



# The Baker 18HD Portable Band Sawmill

Makes a Guest Appearance at the University of New Hampshire

**In the fall of 2007, the Baker 18HD was shipped to the Thompson School of Applied Science at the University of New Hampshire (UNH) for our unrestricted use and study. For nine months we put the machine to work in a wide variety of sawing conditions. The machine was used intensively on campus and at several workshops conducted by the New Hampshire Division of Forests and Lands Urban Forestry Center.**

**W**hen the folks at Baker Products of Ellington, Missouri, asked us to conduct a technical review of their 18HD sawmill, we were enthusiastic about it for two reasons: First, our old sawmill was down for long-needed renovations and we needed to cut some wood, and second, it was a great opportunity to get the students involved with a growing industry and new technology.

The Thompson School of Applied Science at the University of New Hampshire (UNH) has been the home of one of the finest forest technology programs in the Northeast since 1960. The school has a long history with the sawmilling industry and has had its

own modest circular sawmill since 1968. Several years ago it was determined that the old circular mill needed to be upgraded due to safety and access concerns, and a funding campaign was launched to renovate the facility. In the transition phase of the project, it looked like we would be without a mill for one season—that is, until the folks at Baker stepped forward with a solution.

## **The Sawmill**

The Baker 18HD portable band sawmill is a simple machine, which uses little fuel and can do very exacting work in converting logs of all sizes and species to usable lumber. The overall productivity of the machine and the relative labor

## SPECS

### BAKER 18HD

Total mill length.....	28 ft.
Frame length.....	24 ft.
Height.....	7 ft.
Weight.....	1,600 lbs.
Frame material.....	2 in. x 6 in. x 3/16 in.
Space between guides.....	.25 in.
Throat.....	14.5 in. tall
Max log size.....	30 in. diameter
Band wheel diameter.....	18 in.
Blade.....	13 ft. 5 in. length x 1 1/4 in. wide x 0.035 or 0.042 gauge thickness
Cutting speed.....	varies according to the width of the cut
Motor.....	Honda 20- hp gasoline w/12 v. electric start
Trailer hitch ball size.....	2 in.
Networks.....	manual standard, electric raise-and-lower optional
Hydraulics.....	none
Price.....	base \$10,800
Options available.....	power raise and lower + powered forward and reverse chain feed adds \$1,600 to price, 15-hp electric motor is optional, log-loading ramps, other lengths available upon request



Photo left: A.J. Dupere, Community Forester for the N.H. Division of Forests and Lands saws a pine log with Thompson School student Kelvin Flannery looking on.

Above, Seniors of the Thompson School Forest Technology Program have spent quite a few hours operating the Baker 18HD. Pictured are Cory Johnson, Brian Tasker, Megan Bujnowski, Swift Corwin, Kevin Daly, Billy Caveney, Eric McConnell, Adam Green, Martine De Rusha.

involved has less to do with sawing than with setting up the overall job site. The removal of sawdust, slabs, and lumber, as well as the delivery of logs to the machine, contributes the greatest production variables

over a day's sawing. Setting up the job for maximum production is often missed as an important point when production figures are mentioned. What good is the figure of 2,000 board feet per day if the next

day is spent untangling the mess? The 18HD comes standard with a 20-hp gasoline engine which drives 18-inch-diameter band wheels. The standard 1.25-inch-wide blade typically produces a

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## SAWMILL REVIEW

kerf of only 0.08 inches in most sawing conditions. The mill is designed to saw logs from 6 inches to 30 inches in diameter and was tested on logs up to 24 inches with good results (loading and positioning this log took a long time). The track length of 26 feet allowed for sawing 20 feet of log.

The machine comes with some features that are outstanding in our view. Foremost are the frame and trailer on which the machine is mounted. It is simple, robust, and tows and sets up very well. Drop-down legs make setup simple—but you don't want one of the legs coming loose on the highway! (Just to reassure you, we towed this machine several hundred miles without a problem.) Another plus is the centrifugal clutch drive system for the blade. This feature provides safe working conditions around the machine during log positioning and works effectively. The lumber scale/setworks system that allows for control of lumber thicknesses is very good, and, with calibration, is quite accurate (when the blade is sharp). The gravity-controlled "drop-down" feature for the setworks is unique among many mills of this type and allows for a quick set for the next cut. The frame and tracks are tough and provided good stability on the worst of setup conditions. The Honda engine on the model we tested provided plenty of power and quick start-up, an important feature when starting and stopping frequently. One operator who has experience with several different brands of machines raved about the lower dogs, or clamps, which hold the cant for the last few cuts and for edging. These eccentric cam-type clamps with a "T" handle are effective and easy to use. Overall maintenance and service points are well designed and access to all adjustment points is good. Changing blades is simple and blade tensioning, though very manual, is adequate.

