

# METSÄ-BOTNIA AND ANDRITZ: PROVEN PARTNERS TAKE ON A NEW CHALLENGE

When Metsä-Botnia was formed in the 1970s, Andritz was a key supplier of production systems for the first greenfield mill (Kaskinen). This relationship has strengthened over the years. The most recent collaboration has Andritz providing all the major production technology for the one million ton-per-year greenfield pulp mill in Fray Bentos, Uruguay – plus maintenance for all areas of the mill. This extent of involvement has never been accomplished on such a large scale by a single supplier before.

Andritz and Botnia have grown to work closely together in an atmosphere of mutual respect and trust. So, it was logical for Botnia to consult with Andritz about the possibility of the next grand collaboration – a very large greenfield kraft pulp mill in Uruguay.

Botnia's Fray Bentos mill in Western Uruguay is its first large investment outside Finland. The Fray Bentos mill represents another first: the first time a single supplier (Andritz) provided all the major production systems and comprehensive maintenance for a greenfield market pulp mill.

While this project was indeed a significant challenge for Andritz, it was not illogical. Every Andritz process and every system in the Fray Bentos mill is successfully proven somewhere in the world, many in South America. Andritz has delivered very large systems whose start-up and production curves have set world records.

With regard to maintenance, Botnia outsourced maintenance activities for all its mills in Finland and was very interested in establishing the outsourcing concept in Uruguay. It looked to a company with global experience and a base of expertise in South America. During the time that Andritz's project team was preparing quotations for the technology, the Andritz service team put together a 10-year maintenance plan and maintenance cost estimates. In September 2005, Botnia signed the contract with Andritz for long-term mill maintenance services.

## Long-term local presence

A considerable amount of work is involved in planning the maintenance of a new pulp mill, such as Fray Bentos. Pre-engineering was largely done in Finland – working side-by-side with Botnia's project team for the year before the core maintenance team came to Uruguay in October 2006 to recruit Uruguayan managers and technicians and to begin the site implementation of maintenance activities.

Pre-engineering planning included criticality analyses performed on the major production systems in the mill – determining how important the equipment is to the process, the time required to repair, the cost to repair, etc. From this, a preventive and predictive maintenance plan was prepared and the plan was entered into Botnia's computerized maintenance system. This approach ensured that maintenance was adequately considered through all stages of the project.

The maintenance target for Fray Bentos is to have better productivity (in terms of maintenance cost per ton of pulp produced) than in Finland. As part of the training, Andritz brought eight key maintenance managers from Uruguay to Finland for a three-month period in 2006 – for intense training in pulp mill processes and pulp mill maintenance. They also gained work experience at Botnia's Joutseno mill.

Training continued during the construction period, equipment commissioning, and mill start-up. The maintenance team now has a network of local companies with experience at the mill to support its various tasks. The work during the construction of the mill gave these companies a good understanding of the installed equipment. This will become extremely relevant during annual shutdowns – periods when hundreds of people can be on-site at one time to perform inspections, maintenance, and repairs to the production equipment.

