By **MONICA SHAW,** Editor

Aiming for excellence

With a history of judicious spending, new business initiatives geared at continuing a "capital smart" tradition, and a unique employee partnership, Greif's Riverville mill is aiming at an excellent future

In recent years, North American mills have become all too familiar with operating on a limited budget, but this is old news to Greif Inc's Riverville mill in Amherst, VA. Since its startup in 1975 as Virginia Fibre Corp, the now 470,000 ton/yr semichemical corrugating medium and 100% recycled linerboard mill has operated in a "capital smart" manner.

From the outset, the Riverville mill has been a unique facility, and, in some ways, a premonition of lean things to come for the North American industry. Founded with unusual financing, including private equity, the mill was the first and only mill in the world to attempt green liquor pulping of hardwood and softwood pulps. As a single mill and ultimately a two mill system, Riverville has always partnered with suppliers to technically develop the mill.

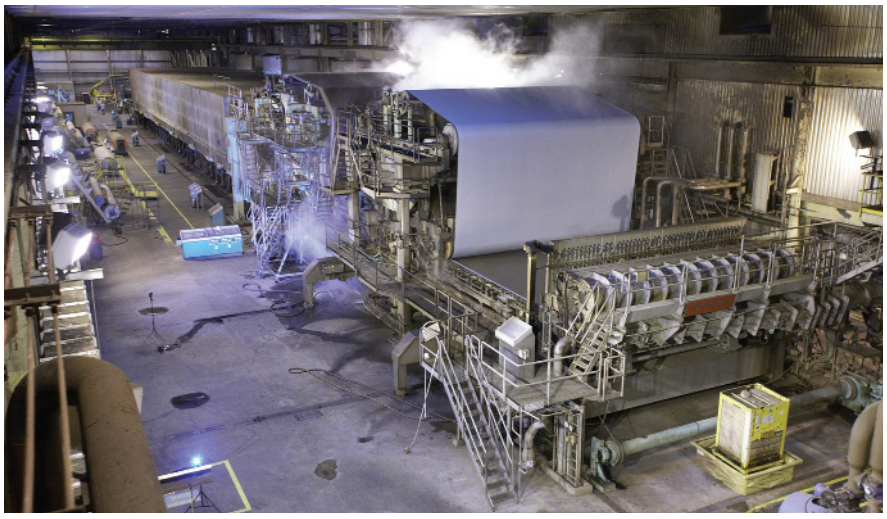
Perhaps most importantly, Riverville is unique in the partnership it has developed with employees over the years at the non-union mill. By incentivizing employees, Riverville has created a workforce that is adaptable to change, including recent education on Lean Manufacturing principles and Six-sigma that are fostered by the Greif Business System started in 2003. By 2006, Greif Inc "achieved the financial performance goals as promised," said Michael Gasser, the company's chairman, CEO, and president. New goals have been established for 2009.

Although Greif's Riverville mill has always operated on a budget, it has also judiciously improved the mill over the years, such as the addition of a second paper machine in 1994, woodyard expansion in 1997, and new combination boiler (combi-boiler) in 2000. With eyes on the future, the mill continues to cooperate with employees and suppliers to implement the right projects.

"Our objective is to become as lean and efficient as possible, learning to minimize the costs we have some control over," says Michael Giles, vice president of manufacturing for Greif's containerboard mill operations. "We're operating in a 'capital light' manner, but we have our eye on projects that can protect our quality and cost status long term."

The Riverville mill services customers in the northeastern, midwestern, and southeastern regions of the US, eastern Canada, and select export markets.

Greif's No. 1 semichemical corrugating medium originally produced 500 tons/day, but has reached a single day record of 1,073 tons through various improvements.



A creative history

The Riverville mill was the brainchild of Bob McCauley and Charles Chandler, who formed Virginia Fibre Corp in 1973 with $1 million plus $5 million, from a Richmond-based brokerage firm, leaving the remaining $44 million as debt. The mill started up in 1975 with one 260-in-trim Beloit Walmsley paper machine making semichemical medi-

um from a green liquor-based sulphate pulping process for both the hardwood and the softwood furnish, the world's first such installation. In 1977, the sulphate was changed to caustic soda.

