



Program Bulletin- Sawpit and Sawmill Demonstration

Program Overview

This program demonstrates historic techniques of squaring logs and sawing them into boards, first outdoors with axes and a large hand saw, and then in a historic sawmill reconstruction driven by water power from Mill Creek. Visitors viewing the program will understand how advances in technology helped sawyers in the past complete their job more efficiently with a mill. Boards manufactured here were sold to construct buildings on Mackinac Island from about 1790 to 1840. The first part of the program includes a visitor assisting an interpreter as they operate a large hand saw, known as a pitsaw. The second part of the program concludes with a demonstration of the water-powered sawmill.

Pitsaw Technology

Before the advent of the sawmill, the job of acquiring sawn lumber and hewn timbers was accomplished through lots of hard work. Workers would first bring each log into a flat area and place it on large blocks of wood called saddle blocks. Then the log was secured to the saddle blocks with large staple-like pieces of iron called saddle dogs. Next, a sharp felling axe was used, chopping at right angles to form notches at intervals of every four-to-six inches down the entire length of the log. After notches were cut with a felling axe, a different axe with a large head (known as a broad axe) was used to square the log by chopping the rounded side off. A broad axe has a large, flat head that is only beveled on one edge instead of both edges like the felling axe. Used parallel to the surface of the log, its handle also curves slightly outward to protect the user's hands. When one side was finished, the log was turned and the process repeated until all four sides were square. The resulting beam was used in framing a building, or could be sawn into boards.

A pitsaw operates by placing the log up on sawhorses with one person on top and another on the bottom. Sometimes the bottom person would actually be in a pit that was dug in the ground. Other times, saws were mounted above ground, such as the one used at Historic Mill Creek Discovery Park. We use this type of pitsaw to provide a better view of the process and to preserve archaeological artifacts that may remain in the ground. The ground is also very rocky and digging a pit would be difficult.

A pitsaw is operated by two sawyers. The one standing on top of the log is known as a "tiller-man." It was the tiller-man's job to steer the saw, similar to moving a tiller on a sailboat. If the saw was steered correctly, the result was a straight board. The sawyer standing beneath the saw, known as a "pit-man," holds another set of handles and pulls down on the saw during each stroke. The rake or angle of the teeth of this type of saw all point in a downward direction. That means this saw only cuts in one direction, on each downstroke. Hewing and sawing by hand is a long and tedious way to saw timber into boards. In a very long day two men could saw about 14 boards. That was a lot of hard work for the approximate 8 cents they were paid per day.

Water-Powered Sawmill at Mill Creek

The sawmill at Historic Mill Creek Discovery Park is powered by water being stored in a millpond on the south side of a wooden dam. To power the mill, a gate is opened, causing water to

run through a long wooden trough called a sluice. The sluice runs under the mill and empties into a large, ten-foot deep, rectangular box called a crib.

At the bottom of the crib is another gate. When a large wooden wheel with a handle is turned it opens the gate and empties water from the crib, causing it to hit the paddles of a flutter wheel. Attached to the right side of the flutter wheel is a crank, and attached to the crank is a long wooden pole called a pitman arm. The rotation of the flutter wheel and crank causes the pitman arm to move in an up-and-down motion. The pitman arm is attached to the bottom of the saw frame. This causes the saw frame to move up and down at a rate of 100 to 120 strokes per minute.

The same motion that runs the saw also drives a ratchet system which is attached to the top of the saw frame. From the saw frame, a beam extends horizontally to a teeter bar, which swings another small arm like a pendulum. This swinging motion moves a long wooden arm ending in a metal plate. When engaged, this metal plate engages with metal teeth on the tread of a large wooden wheel called a rag wheel. Every time the pendulum swings, it pushes the metal plate into the teeth, causing a ratchet system to turn the rag wheel.

A large axle, called a rag shaft, protrudes from the rag wheel across the width of the sawmill. In this shaft are some pockets or notches. As the shaft turns, these pockets engage with large wooden teeth on the bottom of the saw carriage, thus feeding the wood into the saw blade at the rate of 1/3 inch per stroke.

Reversing the saw carriage

In order to back up the saw carriage, the millwright engages a second wheel under the mill called the “tub wheel” or “turbine wheel.” Attached to the top of this wheel is a vertical shaft or axle with a device called a “lantern gear” at the top. The lantern gear is shaped somewhat like an old-fashioned candle lantern, being cylindrical in shape with wooden dowels placed around its edge.

By pulling a lever inside the mill, the lantern gear engages with large, wooden side teeth on the rag wheel. Then, the millwright pulls an additional lever inside the mill which opens a secondary sluice that allows water to hit the tub wheel and set it spinning.

As it spins, the tub wheel drives the lantern gear, which spins the rag wheel in the reverse direction than it first moved when pushing the log into the saw blade. After a cut is completed, the saw carriage is backed all the way up and the blade is moved into the slot in the head block. The metal dogs holding the log on the carriage are loosened, the timber is moved over, and a new cut can be made.

When cutting a board, the millwright usually does not cut all the way through to the end. It was easier to transport lumber if the boards were attached at one end, instead of being stacked in a loose pile. Men would skid these sawn timbers down to the lake, tie them together using metal pins called “raft shackles,” and float them over to Mackinac Island. On the island, the ends were cut off and the boards were ready for use.

On the island, the end piece of wood that is cut off to release the boards is called a stub shot. Several of these stub shots were found in between the walls of a building called the Mission House on Mackinac Island. When the cuts were analyzed, much information about the old mill was obtained. We learned the set of the teeth, rake of the blade, and the amount of the wood that was fed into the saw with each stroke. All of this information was very helpful in reconstructing the mill in the early 1980s.

