

Sawmilling Concepts – Part I: Lumber Sawing Techniques

This article is the first in a series of reports focusing on sawmilling concepts. The purpose of the series is twofold. It will provide some useful tips to those who own a portable sawmill. It will also assist landowners, who may want to purchase a mill or hire a sawyer, gain a better understanding of proper sawing techniques.

Topics covered in the series include: sawing lumber, using the quarter scale, saw blade maintenance, introduction to drying lumber, determining moisture content of wood, wood drying defects, methods of drying lumber and dry kilns.

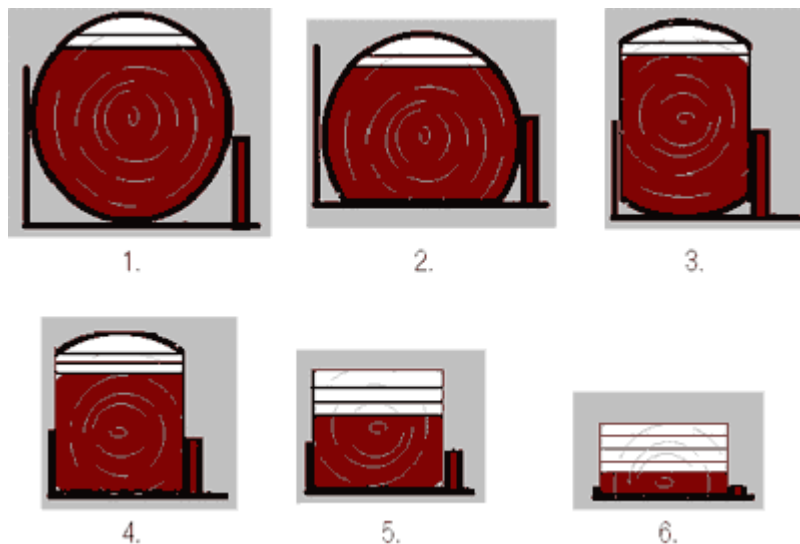
In Part I, we will examine lumber sawing techniques.

Lumber Sawing Techniques

There are four main methods of sawing lumber – **plain sawing, grade sawing, quartersawing and stress-relief sawing**. The technique chosen is based on the value of logs being sawn, the specific characteristics of the species, the size of logs, the stresses within the logs and the intended use of the lumber.

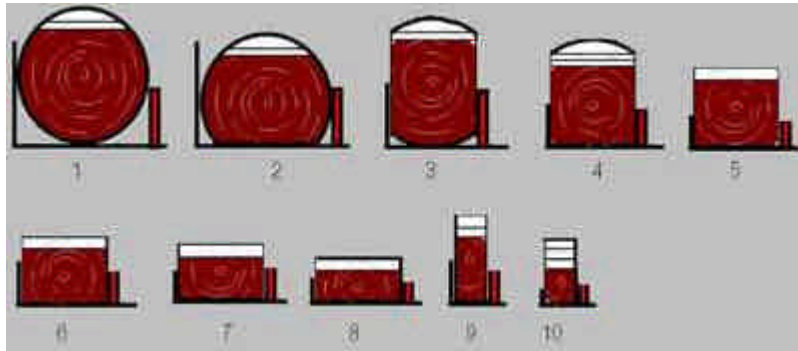
Plain sawing – this method is the simplest technique resulting in high production. It is used when lumber quality is not a key concern and is often used for softwood species. Plain sawing involves cutting off the rounded bark sides of the log (slabs) to produce a cant and progressively sawing boards from the cant (Figure 1).

Figure 1: Plain sawing provides the quickest technique for converting a log into lumber.



Grade sawing – the objective of grade sawing is to maximize the amount of high-quality, knot-free lumber produced. It takes more time, but the lumber that’s milled will be of a higher grade and higher value. First, slabs are removed to produce a square cant, and then the cant is rotated frequently so that only one or two boards are removed from one side at a time

Figure 2: Grade sawing ensures that the maximum high-quality lumber is derived from each log (assuming all four faces are of equal quality). This is especially important when sawing highly valued hardwoods.



Quartersawing – this method produces high-quality, stable and often aesthetically pleasing lumber (with an attractive grain pattern). The objective is to have the growth rings approximately 45 to 90 degrees to the face of the board. Boards sawn with growth rings within 10% to the perpendicular of the board face are said to be fully quartersawn (Figure 3) or rift-sawn (Figure 4).

Quartersawing takes more time and results in lower yields per log and narrower boards but it produces attractive boards that have a low susceptibility to drying deformities. Quartersawn lumber is used mainly for furniture, cabinets and doors. It is important to note that during the sawing process the log is not slabbed initially. The log is basically sawn into halves and each half is then vertically sawn into boards.

Figure 3: Quartersawing is time-consuming but produces some of the most aesthetically pleasing and stable lumber in certain species (e.g., oak).