A few months after startup, it became apparent that the green liquor pulping process was not working for softwood, leading the mill to purchase kraft clippings as the long fiber source. These difficulties necessitated refinancing in late 1976, at which point the then Greif Bros. Corp, led by McCauley's business associate Jack Dempsey, became involved. Greif "took a gamble," says Giles, providing equity and becoming a silent, non-voting owner with convertible stock that would allow it to become majority owner in the future.

Headquartered in Delaware, OH, Greif primarily provides industrial packaging and services, which account for 74% of its sales. The company offers a wide range of industrial containers made from steel, fiber and plastic and is the leading manufacturer of steel and fiber drums globally. Almost 26% of sales are from Greif's paper, packaging and services, of which the Riverville mill is a part, along with the 100% recycled corrugating medium mill in Massillon, OH.

Greif also oversees operations at 14 corrugated box and sheet plants, many of which fall under its CorrChoice business unit. Less than 1% of Greif's sales are from its timber business. Since 2002, the company's two classes of common stock have been traded on the New York Stock Exchange.

In 1989, the Riverville mill, which was still under McCauley's management, chose to install a 500 ton/day OCC line to replace the kraft clippings it was purchasing. This line was Beloit's first OCC plant in the US.

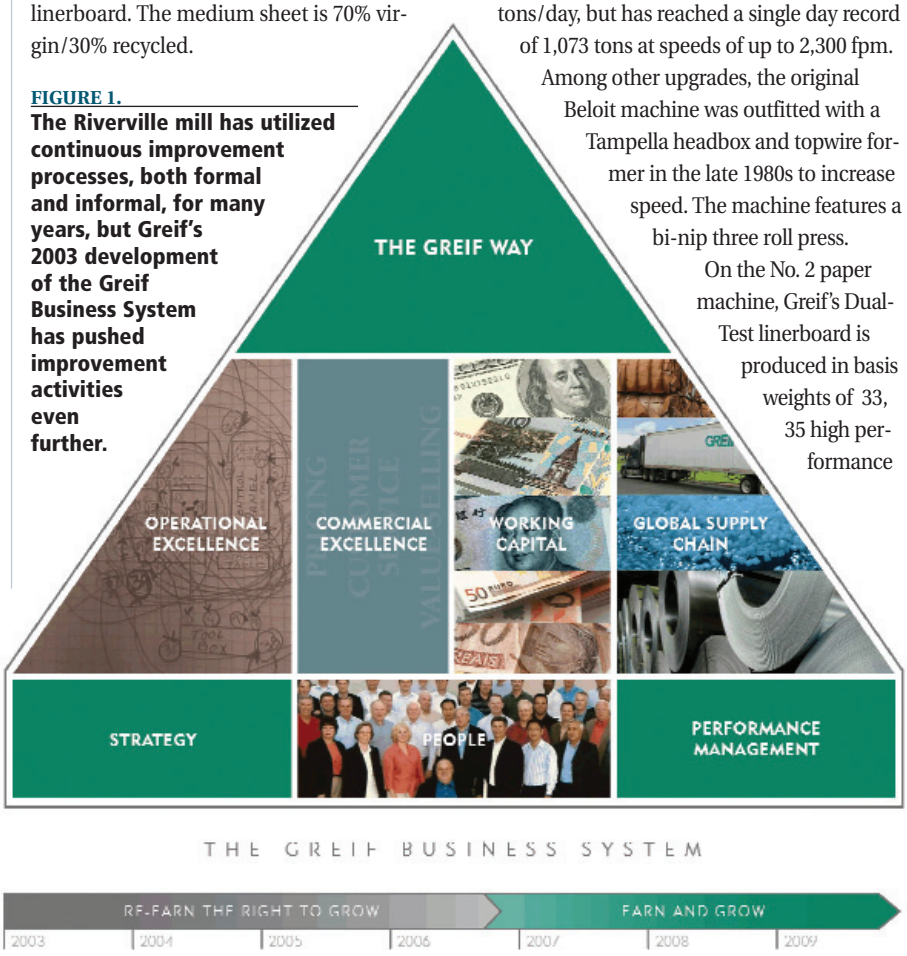
Greif exercised its ownership option in 1992, although McCauley and Chandler stayed at the helm until 1997. The mill's second paper machine, a 180-in-trim Beloit mini-fourdrinier paper machine for producing 100% recycled linerboard, was installed in 1994. According to Dick Ward, mill manager and 33-yr veteran of the Riverville mill, the machine design was not the supplier's first choice.

