

New Fiberline, PM Conversion Repositions Bowater Mill with Expanded Product Mix

New kraft mill with O2 delig and ECF bleach plant now producing superior fiber for broadened spectrum of coated and uncoated publication papers at Catawba, S.C., mill.

By KEN PATRICK, EDITORIAL DIRECTOR

Six years ago when Bowater was formulating plans to convert its No. 3 PM at Catawba S.C., from newsprint to LWC, and was considering scrapping its existing chemical pulp mill in favor of a newer, more environmentally and production efficient model, the great paper industry downturn of the early 2000s had not yet materialized.

Three years later, after the events of Sept. 11, 2001, pushed an already sagging U.S. economy to its lowest depths in a quarter century, Catawba was well into the equipment procurement and delivery stage of its new fiberline. And with the souring economy continuing to shut down pulp and paper mills across North America, Bowater began preparing for the conversion of PM 3 into the largest coated groundwood machine in North America and the world's fifth largest.



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**—Bud Nash,
VP and resident manager**

On the surface, a \$281 million expansion (\$175 million for the new fiberline and \$106 million for the rebuild of PM 3) during such dark hours in the paper industry might have seemed ill-timed, to say the least. But, as Bud Nash, VP and resident manager at Catawba, points out, the planning for these projects actually began long before the current economic downturn, when no one could have envisioned events and conditions (including a war) that would spread economic problems worldwide.



The 225-ft continuous digester, centerpiece of the Catawba's new fiberline, uses low solids cooking for lowest kappa number and highest fiber quality.

But more important, Nash adds, the two projects at Catawba were part of a longer-term Bowater strategy to not only reposition the Catawba mill but, along with the Alliance acquisition in 2000 and upgrades at other company mills, to expand and reposition its entire Coated and Specialty Papers Division. From that perspective the projects were not related to any short-term ups and downs in the economy, but rather represented a firm commitment to the future.

As it turns out, startup of rebuilt PM 3 in early March and the new fiberline in late August of last year came at

a time when the North American economy was showing real signs of improvement. The markets for coated groundwood in particular began “coming back” last year, or even the year before that, Jim Colewell, director of marketing for Bowater’s Coated and Specialty Papers Division, notes.

In both 2002 and 2003, the coated groundwood market grew by about 5%, Colwell adds. “Back to back 5% is not bad considering that 0%-2% is what the industry has been used to recently and would consider a good year. These past several years have been rough on the paper industry. Market conditions, in fact, caused a nine month delay in our PM 3 conversion project.” The Catawba mill, however, has not taken any market related downtime at all these past few years.

“You have to work through these things and not stop and abandon ship, if at all possible, especially when you have the cost situation that we’ve come up with at Catawba, and the capabilities we now have to move forward with a broadened product spectrum and an expanding customer base,” Colwell emphasizes. “From a sales and marketing standpoint, we never had any doubts about what we were doing here. From the outset, everyone was on board and our customers were all lined up and ready to go,” Colewell says. “There was no looking back.”

Marketing Strategies.

As Nash and Colwell explain, Bowater did major customer surveys in the mid- to late-1990s, which showed the Catawba mill and the division were very strong in the products they were producing. “At that time, we were seen primarily as a boutique type of supplier, primarily No. 5 coated groundwood,” Colwell says.

“But our customers were asking us to expand both the breadth (grade variation) and depth (basis weight) of our product spectrum, and volume for that matter,” Colwell continues. “Rather than a boutique, they were asking us to operate more as a department store for coated papers generally (and not just coated groundwood grades), while continuing to provide our boutique style of service.”

Nash explains that in the recent past (before the Alliance acquisition) Bowater produced newsprint, uncoated products (a machine finished grade called Southern Pride), and coated groundwood (mainly No. 5) on the mill’s other two paper machines. “Based on cus-

tomers feedback and our own strategic analyses, we needed to increase and expand our product spectrum to cover just about everything from newsprint up through coated free sheet,” he says.

As the company has expanded to cover more of the grades in the newsprint-through-coated-free-sheet spectrum, not all of the products have come by conversion of existing capacity. The Alliance acquisition, for example, brought SC grades as well book grades into the Bowater fold.

The conversion of PM 3 to No. 5 coated groundwood has allowed Catawba to shift grade production on its other two machines—PM 1 and PM 2—to broaden the mill’s mix of products. Two new grades have been launched from these machines—BowMax 84 Gloss, the company’s first No. 3 coated free sheet grade, and BowOffset, a new 83 bright lightly coated groundwood grade, which competes in the book and commercial segments of the uncoated free sheet market. Production of No. 4 LWC is also increasing on these machines.

“We’re doing very well with these two machines,” Nash says. “This was the thinking and planning back in the late 1990s—convert No. 3 to coated groundwood and give the mill flexibility to broaden its product mix on No. 1 and No. 2 machines.”

Biggest and Best

Colwell notes that the strategy for converting No. 3 PM to coated groundwood focused mainly on the machine’s production capacity. “When you want to grow your product line and volume, you either go outside and purchase capacity or you look internally at what can be converted.