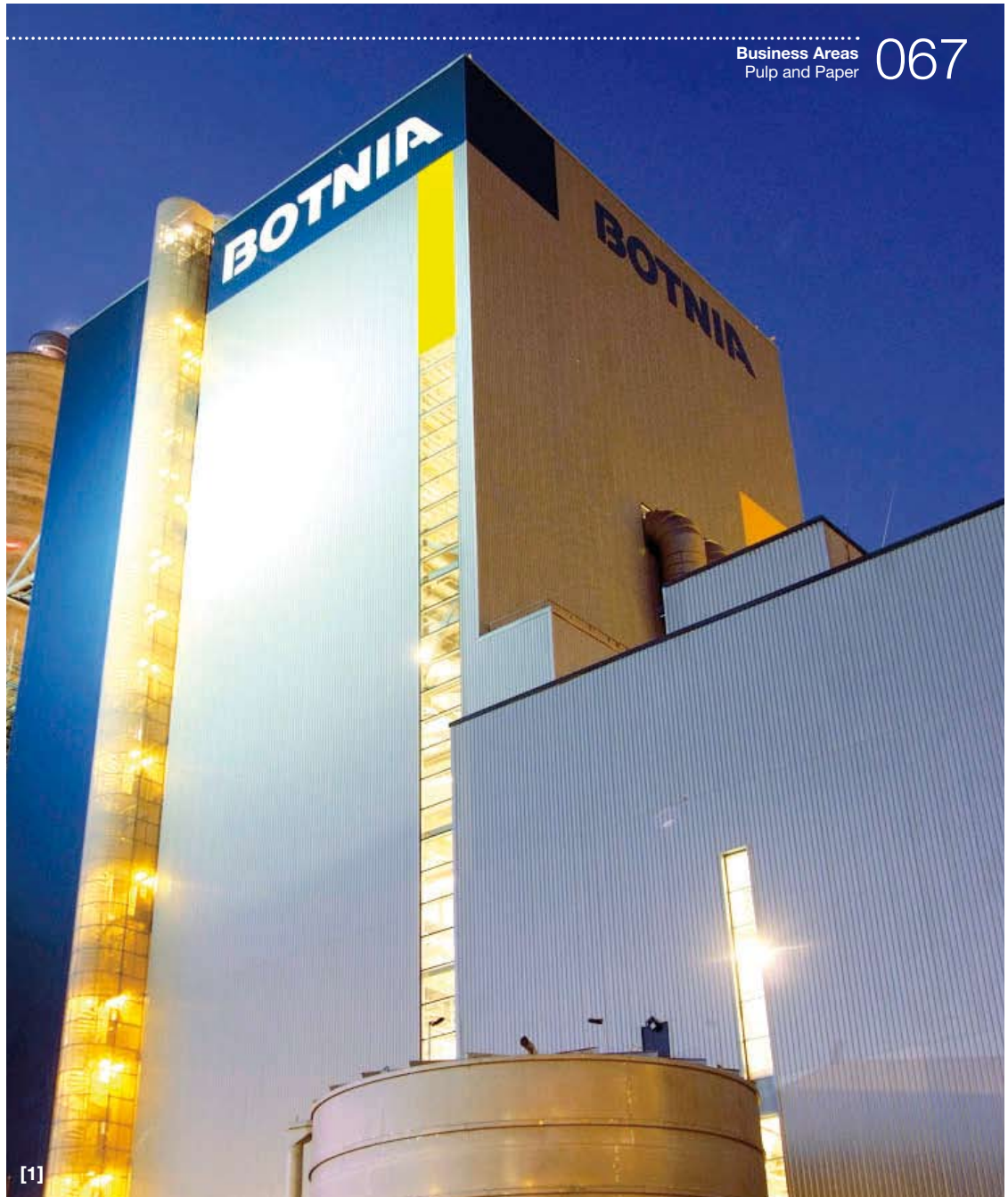
A commitment to the government is that at least 75% of the approximately 100-person maintenance staff will be Uruguayan. Since Uruguay does not have a tradition of pulp production, this required Andritz to recruit locally and train extensively. Today, 95% of the staff is from Uruguay and Andritz's goal is to increase that to 100%. In addition, local companies have been hired as subcontractors for auxiliary maintenance services (HVAC, cleaning, etc.). Thus, Andritz and Metsä-Botnia are contributing substantially to not only creating highly qualified jobs, but also to training local personnel to take advantage of these jobs. →

**[1]** Andritz supplied the entire chemical recovery island for the Fray Bentos mill. The evaporation plant has a capacity to remove 1,100 t/h of water. The recovery boiler (pictured), capable of burning 4,450 tons of dry solids per day, is among the world's largest.

**[2]** For added flexibility, Botnia selected two identical Andritz dewatering and drying lines designed to handle 3,600 t/d production.

**[3]** The Andritz white liquor plant represents the most modern technology for recausticizing and lime reburning. The lime kiln (foreground) is 135 m in length and 4.75 m in diameter.

**[4]** Andritz provides all the maintenance services for Fray Bentos under a long-term contract. The target is to have better productivity (in terms of maintenance cost per ton of pulp produced) than in Finland. Since Uruguay does not have a tradition of pulp production, Andritz had to recruit locally and train the new maintenance employees extensively. Today, 95% of the maintenance staff is from Uruguay. The longer term goal is to increase this to 100%.



[1]



[2]



[3]



[4]

**FRAY BENTOS IS THE FIRST PROJECT  
WHERE A SINGLE SUPPLIER (ANDRITZ)  
PROVIDED ALL THE MAJOR SYSTEMS  
AND COMPREHENSIVE MAINTENANCE  
FOR A GREENFIELD MARKET PULP MILL.**



[1]

**[1]** A two-vessel continuous digester (background) produces 3,200 t/d of prime quality pulp. A total of nine large DD Washers (foreground) wash the pulp as it flows through the oxygen delignification, screening, and bleaching stages.