"Beloit did not want to build our No. 2 paper machine as the mini-fourdrinier design we were committed to, wanting to use its standard belt based system instead," Ward describes. "Beloit finally agreed and the machine became its first mini-fourdrinier recycle machine in the US."

Highlights of the mill today

Last year, the Riverville mill experienced a record production year, averaging 815 tons/day of semichemical corrugating medium and 467 tons/day of 100% recycled linerboard. The medium sheet is 70% virgin/30% recycled.

FIGURE 1.
The Riverville mill has utilized continuous improvement processes, both formal and informal, for many years, but Greif's 2003 development of the Greif Business System has pushed improvement activities even further.



THE GREIF BUSINESS SYSTEM

In the Riverville pulp mill, a low-sulfur caustic carbonate process is used for the hardwood cook to supply the 70% virgin fiber furnish required for the corrugating medium sheet. There is one continuous digester, one recovery boiler and a pulp blow line refiner.

For the recycled pulp requirements, the mill's OCC plant consumes 800 tpd of OCC. While the original equipment supplier was Beloit, the mill continuously upgrades the plant using other suppliers.

The No. 1 paper machine produces Greif's Hi Corr semichemical corrugating medium in 23, 26, 33, 36 and 40 lb basis weights, as well as 33, 36 and 40 lb wet strength grades. This paper machine originally produced 500 tons/day, but has reached a single day record of 1,073 tons at speeds of up to 2,300 fpm.

Among other upgrades, the original Beloit machine was outfitted with a Tampella headbox and topwire former in the late 1980s to increase speed. The machine features a bi-nip three roll press.

On the No. 2 paper machine, Greif's Dual-Test linerboard is produced in basis weights of 33, 35 high performance

and 42 lb. The machine runs at speeds of 1,500 fpm on the 33 lb grade and features a pick up first press and ENP second press.

One of the larger capital expenditures in recent years was installation of the combi-boiler supplied by Foster Wheeler in 2000 to reduce dependency on fossil fuels. The combi-boiler burns wood waste and OCC rejects from mill operations as about 50% of its non-natural gas fuel source, while the other 50% is purchased from local sawmills. It produces 160,000 lbs/hour of steam at a 600 lb pressure. This project also required installation of a new wood waste dumper.

Another expenditure was a new woodyard from Andritz in 1997 to support tree length wood rather than the older convention of 5 ft logs. Basically, says Ward, the mill went from "1975 to year 2000 technology."

The old wood yard was manned 24/7, while the new one operates 5 days/week with 2 shifts/day. This reduced manpower in the woodyard from 25 to 8, which was accomplished through attrition. About 15% of the required wood comes from local sawmills in chips, with the balance in long logs.

Partnerships with suppliers

North American pulp and paper mills have become increasingly reliant on suppliers for their research and development needs in recent years, but this is a long established trend for Greif's Riverville mill. According to Ward, the mill's strong relationship with suppliers has led to trials of new technology that have paid off for the mill. From a supplier standpoint, the non-union mill's receptive employees have made it a desirable place to run such trials (see sidebar, p. 29).

"We rely on the expertise of our suppliers and try to provide a cooperative environment for such work," describes Ward. "We can't afford a lot of lost production, and we do this in moderation, but I would say we've been on the leading edge of some technologies."

Ward says the mill was one of the first to use Hercobond from Hercules to improve quality and cut chemical costs and has worked with the company for many years. It also has longstanding relationships with other suppliers, such as Babcock & Wilcox, which installed the mill's recovery boiler in 1977 and has supported it over the years. In addition, the mill was a test site for use of segmented baskets in the OCC plant.

Among the mill's current collaborations is its work with suppliers in improving yield in the OCC plant as a way to mitigate rising fiber costs and falling recovered fiber quality. An improved screen design with finer slots from Voith has allowed the plant to shut down screens and reduce horsepower by 50%. In addition, deflakers were replaced in 2005, and a new pulper detrasher system came on line in 2006, as well as a bale conveyor.

The mill is also going to install trial rotor pads that require changing every 6 months rather than four weeks to increase OCC plant uptime to 99%. A new rotor for the pulper is also being explored to provide better mixing of bales.

Longstanding customer relationships

The Riverville mill services customers in the northeastern, midwestern, and southeastern regions of the US, eastern Canada, and select export markets. The mill retains some customers from when it started production in the 1970s.

