Partnering Up **for Success**

U.S. CORRUGATED'S ECO-FRIENDLY RECYCLED CONTAINERBOARD mill in Cowpens, South Carolina, owes much of its success to a close relationship with a major supplier.

GLENN OSTLE

Two things are immediately apparent at U.S. Corrugated Inc.'s 100% recycled containerboard mill in Cowpens, South Carolina: first, it is probably one of the most environmentally friendly and sustainable mills in the world, and second, the great leaps forward in production and quality can be directly attributed to a positive working relationship with a supplier. "We wouldn't be where we are today without ABB," says Jim Painter, U.S. Corrugated VP and general manager.

Built by LINPAC in 1992 on a 75-acre site, the mill was originally known as Somerset Fiber and saw the first installation of a mini-mill machine from Metso (then Valmet). In 1995, the 165"-wide machine was upgraded with eight 6' dryers in the basement, and a bottom ply pulping system was added which "let the mill pulp and dry many more tons than originally possible," according to Painter.

The mill was later renamed LINPAC Paper until August 2006 when it was acquired by U.S. Corrugated, a premier independent corrugated packaging company that also owns 24 manufacturing facilities in 15 states. Each year the company and its affiliate, MannKraft, consume about 550,000 tons of containerboard, 230,000 tons of which come from the Cowpens mill.

In 1997 Jim Painter and mill manager, Joe Gasperetti, arrived and set about putting the mill on a different path. "It was pretty filthy here and safety results were terrible," said Painter. "They had about 85 employees, wages were low, and they were only making about 280 tons per day."

Painter, who had previously managed a mill in Detroit, came out of retirement to take the top job. "I didn't know anything about making brown paper," said Painter. "But you don't have to if you treat people right. We have two priorities here: safety and quality. We'll shut the machine down for any safety or quality issue. Most mills won't do that."

Today 100 people work at the Cowpens mill, producing 26-40 lb medium and 26-42 lb liner. The quality is such that the mill trades tons with major integrated paper manufacturers. "We trade ton for ton, virgin or recycled," says Painter.

Each day more than 80 trucks deliver recycled furnish or move finished product to customers, and 1,200 bales a day are fed into the mills pulpers. All recycled materials are supplied by Eastern Recycling and come mostly from within a 150 to 200 mile radius of the mill. The end result is that the mill ships about 250 rolls every day. But what makes the mill special is its emphasis on environmental aspects.