**[2]** Two chipping lines produce high quality chips. Chip storage utilizes the latest blending technology with a rotating stacker-reclaimer. Two species of eucalyptus are blended to achieve the optimum fiber for pulp production.



[2]

## Andritz Technology at Fray Bentos

The Fray Bentos mill is based in all aspects on the best available technologies, e.g. for forestry, wood harvesting and transport, pulp production, pollution control, and environmental management. The Best Available Technologies (BAT) from Andritz are impressive in terms of scale and efficiency.

### Woodyard

Two-line chipping system, chip storage, chip screening, and conveying system provide high-quality eucalyptus chips to the fiberline. Chipping capacity is 330 m<sup>3</sup>/h per line.

### Pulp Production

Two-vessel Downflow Lo-Solids<sup>®</sup> continuous digester (capacity: 3,200 t/d) with patented TurboFeed<sup>®</sup> chip feeding system produces high-yield, high-quality pulp. DD Washers clean the pulp before and after two-stage oxygen delignification. Combined knot separation and screening system cleans the pulp prior to bleaching.

### Pulp Bleaching

Four-stage light ECF bleaching with patented A-Stage<sup>™</sup> to reduce the amount of bleaching chemicals required. Four efficient DD Washers wash the pulp to final cleanliness and further reduce effluent volume due to filtrate recycling capabilities.

### Dewatering/Drying/Baling

The drying plant consists of two five-stage screening systems to ensure pulp cleanliness, followed by parallel Twin Wire Former pulp machines (each 5.3 m width), Andritz Fläkt dryers, and Cutter/Layboys. There are four automated baling lines to weigh, press, wrap, stencil, and tie the dried pulp bales.

### Chemical Recovery and Energy Production

The evaporation plant (1,100 t/h evaporation rate) consists of seven effects with internal stripping of volatile gases and the ability to segregate condensate streams. The recovery boiler has a capacity of 4,450 tds/d. The white liquor plant (10,000 m<sup>3</sup>/d) consists of advanced technology for the filtration of green and white liquors, and a 830 t/d lime reburning kiln. A complete system for the collection of odorous gases and incineration in the recovery boiler (with backup alternatives in the auxiliary boilers) ensures low odor emissions from the mill. The steam from the recovery boiler is sufficient for the turbo generator to generate enough electricity to power the entire mill.

### Dynamic Simulation

Dynamic process simulator from IDEAS to model all the mill's processes for training operators prior to start-up.

## The Fray Bentos project

A global team of project managers, technical experts, site managers, erection specialists, and commissioning technicians were a key part of the team in Fray Bentos. The overall construction manpower at the mill peaked at about 4,500 people during the first months of 2007. One Andritz site manager likened the scene to a 'miniature United Nations' with people from 25 countries working together to build this massive mill. Even with this, the majority of workers came from Uruguay – between 70–80% during the construction peak period were Uruguayans.

## Environmental care

Compared to the amount of pulp produced, the emissions from the Fray Bentos mill are among the least intrusive in the world. Due to improved management of the combustion processes and cleaning of fuel gases, what comes out of the smokestacks is mostly water vapor. Air emissions of nitrous oxide and sulfur dioxide have been virtually eliminated with the advanced chemical recovery technologies.

Modified cooking and efficient pulp washing lower the effluent load from the fiberline. Oxygen delignification and A-Stage<sup>™</sup> bleaching decrease the amount of chemicals required. The level of organic chlorine compounds in treated effluents is so low that it is no longer considered environmentally significant.

As a result of using raw materials this efficiently, there is very little solid residue left to discard to the landfill. In fact, less than 1% of the initial raw material is discarded.

Since the collection and treatment of odorous gases are a major factor in forming the local community's opinion about having a pulp mill as a neighbor, the mill has added auxiliary boilers into the plant design if there is a process disturbance. Electricity is generated in an environmentally friendly way at the Fray Bentos mill. The black liquor from the pulping process which is burned in the recovery boiler is a renewable biomass material derived from eucalyptus. Botnia's electricity generation adheres to the Clean Development Mechanism (CDM) which is determined in the Kyoto Protocol to the United Nations Framework Convention on Climate Change. ○