NORTH FOREST PRODUCTS TURNS NORTHERN TASMANIA INTO A FIBER WONDERLAND

DONALD G. MEADOWS

Eucalypt plantations in northern Tas - mania

A eucalypt seedling

RESEARCH CENTER, EUCALYPT PLANTATIONS, AND NEW CHIP MILL DEMONSTRATE COMMITMENT TO FIBER RESOURCE DEVELOPMENT.

FOLLOW THE WINDS DUE SOUTH ACROSS THE BASS STRAIT, OVER THE waters that separated Tasmania from the mainland of Australia eons ago,and just shy of 146 degrees of East Longitude you come ashore at Burnie.There,in 1938,Associated Pulp and Paper Mills (APPM) started its first paper mill.

The Burnie mill was the first in the world to use 100% eucalypt fibers to make fine paper, explains Allan Jamieson, manager of North Eucalypt Technologies. NET, the research and development arm of North Forest Products (NFP),traces its origins back to APPM and the early efforts to understand eucalypts as a fiber resource.

NFP's parent company, North Limited,a major Australian mining and forest resources company, took over APPM in 1982.It sold the Burnie mill to Amcor in 1993,"but retained the forest lands, the plantation program, and the Eucalypt Research Center" that had been established at Ridgley in 1985, Jamieson said.

Within the last few years,NFP has opened a new research facility at Ridgley, expanded its Surrey Hills eucalypt plantations, and commissioned a highly automated woodchip mill at Hampshire,all within an easy drive from Burnie.

The defined objective for NFP is "to be a globally significant supplier of wood fiber suitable for graphic paper production." As Jamieson explains, NFP plants trees, but what's really growing is fiber. And part of doing fiber research is to understand what the customer wants and to keep up with customers' changing needs.

NET is taking what Jamieson calls a "fourth-generation" approach to research management at Ridgley, in that it has invited its customers to propose research projects to be carried out there.

North Forest Products also has used the lab to help sell the concept of wood quality to its customers. The Triabunna chip mill, for instance, has two distinct types of wood, old and regrowth. Compared with chips from the older trees,the regrowth produces greater yield, a measure now used in the pricing formula.

Jim French checks some of the chips in the drying room at Ridgley

North's field eucalypt nursery

The mini-chipper specially built for North Forest Products

RESEARCH AT RIDGLEY

The new fiber technology laboratory—built at a cost of A$ 2.0 million—started up the first part of 1995.

The laboratory has five main work areas: wood preparation, wood testing, wet lab (pulping and handsheet preparation),paper testing (constant temperature and humidity room), and chemical laboratory and microscopy, said Jim French,manager of North Forest Products' fiber technology unit at Ridgley.

The lab conducts two main types of testing, French said. One is research testing, which includes assessing trial plots, assisting with the tree breeding program, and looking at the quality of plantation wood that will be used for fiber supply starting in 2004.

One of the challenges of research testing is determining what samples to take, French said. Actually collecting the sample can sometimes be a problem,as well.

What they end up doing is felling the tree and then cutting disc samples at 3–5 locations up the trunk, depending on how intensely they want to sample an individual tree. The technique allows for a broad scope of testing options, French said.

To chip the samples, French had a specially designed chipper built to satisfy some strict criteria. The chipper produces very uniform, 3.5-mm thick chips,that are 25-mm by 25-mm square, with the option to modify chips dimensions slightly.

The lab also conducts wood chip mill quality assurance testing.North Forest Products has four chip mills in Tasmania: Tamar, Triabunna, Hampshire,and a pine chip mill at Burnie.

QA testing includes assessing forest coups before harvesting to assure that the wood meets the required quality standards.It also includes looking at the impact of different species of wood on the mix of chips, French said. The lab also checks pulp yield,basic density, and chemical requirement for every shipment of chips dispatched from those mills, so that customers can have a quality report even before the shipload arrives.The reports also include information on loading rates, fines, BDUs, chip size, and other characteristics. The lab likewise checks the quality of chips purchased from local sawmills.

Pulp "crumbs" processed at the labs

One of the laboratory work stations at Ridgley, with an "elephant trunk" exhaust tube extending from the ceiling

North Forest's new laboratories in Ridgley, Tasmania

about two years before they deteriorate—eucalypts can be stored longer, he said.

All samples first go to the wood preparation room. It contains the lab's showpiece—a custom-designed mini-chipper.

French worked with the Center for Precision Technology (CPT) in Hobart to develop the chipper. He wanted a machine that would produce very uniform chips without a lot of debris. He also wanted it to operate at an acceptable speed and to be relatively quiet.

Above all, French wanted a design that would make it impossible for anyone to get their fingers near any moving parts. The new machine was intended to replace a chipper that often jammed, prompting operators to go digging around with a screwdriver amongst the blades in an effort to dislodge knots. The new machine has enough power to cut a knot 250-mm wide.

