

GERMANY'S ROSENTHAL MILL PROSPERING AFTER CONVERSION TO KRAFT PULPING

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PROJECT TURNS SULFITE MILL INTO GERMANY'S ONLY KRAFT PULP MILL

YOU WON'T FIND THE TOWN OF BLANKENSTEIN ON A standard classroom map of Germany. It takes a good highway map and a careful search to locate the town of 1500 inhabitants, just a bit west from Plauen and not that far from the most western tip of the Czech Republic.

If you'd found your way there, down through the Thuringian forests on June 16, 2000, you might have witnessed the official ribbon cutting for Mercer International's newly converted Zellstoff-und Papierfabrik Rosenthal kraft pulp mill. The US\$ 343 million conversion from a 160,000 metric tons/year sulfite pulping operation to a 280,000 metric tons/year kraft pulp mill was dubbed the Rosenthal 2000 Project.

Along with increasing the mill's production capacity by 75%, the project reduced the mill's environmental impact by about 75%. With the conversion of the Rosenthal mill, the company is the only domestic supplier of kraft pulp, although Mercer, based in Zurich, Switzerland, is already planning to build another pulp mill at Stendal.

The Rosenthal mill was founded in 1883. It has gone through various transformations since then—from groundwood mill to sulfite pulping mill to sulfate pulp mill. It was rebuilt as a 30,000 tons/year batch pulp mill

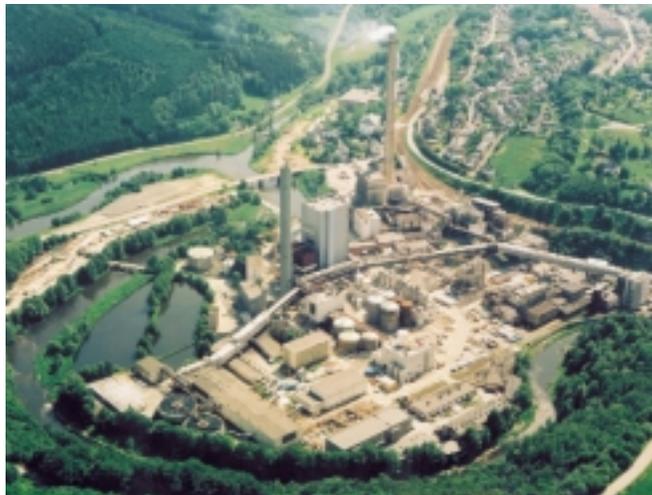
in 1932. In 1970, the mill converted to magnesium sulfate pulping.

From 1973 through 1977, the mill underwent a major upgrade. (A report on the mill improvements was presented by S. Rennert and G. Fiehn at the 1993 TAPPI Pulping Conference.) A complete wood preparation plant and

chip storage area were installed. A continuous Kamyr digester, with diffuser washing, was erected. A screening plant, a 5-stage bleaching plant, and a cleaning plant for bleached pulp were built. The project also included a Fläkt dryer and dewatering machine, a chemical recycling plant, a fresh water treatment plant, and a waste water purification plant.

In the early 1990s, more effort was put into addressing environmental concerns. In 1990, a program was begun to switch

over from chlorine-based pulp bleaching processes to oxygen and hydrogen peroxide use, Rennert and Fiehn reported. Next, an O/P reactor using magnesium hydroxide was installed to supply alkali. Two additional pressure washing filters-before and after screening-were installed in 1991. That increased spent liquor capture to more than 99%. A "smell disposing" system also was installed in 1991 to remove most of the odors from degasification in the stock towers. Two oil-heated boilers were later converted to use natural gas or light fuel oil.



An aerial view of Mercer's Rosenthal kraft pulp mill in Blankenstein, Germany



Wolfram Ridder, left, and Werner Stüber

In spite of the upgrades, the mill was at risk of being shut down as “uncompetitive” in the reunified Germany if it hadn’t been purchased by Mercer in 1994. After looking at various options, the company decided in 1996 to convert the mill to kraft pulping, partly based on existing equipment and because of the available supply of fiber. Concrete work began in 1998. Groundbreaking for the project officially took place June 16, 1998.

By converting from sulfite to sulfate pulping, the mill could still use the existing continuous digester, but increase pulp yield from a peak of 160,000 tons/year with the old process to 280,000 to 300,000 tons/year with the kraft process, Ridder said. So the project involved modernizing the digester and fiber line, as well as fitting new chemical recovery and power generating systems into the limited area of the mill.



A temporary bridge allowed construction crews to bypass some of the narrowest roads leading to the mill (above). A rarely seen view inside the recovery boiler during construction (right).

