamberlin's view of the fiberline start-up? "Water in, liquor in, chips in, and we were making on-grade pulp. We have never sent any off-grade pulp to the paper machine."

Weyerhaeuser believes it has technical advantages in the Kingsport fiberline. To do this, they took some calculated risks with regard to the equipment, according to Chamberlin. "For example, we helped work out the nuts and bolts of the TurboFeed® system that had only been installed in one other mill in the world. The risks we took are paying off in terms of dollars for our shareholders."

"This is a great pulp mill," he continues. "It's high quality. Strength, cleanliness, bleachability, brightness, and yield are right where we need it to be. It's environmentally sound. BOD on a per-ton basis is less than half of the previous operation. It's extremely reliable. We just went one month with zero downtime — no shorts, no breaks, no trips, no equipment failures. It's amazingly flexible. We can speed up and slow down as needed to match production of the paper mill."

And, it has room to grow. "Within three or four months from start-up we were running for days at a time at 100% of design capacity," Chamberlin says, adding, "we can run 15% above design and I know we can go higher if needed."

Raising the bar

"This is undoubtedly one of the most automated pulp mills in the world," says Steve Turner, Fiberline Process Control Specialist. "We have lots of instrumentation and the most automated start-up sequences for operators that I have ever seen."

Turner thinks that Kingsport has "raised the bar on the level of automation."

"There is a lot of flexibility built into this digester, so we are able to try different control strategies," he says. "We've really taken the load off the operators when it comes to tasks like sequencing the start of equipment. Most of the operators had never used a DCS before. Now they can concentrate on production and quality, and not on being computer experts. The computer is fast, consistent and keeps the processes stable. Stability means higher quality at lower costs."

Improving every month

After the start-up, Kingsport is focusing on three areas: workplace safety, continually looking for ways to lower manufacturing costs, and employee training.

"Our product quality is improving every month," Chamberlin says. "We're now in the middle of step-up training (one or two job levels up) so employees can relieve each other for days off and vacations. We're about to embark on the SafeStart™ program, which is a common sense approach to safety using behavior-based techniques."