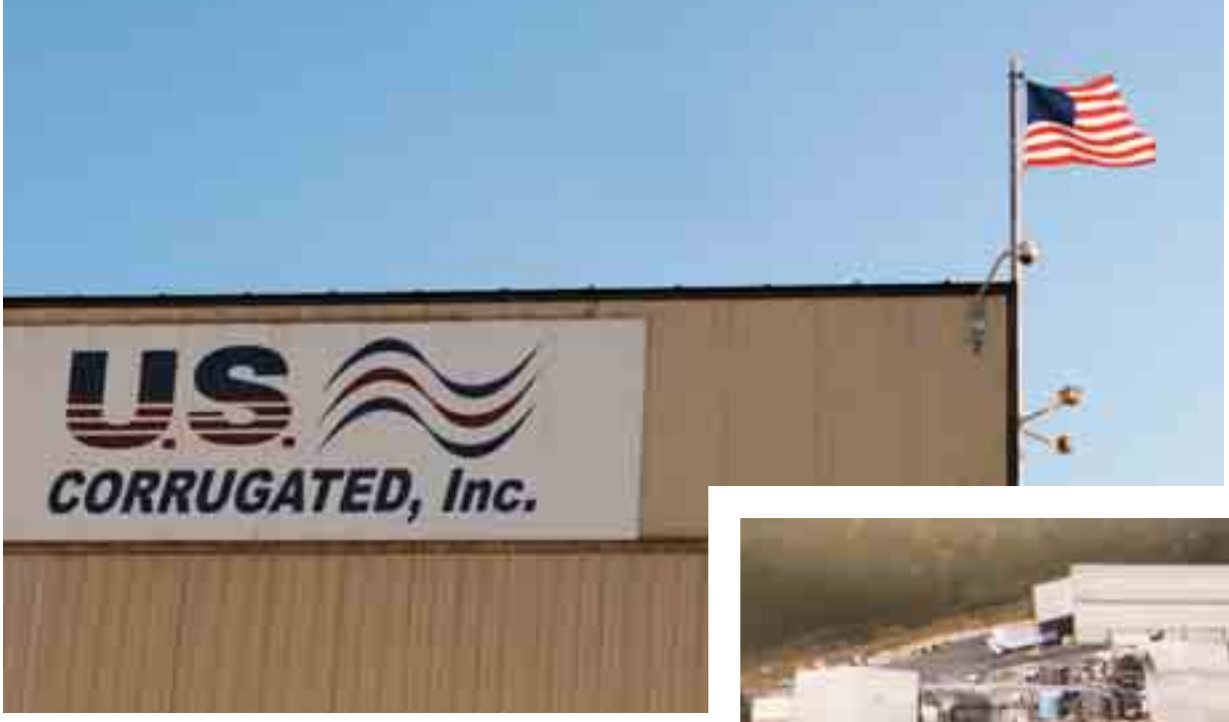
ECO-FRIENDLY

According to Painter, water only leaves the Cowpens mill in two ways: with the sheet or through evaporation—the rest is reused. But the closed-mill concept wasn't planned that way. When the mill was built there was an offsite settling pond and the city of Cowpens treated the water, but the effluent was too fiber rich. "When I arrived, the discharge water was 2,000 parts per million (ppm) suspended solids, and 5 to 6 percent dissolved solids, and that's what they were sending back to the mill to make paper," says Painter.

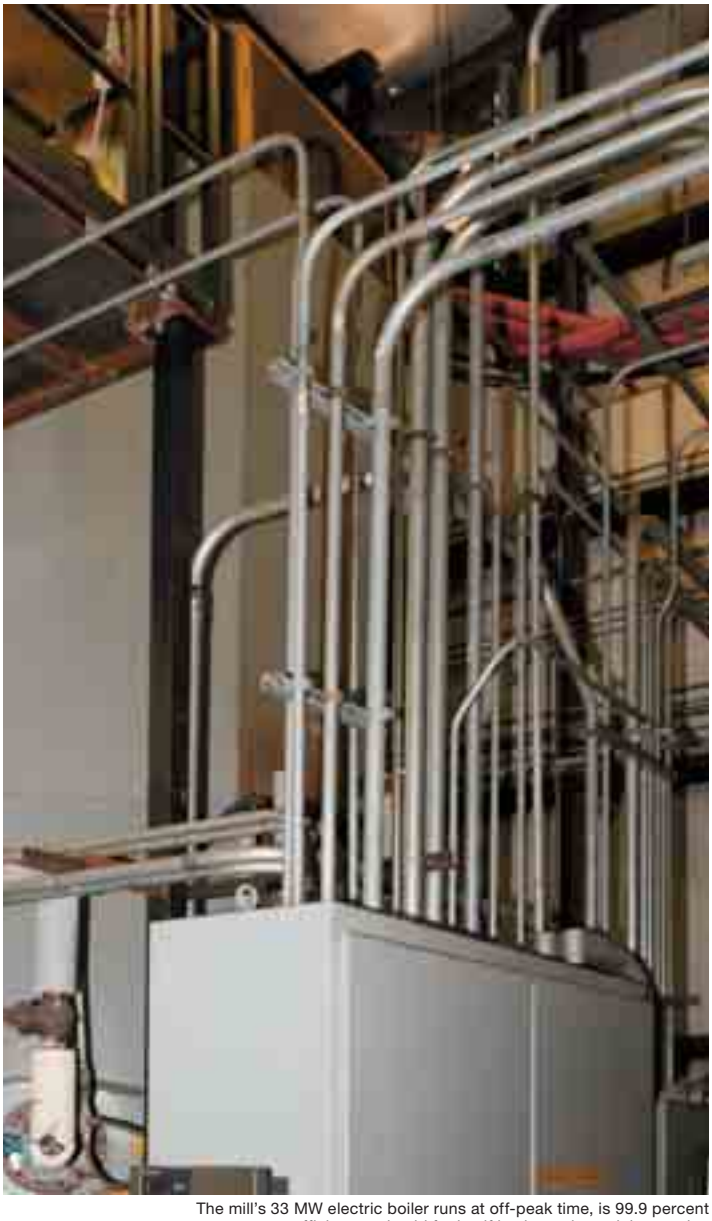
Today, the water cleaning and fiber recovery systems are the only ones of their kind in the world. All mill discharge goes to an onsite effluent treatment plant. A pulp washer separates out the longer stock, which is sent back to the mill, and sends the filler, fines and water to a Poseidon clarifier where it is mixed with a polymer and reduced from 2,000 ppm to about 50 ppm. That water then goes back to the pulper and is used as mill white water. However, it still isn't clean enough for the water showers so a slip stream goes through ultrafiltration and then nano-filtration. "We are the only mill in the world using nano-filtration to lower the total dissolved solids, and the only one using ozone and microscopic air injection to control VFAs," says Painter.