To operate the mini-chipper, sample discs—either green or dry—are loaded into a magazine that fits into the mini-chipper. An air-operated pad pushes the discs forward, to be sliced by a guillotine blade into full-width wafers of 3.5 mm. Those drop to a second blade which cuts them into 25-mm pieces. Those pieces then drop into a hopper and are ready for testing.

Another unusual feature of the room is the silver "ele-

A third function of the lab is to do contract testing.

The lab is equipped with a computer-controlled, 12-bomb air digester for pulping. The lab isn't set up to do pulp bleaching, "mainly because there are so many recipes and so many secrets that we'd just go silly trying to satisfy what people want, even our own customers." If needed, the chemical laboratory on-site can do some single-stage bleaching, or the pulp can be sent out for bleaching.

A wood storeroom is used for samples being tested and for some archiving of samples. It can hold about 750 sample lots, French said. Floor heating helps regulate humidity in the room. Pine samples can be retained for

Darrell Clark, area operations manager, in an older stand of eucalypts

Trays of eucalypt seedlings outside the laboratories at Ridgley

A tractor-pulled root wrencher is used to prune the young plants.

phant trunks"hanging from the ceiling—flexible exhaust ducts that can be positioned over various work areas. Other equipment in the room includes a riffle, chip classifier, chip screen,and a rechipper to break up any oversized pieces received from NFP's chip mills.

In the drying room, chip samples are air-dried for about 10 days at a maximum of 35°C,to about 10% moisture.The room holds 180 trays,and each tray holds about 10 kilograms of chips. Drying the chips to a uniform moisture allows for better reproducability of test results; it keeps the chips from getting moldy, and it allows for longer chip storage.

Other special features of the new facility include:

- A computer-controlled air digester
- Chemical storage separate from the mixing area
- A treated water system for the building.

THE TREES

North Forest Products owns about 125,000 hectares of private forest estate in Tasmania. That includes about 37,000 ha of eucalypt plantation and 7500 ha of pine plantation. The company intends to retain at least one-quarter of the total estate in its natural state,partly based on environmental, archaeological, and recreational considerations. The company is also working to help save endangered species such as the wedge-tailed eagle, swift parrot,and Ptunarra butterfly.

One of those setasides,the Companion Hill Reserve, provides a protected area of 1200 ha little more than two miles from the Hampshire chip mill.

The estate was acquired by the Van Diemen's Land Co. around 1826. From St. Valentine's Peak, the grassy plains seemed ideal for raising cattle and sheep,but the cold climate turned the effort into a failure.In 1936,Gerald Mussen, founder of APPM, purchased the estate to supply wood to his mill at Burnie, so the land has been used as a fiber source for about 60 years.

The Surrey Hills region of the estate covers about 80,000 ha of forest land.A lot of it had been planted with *Pinus radiata*,but is now being converted to *Eucalyptus nitens* (shining gum), said Ian Blanden, tree farm manager. Douglas-fir was also tested,but it grew too slowly to be of commercial interest.About 40 species of eucalypts were also tested,but *E.nitens* was the only species to survive the cold, especially at elevations greater than 500 meters.

E.delegatensis (gum-top stringybark) was planted in some of the tracts in 1956 and has been selectively harvested. The species isn't well suited to plantation growth, however, especially in comparison with *E. nitens*, according to Darrell Clark, area operations manager.

E.nitens survives frost better than *E. globulus* (blue gum),so at higher elevations—as at Surrey Hills—it is the preferred planting. In fact, 90% of the plantings are *E. nitens*. Lower elevations are preferred,however, because trees grow faster and North Forest Products is working to expand its area of *E.globulus* plantings.

Some customers prefer *E.globulus* because it is the better known species, Jamieson said. *E.nitens* is a lower density wood, so it takes up more volume per ton shipped.But in terms of yield of fiber and fiber properties (strength and opacity), it is essentially identical (within 2–3%) to *E.globulus*, Jamieson said.

In the areas being converted to eucalypt plantation, sites are clear-felled at the time of harvest, explained Clark, area operations manager and senior forester. In southern Surrey, however, especially at sites above 650 meters which aren't suitable for plantations,NFP uses a system of over-story removal,selectively logging to maintain some shelter from frost and snow for seedlings.

Old growth in Companion Hill Reserve

The focus over the last five years has been on developing the better quality sites,Clark said.Now the effort is shifting to some of the "less adequate"sites.

Meadows is editor of TAPPI JOURNAL.

Hampshire chip mill showcases recent woodyard technology

DONALD G. MEADOWS

Tasmanian mill has chip production capacity of 1.2 million metric tons per annum.

North Forest Products is rightly proud of its Hampshire chip mill, built two years ago in the midst of its Surrey Hills eucalypt plantation, near Burnie, Tasmania.