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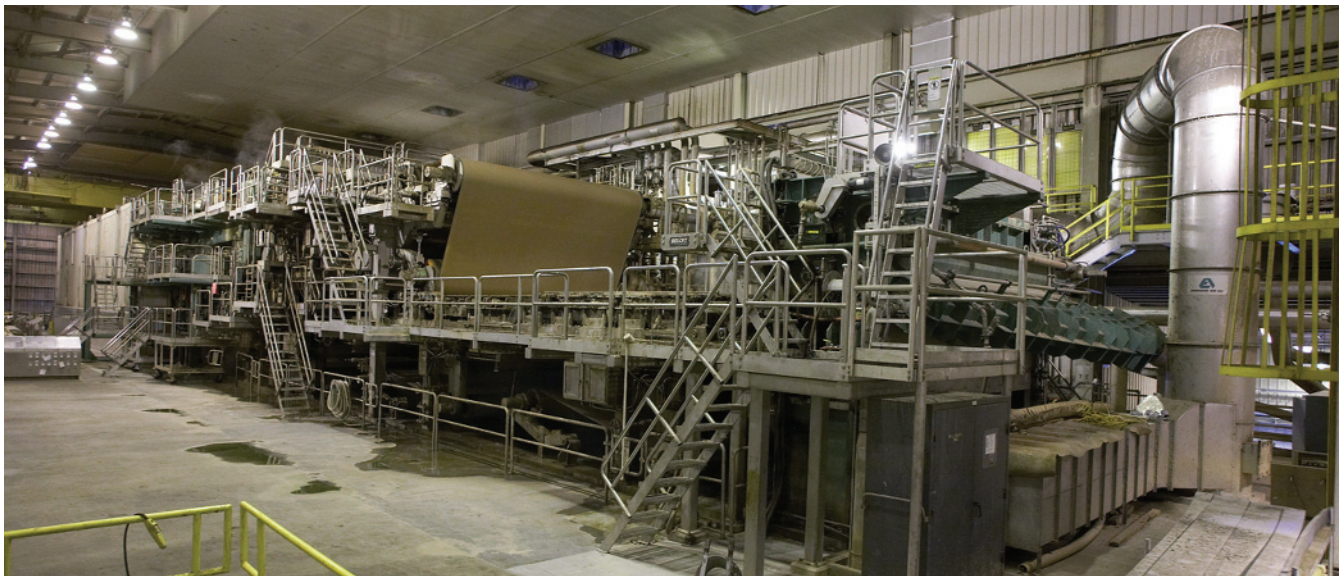

distribution business, chose this Virginia location for the mill because it was one day's trucking distance to independent customers in the Northeast," explains Ward. "We've always had strong relationships with independents; they got us through some of our tough early years, and we've stood by them, too."

Though founded on a fast turnaround philosophy, the just-in-time delivery requirements have increased over the years, leading Greif to ship about 80% of the mill's outbound production by truck, which is "somewhat unique for a southern mill, but necessary when you consider 7-14 days by rail," says Ward. Quick delivery has become increasingly important as box customers convert their own warehouse space to converting purposes.

Aiming for operational excellence

The Riverville mill has utilized continuous improvement processes, both formal and informal, for many years, but Greif's 2003 development of the Greif Business System has pushed improvement activities even further.

Figure 1 outlines the eight components of the Greif Business System, as well as the timeline for its implementation. Within the eight categories, there are concepts of lean manufacturing, continuous improvement, value selling, customer service, cash flow maximization, performance management, employee motivation and more. As part of the

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"We can't afford a lot of lost production ..., but I would say we've been on the leading edge of some technologies," says mill manager Dick Ward about the mill's trial work with suppliers.

labor relations

Principles of partnership foster cooperative working environment

Maintaining excellent employee relationships has been an integral part of the Riverville mill's philosophy of operation since its inception when the founders adopted a "partner" relationship with employees. The vision was that a company working in partnership with its employees toward a common goal and guided by basic principles could outperform the competition.

Greif's Riverville mill has spelled out these guiding principles in a document called "Principles of Partnership" that defines how the partnership should function and how the members should act. As a "partnership enterprise," the Riverville mill offers employees opportunity, incentive, recognition and security, while employees are expected to uphold their responsibilities of high performance.