The krill that came out of the water is belt pressed to about 1/3 consistency, but instead of being landfilled it goes through a screw press, is pelletized and sold.

"We bring in about 225,000 to 250,000 gallons of city water per day. About 80,000 gallons go to the boiler and the rest is evaporated. Every inch of rain water equates to about 25,000 to 30,000 gallons here. So if were making 700 tpd, we are evaporating 700 tpd or



U.S. Corrugated's 100 percent recycled containerboard mill, built in 1992 on a 75-acre site in Cowpens, South Carolina.



The mill's 33 MW electric boiler runs at off-peak time, is 99.9 percent efficient, and paid for itself in about six to eight months.

about 150,000 to 160,000 gallons per day," says Painter. "We have a tremendous energy advantage as we are not heating the water and sending it down the river." Currently the mill is considering adding an anaerobic reactor to further improve the quality of their product while producing methane gas to burn in the mill boilers.

"What makes for strong paper is fresh water," says Painter. "When you have an upset in an open mill, you just open the valve. We can only hold about one and a half million gallons in our system, so we worry when a hurricane comes. But we've never had a problem.

A few years ago, the mill began talking to Duke Energy about an electric boiler that would run at off-peak time to make steam when electrical rates were cheaper. As a result, the mill installed a 33 MW electric boiler that is 99.9 percent efficient (compared to fossil fuel types, which are about 80 percent efficient and create emissions). "We're now buying electricity at about 2.4 cents per kilowatt compared to about 6 to 7 cents that you'd pay at home," says Painter. The boiler basically paid for itself in about six to eight months. "If we get natural gas at the burner tip below the price of electricity, then we run natural gas," says Painter.

"From an environmental standpoint we don't discharge any water, don't lose any heat, we sell pelletized rejects, and use only recycled furnish. We are one of the most environmentally friendly mills in the world, but very few people know it," claims Painter.

THE ABB CONNECTION

Since Painter and Gasperetti arrived in 1997, the mill has gone from producing 280 tpd to a recent record of more than 780 tpd. Much of the improvement is attributable to their strong relationship with ABB, which dates back to 1995.

"Before I got here the mill had a scanner that was giving readings that they didn't believe," says Painter. "They changed it to an ABB 1190 system when they upgraded the machine in 1995, but still got the same readings. Using a heat gun we could see that the scanner was reporting the truth. We had the machine down ten times in 1997 trying to figure out what was causing it and finally found that about 100 holes in the headbox hadn't been drilled all the way through. The greater velocity was filling up sections of the dryer felt with fines. It was a major breakthrough."

To improve the quality of the water used in the process, the mill teamed up with a company that installed equipment to take the water from 2,000 ppm suspended solids down to 50 ppm while reducing total dissolved solids, and this was a major breakthrough. The process also recovers 20 to 25 tpd of good fiber that is returned to the mill. The strategy was to improve water and thus paper quality, improve throughput and reliability of the bottom ply stock prep system, and then make selected improvements on the paper machine.