The mill, built by Fulghum Industries, was commissioned March 21, 1995. It has an annual production capacity of 1.2 million metric tons of woodchips. That's three times the capacity of the old Burnie chip mill it replaced.

Hampshire operates five days of the week using two shifts of five people each. Those include three production people, one electrician, and one fitter. The last two are tradesmen-operators. And, except for a couple of people, all are contract laborers, said Tony Marlow, mill operations manager. The mill is also set up with a preventive maintenance contract.

The mill can produce 1000 metric tons of chips every three hours, compared with some other chip mills in Tasmania that may take a full day and substantially more people to produce as much.

The mill is equipped with two 125-ft radial cranes, each controlled by one person. Outside of the two crane operators, the person at the controls of the chipper runs the whole Hampshire mill.

The Hampshire chip mill (Photo courtesy of Al Martin, Fulghum Industries)

Like a futuristic spaceship captain, the chipper operator sits in a swivel chair in a compact office overlooking the woodyard. Using a joystick, the operator maneuvers a grappling arm, repositioning and spacing logs as they are conveyed from the log washer to the chipper.

The bulk of the mill's operations are governed by computer. Two information screens alert the chipper-operator to overloads or other problems.

Normally logs are unloaded, debarked if necessary, washed, and sent to the chipper. The chipper handles a 39-in. diam. log max. The logs run in one direction, allowing for smoother operations and fewer jams.

About 75% of the logs brought to the mill have been "bush-barked"—debarked at the harvest site. Those are deposited in the south wood mound.

The radial crane on the north end handles logs that still have their bark. Most of those are myrtle and smaller diameter logs that are less economical to debark in the bush. From the log pile, they go through a large, rotating drum debarker. Each log pile holds about 6000 metric tons of wood, Marlow said.

The 27-m-long, 4.3-m-diam. drum debarker rests on 80 truck tires. Its eight motors each use an electrical variable frequency drive and produce a combined 1200 hp to rotate the drum at 3–8 rpm. Normal rotation at the mill is about 3.5 rpm, Marlow said.

Dirt levels in the chips must be kept to an absolute minimum to meet specifications required by Australian Paper for its Burnie Mill. Before logs are chipped they are subjected to a high-pressure washing. A high-pressure pump shoots about 90 L/s of water on the logs at about 1200 psi as they are being conveyed to the chipper.

Waste water from the washing is treated by "a unique, environmentally positive cleansing process" developed by NFP. The process uses about 6.8 million liters of waste water to irrigate 45 ha of pine plantations each day.

A 144-in., 10-knife chipper, powered by a 4000-hp induction motor, allows the mill to chip large diameter logs. Startups are gradual to avoid putting a sudden demand on the power supply that might affect other power users. Knives are changed every 1000 tons, Marlow said. The mill averages with wood on the wheel 69% of the time, compared with 25% of the time at some older chip mills.

To a certain extent, Hampshire customizes its chipping to suit its customers. The Wesley Vale paper mill, for example, prefers lighter colored chips for its mechanical pulp-

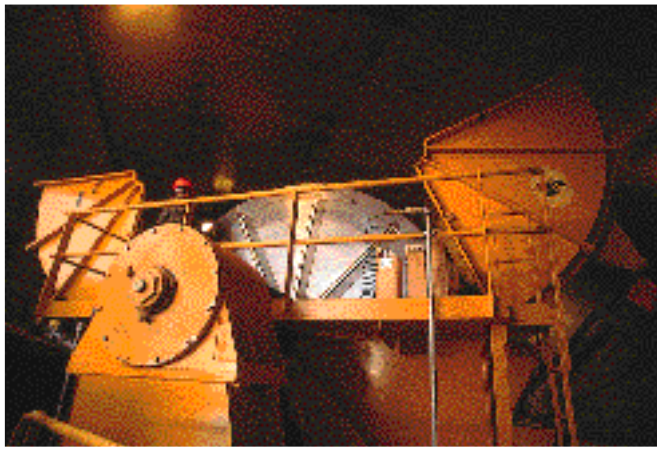
Truck tires and axles transfer the driving force to the drum debarker

Logs exit a high pres - sure washer on their way to the chipper

One of the cranes and wood piles at Hampshire

Tony Marlow, mill opera - tions manager, in the mill's main control room

Oversized pieces are removed before the chips are conveyed to the chip pile.



Hampshire's 144-in. chipper (Photo courtesy of Al Mar - tin, Fulghum Industries)

ing process. So a "Wesley Vale run" uses shorter knives to cut smaller chips from mostly younger wood, Marlow explained.

Throughout the mill, vibrating conveyors transfer refuse to collection piles. Oversized chips are routed to one of two rechippers. Between 150 and 200 tons of refuse is produced each day. Belt conveyors transfer chips to four screens to allow separation of fines, oversize and accept chips.

Meadows is editor of TAPPI JOURNAL.