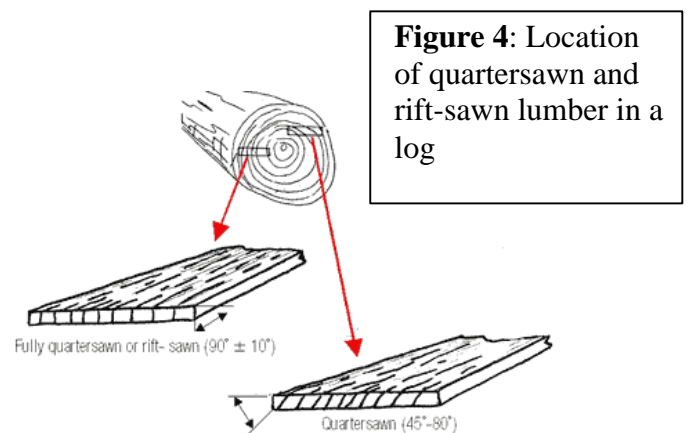
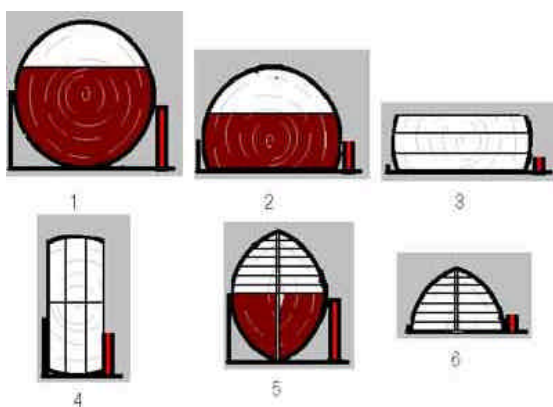


Figure 4: Location of quartersawn and rift-sawn lumber in a log

Stress-relief sawing – sawlogs often have internal stresses resulting from growing conditions (e.g., trees growing on side of hills, leaning outwards to forest openings or subjected to prevailing winds). When sawing a log that has internal stress the lumber produced will be bowed.

There are two methods of stress-relief sawing. Using the first method, the log is turned often as it is being sawn (do not cut several boards from one side before turning the log). This method can be combined with the grade sawing technique (Figure 5).

The second method of stress-relief sawing entails: first, cut the log into oversized cants; second, trim the cants; and third, saw dimensional boards from the cants (Figure 6).

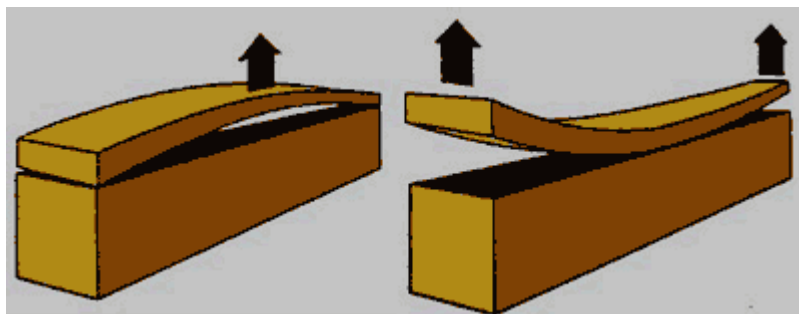


Fig. 5: Stress-relief sawing is a technique used to deal with trees that have internal stresses that will cause the lumber to distort once sawn from the log – technique #1.






1. Saw oversized cants (>6" thick) from log
2.  Saw off log 'hump'
3.  Turn 180°, trim off ends
4.  Turn 90°, saw lumber

Fig. 6: Stress-relief sawing – technique #2.

Sawing Difficult Wood

Listed below are the common difficulties that may arise and hamper sawmill productivity and lumber quality.

Sawing oak – the tannic acid in oak, combined with the metal on the sawmill bed (unless it is stainless steel) will stain the wood blue (like ink). To minimize the staining, some sawyers wash boards immediately after sawing. If left a few minutes after sawing, the stain will become permanent. An oxalic wash can bleach out the blue stain. The tannic acid will also cause damage to the sawmill's painted surface.

Wood density – consistently dense wood (e.g., oak) must be sawn more slowly; otherwise, a wavy cut appears on the face of the board. Variations in the density can also cause a wavy cut in tree species such as white spruce (a lower density wood that contains hard, dense knots). The best way to minimize this problem is to ensure that the blade is sharp and has the proper tooth set.

Old, dry logs – old, dry logs have hardened cell walls requiring more energy to saw them. Blade sharpening will be required on a more frequent basis. Also, the fine sawdust produced by cutting such wood can be a respiratory hazard.

Frozen wood – certain woods and temperature combinations can cause sawdust to freeze in the cut making cutting difficult. It is recommended that the tooth set be reduced in order to generate less sawdust (narrower kerf of the blade). There are some advantages to winter sawing, such as fewer problems with pitch build-up and less fibre pull on species such as poplar (resulting in smoother lumber).

Coarse-fibred species – basswood is a coarse-fibred species where the fibres will immediately spring back to the blade, creating increased friction and heat for the blade. To avoid this problem, it is suggested that the tooth set be increased (larger kerf for the blade).

Sawing creosoted wood – poles treated with creosote will collect dirt and grit and are very abrasive on saw teeth. (Caution: sawing and handling creosote can be hazardous to your health.)

Sawing dirty logs – you can avoid premature dulling of the blade by either cleaning dirt from the bark surface using high-pressure water or by physically removing the bark (using bark-peeling tools or power strip debarkers).

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