“In our case, we started looking at the largest and best in house, because from our perspective it wouldn’t make sense to go to a higher value grade with a smaller machine. In addition to capacity flexibility, the larger machine generally has more production cost advantages. So No. 3 at Catawba was selected because it was one of our biggest and fastest, and also because some upgrades had already been done on it, including the addition of a shoe press (2001) and a gap former (1988), that would complement production of coated groundwood papers,” Colwell explains.

Nash points out that PM 3, which ran on newsprint exclusively since original startup in 1968, is now the most productive paper machine in North America, in almost all categories. It is also among the lowest produc-

tion cost machines currently in operation.

PM 3 has an upgraded production capacity of 330,000 tpy. It has a 353-in. trim width and, with a new on-machine roll-type film coater and an 8-nip supercalender, can operate at speeds up to 4,200 fpm. The conversion project includes new IR and flotation drying capacity and a rebuilt winder section.

The existing No. 1 and No. 2 machines have off-machine coaters. Total production capacity of the mill's three paper machines, using groundwood (TMP) and kraft furnish from the new fiberline, is in the 750,000-tpy range. In addition, some 230,000 tpy of bleached chemical pulp capacity is available as market pulp.

New Fiberline

According to Nash, the mill closely analyzed and compared the options of upgrading its vintage 1959 kraft pulp mill (10 batch digesters and a C_DHD bleach plant) versus building a new one with a continuous digester and an ECF bleach plant that would be in full compliance with EPA's Cluster Rules.

"Actually, rebuilding the old pulp mill turned out to be a hopeless case, considering that we wanted to achieve Tier 1 status under the Cluster Rules," Nash explains, "making us only one of four North American mills to accomplish that." In fact, he adds that it would have required more investment to get the old pulp mill in compliance with the Cluster Rules than to build a completely new one that would accomplish Tier 1.

Vic Bilodeau, operations manager-fiber, explains that ClO₂ substitution in the old bleach plant's chlorination stage was averaging more than 60%, but going to 100%



Oxidized white liquor is used in the two-stage oxygen delignification towers, reducing kappa numbers from 30 with the old bleach line to 14 entering the bleach plant.

substitution still involved a significant risk that it wouldn't attain Tier 1 status, even with the addition of oxygen delignification.

One design requirement for the new plant, Bilodeau notes, was to use no more ClO₂ than was previously being used in the old plant. "To do this we included an oxygen delignification stage and used low solids cooking in the continuous digester, which, along with advanced washing technologies, significantly reduced kappa number going into the bleach plant, from around 30 to 14."

With no increased ClO₂ requirement in the new DE_{OP}DD bleach plant, the mill was able to use its existing chlorine dioxide generation capacity. It was also able to retain its existing chemical recovery island with a few minor upgrades.

Because oxidized white liquor was to be used in the two-stage O₂ delignification towers, about 30% more was needed than before. To accomplish this, a new burner was fitted in the lime kiln and automated causticizing efficiency controls were installed to ensure sufficient white liquor production and a correct sulfidity balance in the mill.

Because the new pulp mill and bleach plant would operate considerably more "closed" than its predecessor, a new cooling tower was also installed. Overall, the new fiberline uses about 2 million gal of water/day less than the

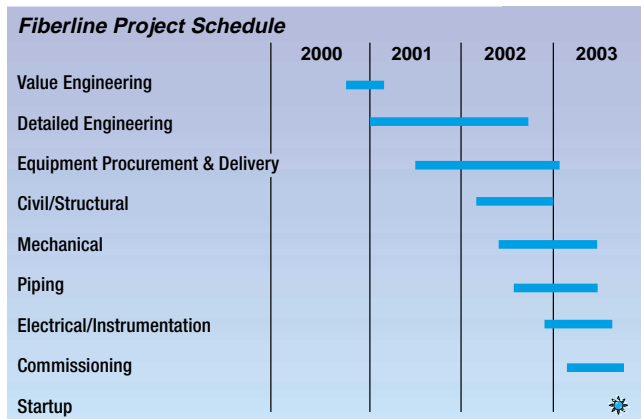


Figure 1. Timeline of Bowater's new fiberline project Catawba, S.C., from value engineering that began in the fall of 2000 to startup on Aug. 28, 2003.



The ECF bleach plant has a DE_{op}DD sequence with washing between the last two dioxide stages.

old pulp mill (20% reduction/ton of pulp), along with improved effluent color. Among the water reduction measures implemented in the project was use of paper machine white water for washing in the bleach plant E_{op} stage.

Bilodeau adds that the mill has an effluent color removal plant on site that ran all the time with the old pulp mill. “But since startup of the new fiberline, it has not been used at all. There’s been no need for it,” he says, pointing out that due to seasonal flows in the Catawba River, effluent color has been more of a discharge limitation than anything else. The mill also monitors for AOX to meet state requirements, which since startup of the new fiberline has been well within limits to meet Tier 1.