TIMING IS KEY

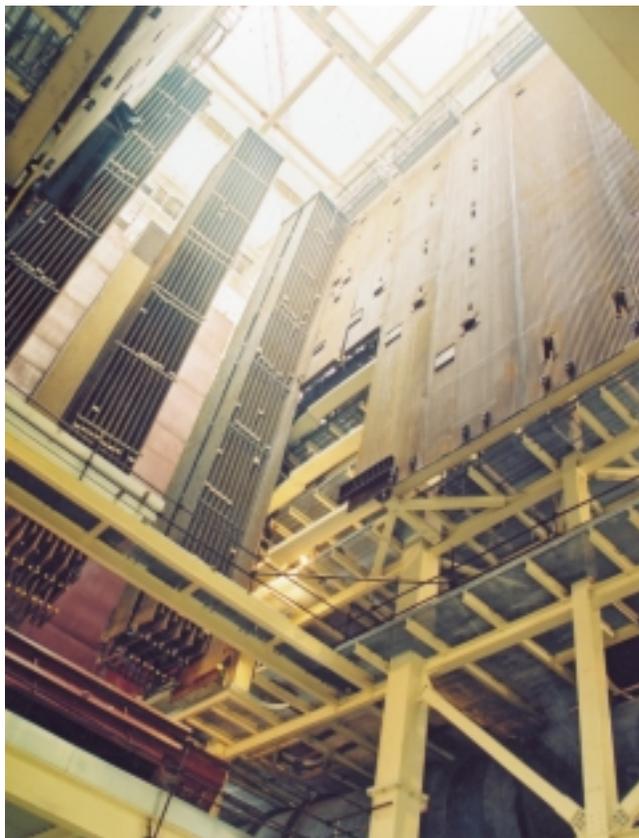
Timing can be a major factor in the success or failure of a new start-up.

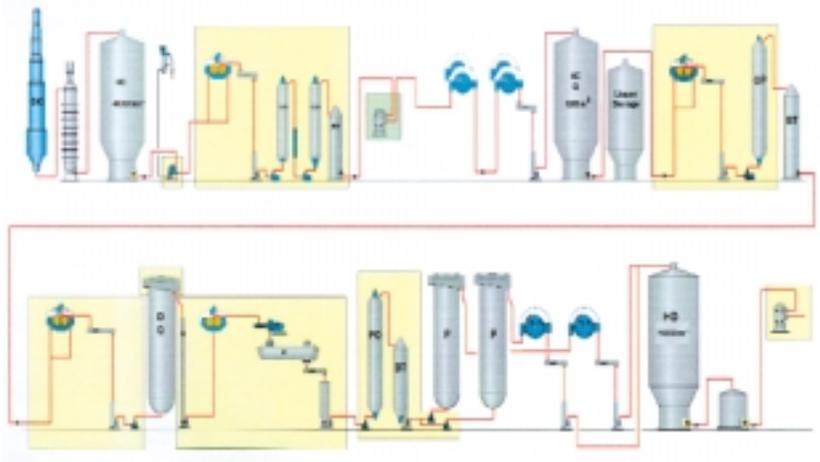
Think of it in terms of surfing. You get your board ready and paddle out to meet the wave. If you anticipate its approach properly and catch the slope just right, you’re in for a great ride. If your timing’s off, you may wipe out or lose the wave and find yourself paddling in the water.

At the end of 1993, pulp prices were at the lowest quarterly average since 1985. Six months later, with pulp prices quickly rising, Mercer International acquired the Rosenthal mill. Prices peaked in the second half of 1995, then dropped dramatically at the beginning of 1996. After some slight improvement through 1997, prices again bottomed-out at the end of 1998. With start-up of the kraft mill approaching in 1999, prices began to rise and continued to rise through the first year of operation.

At the beginning of 2000, Mercer chairman and president Jimmy S. H. Lee said, “We are pleased with the timing of the start-up relative to the pulp cycle. Over the past six months, pulp prices have improved 22%.”

Funding for the project came “through a combination of grants and subsidies from the German State of Thuringia, a syndicated project and long-term loan guaranteed up to 80% by the German government and the State of Thuringia,” and an equity investment by Mercer





The mill's drum washers, left, and a schematic of the bleaching line (new equipment is boxed in yellow, retrofit in green).

which included the fixed assets of the Rosenthal mill, the company reported.

Permitting for the Rosenthal 2000 project cost roughly DM 10 million, most of which was spent on preparing the documentation. The 83 copies of documentation filled 2500 binders with approximately 5 tons of paper in total, noted Werner Stüber, production/technical manager for the mill. Jaako Pöyry consultants and mill staff put in a special effort to prepare the documentation.