An employee relations advisory committee (ERAC) composed of departmental managers ensures adherence to the principles and acts as an employee advocate while still fulfilling management responsibilities. The ERAC also makes sure policies adhere to the principles and recommends changes to them.

Employees at the Riverville mill qualify for salary incentives. For example, they earn a cost savings incentive for reduction in the actual usage of targeted materials compared with the original approved budget. Also, employees earn an incentive for achieving daily average production targets on a monthly basis. In addition, gift certificates are awarded if yearly absenteeism goals are met, as well as for safety and for meeting monthly and annual production records.

Mill manager Dick Ward says Riverville has long been known as an excellent place for suppliers to trial technology due to the cooperative and receptive nature of its workforce.

Recently, this cooperation was put to the test when the spring shutdown was moved up five weeks with just a day's notice. On top of that, the paint contractor was not ready, so paper machine operators picked up brushes and completed the press section painting job.

As further evidence of the cooperative spirit at the Riverville mill, employees celebrated 1 million employee hours worked without a lost time accident in July 2005.

system, each employee is tasked with asking two questions about his or her work: "Does this add value?" and "Is there a better way?"

The new business system has encouraged a variety of improvements at the Riverville mill. For one, the mill now uses information from its mill systems, such as the Pi system and its Foxboro DCS, to assess overall equipment efficiency instead of simply examining uptime.

"Overall equipment efficiency takes into account the speed, trim, paper waste and other factors," notes Ward. "The process opened our eyes to the magnitude of some wastes and the opportunity to make improvements around them."

The mill is also pursuing Lean Manufacturing principles and has four employees close to achieving black belt status in Six-sigma practices. These employees, who came from the maintenance, paper machine, pulp and OCC areas, formed a core team and trained in Six-sigma for one year. The mill found, however, that keeping them as a separate team was counterproductive, and that reintroducing them in their given areas was most effective.

"It set up a 'we versus they' mentality, but now that they're back in their respective departments, the cooperation level and excitement around this improvement process has grown and we are expecting great things from it," Giles says.

As part of the Greif Business System, about 16 jobs were eliminated at the Riverville mill, of which six were reassigned in other areas. These were the first layoffs in mill history, notes Ward, which was difficult for the mill's veteran workforce. Since then, he says, the mill has announced that further reductions will be managed through attrition.

In 2005, the company saved more than $2 million by taking advantage of cost saving opportunities like conserving warm water tank heat, reducing scrap at the paper machines, increasing combi-boiler steaming rates, reducing cleaning of paper machine hoods and adding a dedicated (outsourced) truck fleet operation.

Greif's improved financial performance in its paper, packaging, and services segment is attributable to improved net sales and labor efficiencies resulting from the Greif Business System, according to Greif's 2006 Annual Report. The report said the segment's gross profit margin increased to 17.5% from 15.3% in 2005 and from 14.8% in 2004 due to these factors.

In addition, containerboard markets experienced three price increases, and the mill's ability to burn wood waste in its combi-boiler helped insulate it from natural gas price surges. The company is expecting even

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further gains as continuous improvement gathers steam in the future.

Looking forward

The Riverville mill expects another "great year from an operational standpoint" just like its record production year in 2006, says Giles. Tonnage is averaging 825 tons/day for semi-chemical medium and 479 tons/day for linerboard. The mill continues with its "capital smart" incremental investments, as well as identifying operational improvement possibilities.

In additional to the new rotor and pads in the OCC plant, the mill has approval this year for a new automated wire cutter for OCC bales. Other approved projects for 2007 include reducing blow through steam on the medium machine and replacing the BelPurge detrasher unit at the OCC plant. The mill is also looking to purchase another combi-boiler to eliminate dependence on fossil fuels in the near future.

When asked about future challenges facing the Greif mill, Ward points to providing a runnable, quality sheet for the larger, faster corrugators coming on line.

To Giles, the biggest challenge the Riverville mill faces in the next five years is the retirement of experienced personnel. About one-third of the workforce has been at the mill for 30+ years, so a "significant drain in knowledge and expertise" will occur, he says, on top of low unemployment in the area, making it harder to find quality recruits.

"We have some great young people here who we will continue to develop, so it is not like we have a complete void," Giles describes. "We also have an apprentice program for production employees who want to move into maintenance. Still, it will be extremely difficult to compensate for the long-time employees." P&P