

FACTORS THAT AFFECT DRYING

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Factors that affect drying of lumber start with the tree standing in the forest. The quantity and the quality of material to be harvested from the tree is affected by the way in which the faller fells and bucks the tree into logs. Some logging operations buck the tree into logs near the stump. Other companies skid the trees to a landing where they are then limbed and manufactured into logs. From the log landing the logs are loaded and hauled to the mill yard.

Depending upon the immediate sawmill needs, logs are unloaded in the mill yard and are sorted for species, in some cases log diameter sizes, and are then moved either to storage decks or directly to the log infeed deck at the mill.

As the logs start their trip through the sawmill they are usually first debarked and long logs, usually 20 feet or longer, are bucked into shorter lengths. At this point in the sequence of manufacture, many companies scale the logs before they go on to the mill deck to determine the board foot volume of material going into the mill.

At this point, small-diameter logs can go to a small-log headrig, a "Chip-N-Saw," a "Beaver," a "Scragg," or a set of narrow kerf bandsaws. These operations are called "one-pass" where the log goes in one end of the machine and dimension or 2 x 4 material comes out the other end.

Larger logs are usually broken down on a carriage which passes back and forth by either a band saw or a circle saw. At this point the sawyer cuts boards from the log and the sequence in which the boards are removed can have a great effect on the quality of the material that is cut from the individual logs. If logs are large enough the sawyer will usually remove the sapwood first, trying to keep the boards composed mainly of either sapwood or heartwood.

From the headsaw, boards which do not have square edges are routed to an edger where this material is ripped to standard widths. To assure maximum utilization of material when being edged, most edgers are now equipped with shadow line guides which show the edger operator exactly where the saw cuts will be made.

Thick material from the headrig may be routed to a horizontal or vertical resaw, where the thick material is ripped to make thinner boards. In addition, large cants can also be cut at the headrig, and these are routed to either sash-gang saws or double arbor gang saws where the large cants are cut into boards or dimension material.

The next step in the sequence of operation is the trimmer where all the boards and dimension material are cut to standard lengths before going to the green chain.

Many mills have a lumber grader who grades the material as it goes onto the green chain to mark species, heartwood boards, sapwood boards, and some of the quality lumber grades which may require special handling. The green chain workers not only pull lumber by grade, but also by lumber width and lumber length.

From the green chain the stacks of lumber are either put into green storage or are moved directly to the dry kiln package stacker where they are stacked for the dry kilns. After drying the material is moved to an unstacker, from there through a planer, the material is again graded, trimmed to specific lengths, is stored for future sales, or is tallied and loaded for shipment by either rail or truck to the customer.

Each step of the operation illustrated here can greatly affect the recovery of material and the quality of the material. The faller can break trees if he does not take care in how he falls each tree. When the trees are bucked into logs, the quality of material to be removed can be greatly affected if log quality is not taken into consideration. For example, the first 14 feet of a log may yield high quality lumber; however, if the log were cut 16 feet long the last 2 feet of the log may contain knots which would place the boards in a lower lumber grade.

Improper handling of logs during the skidding, loading, hauling, unloading, sorting, and decking can also affect the recovery of quality material and quantity from the logs. Logs can be broken, they can be split, the forks of log-handling equipment can tear chunks from the face of the log, and logs can be left in storage too long, permitting surface checking and, in some cases, staining of logs by various fungal agents.

Every step of the lumber and dimension manufacturing process requires care and interest by everyone concerned if the logs are to yield their highest quality and highest quantity.

Mr. Allen L. Hearst, Jr. :

Mr. Dickinson has illustrated how every step of the lumber manufacturing operation affects quality recovery and quantity recovery. However, he left out a phase that relates to the drying of lumber and dimension material, and I will attempt to cover that specific phase of manufacturing process. Any one or many of the following illustrations of poor practices can be found at any one of the kiln drying operations that I have visited.

The first step usually associated with the kiln drying operation is the stacking of the rough, green lumber or dimension material into packages to make up a kiln charge. The best practice is to stack only lumber of one length in a kiln package; however, most mills will stack two lengths in one package, such as 14- and 16-foot boards. Because all of the boards are usually lined up flush at one end of the package, the opposite end will contain gaps between 14- and 16-foot lengths. If care is not exercised in building the packages by placing 16-foot boards on the outside edges of each course, holes develop in one end of the package which permit a high bypass of air around the end of the package, thus drying the more exposed ends more rapidly and to a much lower moisture content than the balance of the board in the package.

Occasionally, boards of other lengths are included in the kiln packages, and the longer boards then stick out preventing the close butting of kiln packages thus providing an area for additional airflow around the ends of the packages.

Quite often care is not exercised in the placing of stickers between the lumber courses, and this lack of care results in:

1. Poor sticker alignment.
2. Loss of stickers between courses which permits boards to touch adjacent boards of the course either above or below.
3. Stickers not placed near the ends of the boards, thus permitting excessive end checking which can result in the loss of volume because the checking must be trimmed before the board is sold.

Either excessive drying or incomplete drying of the top courses of kiln packages can occur because of lack of uniformity in kiln package height. A lack of uniformity prevents good baffling at the tops of the packages and thus results in either excessive air flow across the top of the package or the baffles may cover the top course or two preventing air flow. Poor drying and warping of the bottom courses of kiln packages can occur when the kiln trucks are not properly located underneath the kiln packages and in alignment with the sticker tiers in the package. Improperly placed 4 x 4 spacers between packages can also cause warping of boards in the top of the lower packages and the bottom of the upper packages if the 4 x 4 spacers are not aligned with the stickers in the package.

Problems in the dry kilns can result from improper baffling, lack of baffles, particularly end baffles, and stain to the top courses of lumber can result from leaking steam pipes, dirty spray lines, or condensation dripping onto the boards.

Lumber that has been dried should be kept under roofs to protect the material from the elements, such as excessive drying of top boards from exposure to sunlight and excessive moisture absorption because of exposure to rainfall and snow.