Design flaws were few on the

BAKER 18HD TIME STUDY								
Log #	DiB	Length (in.)	Scale (ft.)	Load BF	Position	Sawing	Clear	Total seconds
1	10	12	45	4	147	270	84	505
2	12.5	16	105	14	390	455	239	1098
3	11.5	16	85	20	362	322	155	859
4	16.5	16	190	22	356	415	265	1058
5	13	16	150	7	385	245	145	782
6	12	16	95	14	236	160	101	511
7	12	16	87	12	252	192	121	577
8	16	14	155	13	260	305	140	718
<b>Totals</b>			912					6,108
ALL TIMES ARE RECORDED IN SECONDS. DELAY TIME IS NOT CALCULATED.								

machine tested. We recognize that there may be operational differences in the same line of machines made by the same company. We tested only one machine and compared it to experiences with similar machines from other manufacturers. One feature we wish we could change was the horizontal accuracy of the blade position when adjusting the saw guides. All thin-kerf band mills require very close attention to saw-guide placement, especially as wood conditions or blade sharpness changes. Running the moveable guide within 2 inches of the log is recommended. Because log diameter changes between every cut, and even along the same cut, frequent guide adjustment is required. With the tested machine, each adjustment resulted in a slight



Sawing large white pine on a cold and snowless day in December.

change in the band height on one side and sometimes yielded a cut that wasn't square to the machine base. The result was that we sometimes ran the saw with the guide out too far so we wouldn't have to change it between cuts on the same log. In time we learned to compensate for this and produce good lumber. The operators developed a plan for a quick fix to this moveable guide, but we decided to leave it as we found it for testing.

All manual thin-kerf band mills require attention to detail on log positioning. A time study we conducted showed that positioning is the most time-consuming component in normal lumber production. Working with cant hooks and reaching over the machine to adjust the log is hard on the body. Over time, crews can double production with just a few tricks on log positioning and dog placement.

### The Time Study

To familiarize students with fixed and operational costs, we typically conduct a time study of a run of logs. Isolating functions of any production system is the best way to look for opportunities to improve efficiency. Time studies are especially valuable in a sawmill setting where the same functions are repeated all day long. Interesting

patterns often emerge.

One simple study with the Baker 18HD included eight logs of a range of diameters and lengths. The variables measured included: loading time (manually rolling the log up a short ramp and onto the deck of the machine); positioning time (log rotation and setting the log and adjusting the fences and dogs); sawing (time spent activating the saw set and making the cuts); and clearing (removal of slabs and lumber and piling them away from the machine). The crew was a group of four students with little experience with the machine.

The exercise showed that 912 board feet of lumber were converted in about 1.7 hours. Most importantly, as the crew became more experienced, the positioning time was reduced even on larger logs, resulting in a significant cost savings. A larger sample set would likely show the improvement trend continuing to a point.

## Projects with the Baker 18HD

In addition to being used by forest technology students in the wood products class, the Baker 18HD was used by the University of New Hampshire Woodsmen Team to mill white pine timbers for their spring 2008 woodsmen meet. The two-day contest was attended by over 180 students representing 13 schools from the Northeast.

The New Hampshire Division of Forests and Lands used the Baker 18HD for two educational workshops and to produce a unique New Hampshire product. The Caroline A. Fox Research and Demonstration Forest in Hillsborough, New Hampshire, was the site of a two-day project using the Baker 18HD. In December of 2007 A.J. Dupere, community forester, held training for N.H. Division of Forests and Lands staff members in log scaling, grading, and lumber production with a portable mill. The following day a

public workshop was presented and about 25 people braved the cold to hear Jon Nute, Hillsborough county forester, discuss selecting, marking, scaling, and cutting logs to length. Community forester A.J. Dupere demonstrated how the Baker 18HD can be used to saw lumber from northern red oak that was cut from Fox Forest. After this lumber is kiln dried, it will be made into commemorative ship's planks and given to the first crew of the *SSN-778 New Hampshire*, a Virginia class attack submarine. This is New Hampshire-grown and -sawn wood given to commemorate our namesake submarine.

The final highlighted use of the Baker 18HD was at a workshop at the Division of Forests and Lands Urban Forestry Center in Portsmouth, New Hampshire. The workshop was titled "Logs to Lumber" and the focus was on utilizing urban wood. A 2003 USDA Forest Service report estimated that about 3.2 million metric tons

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of urban-wood residue was in fact “good wood” and could be further processed. Portable sawmills, such as the Baker 18HD, have made the milling of urban wood economically feasible. Sawing urban wood carries high risk to some machinery and workers, but working with this simple technology minimizes these risks. One of the demonstration logs sawn at this workshop was a crooked black cherry butt log that had been earmarked as firewood. The attendees were impressed that several clear boards were sawn from this seemingly poor quality log. What was to be firewood now had a new use as lumber for furniture, flooring, or a construction project.



Thompson school student Mike Simmons tries his hand at the Baker 18HD controls.

### Here to Stay!

Thin-kerf band sawmills are here to stay because they are a simple, low cost solution to specific problems. Low energy input, high lumber recovery yield, operator safety, and tremendous versatility will

forge a niche for these machines well into the future. The folks at Baker have produced the 18HD for the serious farmer, woodlot owner, woodcraftsman, and arborist. Working with this machine at UNH, we found that it is also a good fit for agencies providing educational programs in forestry or natural resources. We see future need for educational topics as diverse as studies on tree growth and yield, tree health, development of new

construction materials, rendering artifacts from unique trees, and demonstrating principles of local resource sustainability to schools and other community groups. Education at the small sawmill level serves to support the important work of the large lumber producers by creating public awareness of an industry that has a long history and a good record of providing the wood we need in a very sustainable way. ■

*Donald Quigley is a Professor of Forest Technology at the Thompson School of Applied Science of the University of New Hampshire. Don has been teaching logging and wood products for 30 years and is currently engaged in renovating the school's sawmill with the help and contribution of industry leaders and sawmill business owners from across the state.*

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