During the first year since start-up of the converted mill, Rosenthal has already met the 2007 environmental limits. For AOX, the mill is well below the 2007 requirement of 0.22 kg/ton, Stüber said, and COD is likewise below the 18 kg/ton limit specified for 2007. He also noted that during start-up, the mill never exceeded any of the effluent limits.

As a sulfite mill, Rosenthal's wastewater volume averaged 36,000 m³/day. After the conversion to sulfate, wastewater volume dropped to 25,000 m³/day.

About 75% of the mill's current production is elemental chlorine free (ECF) pulp. For ECF bleaching, the mill is equipped to run chlorine dioxide and ozone (D/Q-Z/PO/P). But it's not run routinely because of associated corrosion problems in the ozone preparation plant, Stüber said. The usual sequence is O/O-Q-OP-D/Q-PO/P, yielding pulp with brightness reaching 90% ISO. For totally chlorine free (TCF) pulp, the mill uses a O/O-Q-OP-Q-Z/PO/P sequence for brightness exceeding 88% ISO.

The mill generates about 45 MW of power, of which it uses about 30 MW and supplies another 15 MW of electricity to the local power system.

Outside of financing and time constraints, there were no significant risks associated with the equipment and processes. The planners chose carefully, favoring proven technology after visits to reference mills in the United States and Scandinavia. That and good planning may have helped the mill reach 75% of its operating capacity within the first month of startup.

Another important factor contributing to the success of the conversion project has been the mill staff. What Rosenthal might have lacked in parts and materials during the post war years, it made up for with one of the best maintenance staffs around, Ridder said. The dedication and support of the mill workers also provided a positive base for the new project, he said.

The mill has gone from a four-shift to a six-shift, 35 hours/week schedule for its 500 employees. The average age of a Rosenthal employee is 42 years. They are, perhaps more than is common these days, like a huge family with a strong commitment to the mill and to their jobs.

The mill took a nine-day shutdown beginning Sept. 22, 2000 for maintenance and to modify the fiber line, primarily in the digester feed area. The modifications will help smooth operations at the mill, thus reducing natural gas, wood chip, and chemical consumption. The mill has been able to produce pulp at 100% capacity, though some areas, such as viscosity and ozone bleaching, are still being fine-tuned.





Rosenthal's ABB Flakt dryer, above, the Sunds/Valmet finishing line, top right, and Valmet/Neles Automation process control system, at right.

FIBER SUPPLY AND DEMAND

Germany is the largest importer of market pulp in the world, explained Wolfram Ridder, vice president of pulping operations at Mercer International since September 1999, (Ridder had served four years with the company as assistant to Ron Aurell, managing director of Rosenthal.) The country's paper mills buy about 3 million metric tons of market pulp a year. Yet 30% of the country is forested and there are abundant wood resources—primarily spruce—within the 150-200 km range from which Rosenthal draws.

Because of the relatively mild climate, the fiber is more dense, longer (3.4-3.5 mm), and a bit thicker than comparable Canadian or Scandinavian fiber, Ridder said. Tear resistance is high (15-17 mNm²/g for ECF) and

breaking length is good, though it does require more beating. It's a good reinforcing fiber, a good fiber for light-weight coated (LWC) and coated mechanical paper grades, he said. The pulp is also being tested for ultra-LWC, Stüber noted.

The mill is capable of processing up to 1.4 million m³ of wood annually. About 40% of that is log wood (mostly thinnings) and 60% is mostly chips from the many sawmills in the Thuringian and Bavarian forests. At least two major sawmills and 40-50 smaller operations are located little more than 10 km from Rosenthal. The mill tries to limit chip storage time to an average of 2-3 weeks, Stüber said. Processing is first in—first out. The mill also stores sawmill chips separate from chips from logs. That way it can mix the chips in specific ratios for better quality control, Stüber noted.

Pulp produced at Rosenthal is mostly sold to paper mills in northern Italy, Germany, Switzerland, Austria, France. About 30% of the pulp bales are shipped by rail, another 10%-15% by the company's own trucks, and the rest is handled by pulp marketing companies.

STENDAL

With the successful completion of the Rosenthal 2000 Project, Mercer International is planning a US\$ 800+ million greenfield kraft mill project at Stendal, roughly 100 km due west of downtown Berlin and 300 km due north of the Rosenthal mill. Lee said he expects project funding commitments to be in place in the early part of 2001. On projected completion at the end of 2003, the Stendal kraft pulp mill project would triple the company's pulp production capacity.



The Stendal mill is expected to have an annual capacity of 550,000 a.d. metric tons of pulp, with the potential to expand to 610,000 metric tons/year. Mercer estimates there will be 1.7 million m³ in chips and 2.45 million m³ in logs available to the mill for pulp production, an excess of nearly 1.24 million m³. The mill will produce ISO 90+ ECF and ISO 88 TCF northern bleached softwood kraft pulp, using low chlorine dioxide charge ECF-bleaching and peracetic acid (PAA) for TCF bleaching.