In June 1997, the mill installed a set of used ABB actuators for the top and bottom ply headboxes. "We profile with both headboxes which is one of the reasons why we have such a flat sheet," says Painter. "We added an ABB water spray that got the sheet flatter, and then a profiling steam box between the presses. But we still had problems with inconsistent profiles. The systems seemed to be fighting each other. ABB helped us resolve these issues."

In 2008, the mill installed a Voith DuoShake at the bottom ply breast roll, to increase production and reduce basis weight. In December 2009, a top ply Voith DuoShake was added. Essentially the DuoShake operates like a shaker table, moving back and forth with a maximum stroke of about 1" and a maximum frequency of about 600 cycles per minute. As a result, the mill picked up additional tonnage and reduced basis weight, which exceeded their expectations.

The mill uses an ABB QCS (Nexus) built on an AC450 platform, and is currently upgrading their Advent operator stations to the latest 800xA PPA based displays. Five different CD actuators control weight and moisture.

According to Kevin Starr, ABB's global services technical developer, the service story at Cowpens began in 2003. The mill had gone to self-maintenance and would call ABB whenever they could not resolve an issue. As a result, performance of the QCS and production started to degrade. "We offered them a Paper Machine Fingerprint plus implementation. They purchased those optimization services and the results in product were substantial," says Starr. "They then came to us and asked us how often we

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Recycled materials come from within 150 to 200 miles of the mill.

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ABB's Mike Church, full-time resident engineer, checks machine information from a remote terminal.

should come to the site. We said twice a quarter. That was our first optimization contract.

"This went on for about five years, but personnel changes caused the mill to move in a different direction. They knew we had been working on remote services and told us that if we could not do nearly 90 percent of our current services remotely, they would have to reduce the contract to match their new workforce," says Starr. "This is what prompted us to come up with the ProcessPRO modules as well as the ABB Service Command Center. We defined all of our services into workable modules and then worked with the customer to define the delivery of these modules. The result was our first remote service contract. That is what the customer just renewed (the first mill to do so), and this year they expanded the remote contract to include a full-time resident."

Says Painter, "Fingerprint really helped. We can now trend anything. We put in a QIS system and we can see where valves are starting to fluctuate before they cause a real problem. ABB monitors it on a regular basis. It has been phenomenal."

According to Bill Dannelly, ABB's director of marketing, pulp and paper unit, ABB has succeeded in the Cowpens mill by using a modular, flexible approach that adapted to the mill's needs as it grew, and through the ability of ABB products already installed in the mill, to interact with the company's latest products. "The Fingerprint was a lengthy exercise," says Dannelly, "but both companies learned a lot."

GOING REMOTE

With the remote capability in Cowpens, both ABB and mill personnel can now access information from outside and around the mill. "We can now help them without always having to bring someone physically into the mill," says Dannelly. "We've been rolling this out globally for the last two years and now between 400 and 500 sites have some form of remote connectivity capability—some contractually and some on an as-needed basis. We install the capability with almost every system we ship, use if needed during commissioning and then let the customer decide how to best use it after commissioning."

According to Starr, "After the first DuoShake was put on the bottom ply, we saw from our monthly VPA SCAN service that there was a degradation of CD performance. Since the bottom is over 60 percent of the sheet, the large process speed change resulted in a big control issue. Fortunately we saw it, and applied the corrective action.

"On another occasion, the mill was having profile problems and asked if I could help," says Starr. "Since I was

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literally under a boiler at the time, I simply called one of my coworkers who had access to the mill's data and he was able to fix the problem within thirty minutes of the original call. It would have taken a week or more to resolve if we had to go to the site."

Much of the work on the DCS system was done by the customer. "We started with the ABB pages and then learned how to make changes," says Painter. "We now show cooling fans, for example, that turn to show if they are on or off."

The mill also now has a "real time" reel profile. "As the scanner is scanning, we get a colored picture in our control room that shows the reel as its being built," says Painter. "That's something most mills only get after the reels are built, and by then it is too late to do anything about quality issues."

Painter is the picture of a satisfied customer. "Our average basis weight 2-Sigma is below .5 and average moisture is well below 1. We haven't had a quality complaint in years," says Painter. "And as we improve our quality, the production of the converting plants also goes up."

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