“Because we were installing a new fiberline into an existing infrastructure with an operating recovery island, in-place support services, existing waste treatment, etc., we had an ideal opportunity for one of the best startups ever,” Bilodeau says. “So we asked our major project suppliers for some references on the best operating fiberlines and best startups in the world. They gave us two references—the Stora Enso mill at Kaukopaa, Finland, and an Aracruz mill in Brazil.

“We visited these mills, which shared their startup data with us. We then normalized these data to our design production rate at Catawba. Challenging ourselves to be the very best, we then set our startup curve to meet or exceed the best these mills had attained. This involved careful planning and execution of every stage from engineering through commissioning and startup,” Bilodeau says.

The “Soft Side”

Although the best engineering and advanced technologies were critical to the success of the new fiberline, “we realized we also had to focus on the “soft” side of this project—training of employees to operate it on a daily basis,” Bilodeau emphasizes. “In this regard, we set up one of the finest training programs I’ve ever seen.”

As Bilodeau explains, the training program required the establishment of a fifth shift to allow rotational training for all employees. One shift would be in training sessions at all times, while the other four ran the pulp mill.

The program designed for Catawba involved evaluation and “refresher”-type courses in basic skills such as reading, mathematics, observation skills, etc., conducted through a local technical college. The standards were set very high for this program, but most employees passed the final battery of testing on the first try, while others were given the opportunity for further work on their own, and eventually all employees passed this level.

Successful completion of the basic skills program opened the way for employees to enter what Bilodeau calls “Fiberline University.” This involved specific classroom training on computer based learning modules and on-the-job-site training that included daily tours of the equipment and systems being installed. It also involved training on dynamic process simulators that allowed future operators to “virtually” run the new fiberline under every imaginable condition, prior to actual startup. Employees had to pass a detailed exam given for each learning module before proceeding to the next level.

The final exam at Fiberline University was “very tough,” Bilodeau points out, “involving 50 questions put together by our highly experienced technical and management staffs.” Two-thirds of the “students” passed this exam on the first try, and those who didn’t were given special review classes, and three weeks later they all passed, he adds.

Having such an intense training program paid off. Bilodeau describes the fiberline startup as flawless and near perfect. “After the September 28 startup, we were at full production within 15 days,” he says. “The best testimony to the immediate success of our new fiberline was the fact that in the second month after startup, the paper mill set a new production record,” he notes.

Kenny Sawyer, director of human resources at Catawba, credits cooperation from the mill's unions as a key factor in structuring the new fiberline. "Historically, staffing these types of operations is driven by employee seniority. The unions agreed to and supported our plans to base the new fiberline jobs on qualifications rather than seniority. They worked closely with us on modifying the lines of progression in the old mill from two to only one for the new fiberline. Having those agreements and support up front was essential to the success of our programs," he explains.

PM 3 Rebuild

According to Mike Forrest, operations manager-paper, "our strategy from the very beginning was to do as much as possible on the run." He explains that newsprint production continued on PM 3 as long as possible, while modifications were being made all around the machine, including installation of some sections, pulpers, ancillary equipment, etc. and removal of some dryer hoods.

Nash adds that the nine month delay of the project helped in getting much of the ancillary equipments such as pumps, motors, screening, heat exchangers, hot air systems, hot oil and hydraulic equipment, etc., installed ahead of time, a lot of it in the basement area. He says there were contingency plans for everything and everywhere there were workers.

PM 3 Conversion Milestones (2003)

- January 13 – Last newsprint production
- February 26 – Uncoated production
- March 3 – Coated production
- March 11 – First line coated production
- March 21 – Surpassed 800 tons in one day
- April 12 – Surpassed 1,000 tons in one day
- New monthly production records
 - ★ July
 - ★ October
 - ★ December

Figure 2. Rebuilt No. 3 PM at Catawba has been achieving milestones almost every month since startup, including new production records in July, October, and December of last year.

Forrest notes that newsprint production ended January 13 (see Figure 2), and the machine went down for a planned 46-day shutdown, which occurred in only 43 days. During this period, the coater was installed along with the hard-nip pre-calender and new after-



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coater drying section that consists of IR drying followed by hot air flotation drying and an after-dryer unit constructed from three rolls that were part of the machine's old fifth dryer section (dismantled to make room for the coating and calendaring operations). The new on-machine supercalender is an 8-nip, inclined (45°) hot roll unit. The winder was completely rebuilt during the 43-day shutdown.

During the shutdown, modifications were also made in the machine's wet end section to improve runnability, and new/ re-built scanner systems were installed, along with a new PC-based control system for the coater and calendaring operations. TMP screening was also upgraded to improve fiber quality.

Nash emphasizes that although the fiberline is still being optimized, quality and production on PM 3 has been on target from the beginning. Pulp strength is excellent, he reports, adding that "we still believe we can do better." Whiteness-brightness is significantly improved as are base sheet opacity, formation, etc. Runnability of the base sheet is as good as or better than expected, he says.

Bilodeau adds that "we have very close contact with our customers in regard to quality of the coated and uncoated products made at this mill. Our market pulp customers also give us feedback on the quality of pulp made on the new fiberline. Because the fiberline supplies three LWC machines here at the mill., we get immediate feedback, on a daily if not an hourly basis." ■