About 30% of the wood supply for Stendal will be spruce, whereas the Rosenthal mill uses about 90% spruce. Consequently, the qualities of the pulp produced at either mill will be different enough that they won't directly compete.

Partners in the Stendal greenfield project include Thyssen Rheinstahl Technik GmbH, Tessag Industrie-Anlagen GmbH (Tessag KSH), AIG Altmark Industrie AG (the original project sponsor and owner of the site), and Mercer International, which will be the majority shareholder and the project mill operator.

Along with the Rosenthal and proposed Stendal pulp mills, Mercer International has two remaining paper mills in Germany, located between Blankenstein and Dresden—the Heindenau mill, and the Fährbrücke mill at Langenbach. The company sold its carton paper mill at Raschau in 1996, its packaging paper mill in Greiz in July 1998, its corrugated mill at Tresben in the second quarter of 2000, and the Hainsburg recycled printing paper mill in November 2000.

In 1999 the company produced 68,615 metric tons of packaging paper, 36,518 metric tons of specialty papers,

REUNIFICATION

Oct. 3, 2000 marked the 10th anniversary of the reunification of East and West Germany. For most of 45 years following the end of World War II, the Rosenthal pulp mill sat just inside the East German border. Barbed wire, mines, and guard towers discouraged East from escaping to meet West.

These days, it's almost difficult to find evidence of the check points and border barriers. In an odd twist, the former Communist-governed East has become something of an oasis and new frontier. While the West rebuilt and modernized immediately following the war, the East (and the West German border areas) retained much of their former character and prospered less.

During the 1950s, the West German government initiated programs to provide economic support for its border regions. With reunification, such programs were strengthened and extended to help the former East German states "catch up" to the western states.

The Rosenthal 2000 project was in part financed with the help of federal and state monies. The proposed Stendal greenfield mill would also qualify for such support.

Part of the process of reunifying the nation has been to gradually achieve parity in worker salaries. At Rosenthal, for example, Mercer has steadily increased salaries from 80% of the level paid "West" German mill workers to 100% within the next year or two.



A major source of chips for the Rosenthal mill are the many sawmills in Thuringia and Bavaria. Chips and logs are brought to the mill by rail and by truck and pulped within a few weeks.



Wolfram Ridder, joined Mercer in November 1995 as assistant to Ron Aurell and was named vice president of pulping operations at Mercer International in September 1999. He'd previous worked at Germany's Federal Institute for Forestry and Forest Products Research.



Jimmy S. H. Lee



Ron Aurell

and 57, 714 metric tons of printing papers. Also during 1999, the company produced 94,523 metric tons of pulp, compared with 145,451 metric tons the year before, even though the Rosenthal mill took 4-½ months of downtime during 1999 to complete the conversion project. TJ

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The traditions of apprenticeships continue at the Rosenthal mill.

ROSENTHAL SUPPLIERS IN BRIEF

Mercer hired 40 main contractors for the Rosenthal 2000 project and more than 100 subcontractors took part. In September of 1999, the project peaked with 2042 construction people on site. In all, roughly 80 km of large diameter pipe were installed during the conversion and about 800 km of electrical and control wires, according to Stüber.

About a third of the DEM 580 million investment was allotted to Ahlstrom Machinery's portion of the project. Ahlstrom was responsible for a major rebuild of the mill's continuous cooking system and brownstock washing plant. The company also provided a new low-odor chemical recovery boiler, the evaporator plant, the lime kiln, the recausticizing plant, and the odorous gas handling system. Along with the equipment, Ahlstrom also was responsible for construction, commissioning and start-up of those areas.

The digester and washing plants have a design capacity of 1000 a.d. metric tons/hour.; the recovery boiler can process 1650 tons of dry solids/day.

Several of the companies involved in the project became part of Valmet Corporation, a member of Metso Corporation, and so the other main supplier for the project. Sunds Defibrator, for example, developed the oxygen delignification technology installed at the mill. Neles Automation provided a millwide automation and control system, including Neles control valves and Kajaani sensors, covering the woodyard, fiber and recovery lines, effluent treatment, bark boiler, and the dryer.

Supplier	Equipment
ABB	turbine dryer, ventilation, electric drives
Ahlstrom	recovery/chemical plant, digester, pressure diffuser
Andritz	pulp dryer
Cellchem	chlorine dioxide
FMW	chip handling
Linde/Wedeco	oxygen/ozone
Siemens	electrical equipment
Sunds Defibrator	oxygen delignification, screening, bleaching, bailing, woodyard
Valmet	automation system