

## DRYING OF CALIFORNIA REDWOOD

By: Bud Peterson

Mr. Chairman, Gentlemen:

The drying of California redwood presents a great many problems of which the pre-air-seasoning or yard drying plays a very important part. It is of vital importance that redwood be dried to a moisture content as uniformly as possible before the stock is put into the kilns for final drying and conditioning.

### PHYSICAL CHARACTERISTICS OF REDWOOD

The primary problem presented in the drying of redwood is the fact that the wood has a naturally slow transpiration rate and is not uniform in those characteristics which affect the rate of drying. The three characteristics having the most pronounced effect on the drying rate are:

Moisture content

Specific gravity

Rate of growth, or number of growth rings per inch.

Moisture content may vary through a range of over 100% in areas closely associated in the board. This extreme variation usually occurs between the normal wood and the streaks of yellow or brown wood. In these cases, the streaks have the higher moisture content. Even in pieces not so affected, certain streaks of high moisture content wood are found. Variation also occurs between the birdseye, or knots in general, the areas immediately surrounding the birdseye or knots, and the normal wood of the board. In these cases, the moisture content of the knot or birdseye is lowest, that of the area immediately surrounding it is highest, and the average moisture content of the board lies between these two extremes.

Specific gravity may vary over a range of 100% based on the specific gravity of the lightest area in the board. This wide range occurs most noticeably between the specific gravity of the knots or birdseye, which is high, and that of the wood immediately surrounding them, which is low. It also occurs between the areas of normal wood and those of compression wood. The normal wood has a lower specific gravity than the compression wood.

Two other characteristics add to the drying problem; the comparatively high concentration of water soluble color extractives in the wood which tend to produce stains in drying, and the peculiar cell structure in certain areas which collapses if dried too rapidly. These characteristics are particularly noticeable in pieces of high moisture content and low specific gravity and dark color.

One of the most important steps in the drying of California redwood is the proper segregation of the stock before it is put in the air-yard. The green lumber should be segregated in proper groups, based on the drying characteristics, so that the pieces in one group will reach the desired final moisture content at approximately the same time. Boards with the following character-

istics will reach the final moisture content in the shortest time:

Low initial moisture content

Low specific gravity

Low green board weight

Low ring count

Boards with the following characteristics will require the longest drying time:

High initial moisture content

High specific gravity

High green board weight

High ring count

If space permits on the sorting table, three drying segregations should be made with the following general limits on the green board weight in each segregation:

Green board weight	LIGHT	MEDIUM	HEAVY
Pounds per board foot	Below 3.5	3.5 to 5.0	Over 5.0

Since it is difficult to judge accurately the specific gravity and moisture content of green lumber, it is recommended that the segregation be based primarily on the green weight, which can be judged quite accurately. The ring count need not be considered in making the segregation unless it is very high, over 50 rings per inch. Pieces with this fine a grain, or finer, should be placed in the next heavier segregation than that which the green board weight alone would place them. If thorough pre-air-seasoning is being practiced, these segregations will be adequate. If the bulk of the lumber is being kiln dried from the green condition, a fourth segregation should be made to include all pieces with the following characteristics, and this segregation should be air dried to between 25% and 50% moisture content before being placed in the kiln:

Massed birdseye

Frequent black birdseye

Boards containing yellow or brown streaks

Streaks of very fine grained wood surrounded by bands of either normal or compression wood

Eccentric or curly grain

Extremely fine grained pieces

Boards showing streaks of high moisture content

Lumber should definitely be stuck with surfaced or uniformly sawn stickers not over 2" in width; for most operations a sticker surfaced to 7/8" or thicker is practicable; for some operations with very good circulation in the kiln a 1/2" sticker can be used very efficiently, due to the increase in the amount of stock that can be dried in each kiln charge.

The pre-air-seasoning of redwood prior to final kiln drying has several advantages. It permits equalization of the moisture content around the birds-eye and in those streaks which, in the green condition, are above the average moisture content. This reduces the losses from the open birdseye and collapse. It permits slow drying during the high moisture content stage when maximum danger from stain, collapse and birdseye damage exist. It produces the final dry lumber at lower over-all cost and with lower drying losses than can be obtained by kiln drying from the green condition. It permits a larger volume of lumber to be handled by a given kiln plant, or it permits a given volume of lumber to be dried with a minimum fixed investment in kiln plant.

Naturally, there are disadvantages to pre-air-seasoning. It takes a larger yard space, a larger inventory is required, a larger capital investment is required, including the investment in inventory, than is required if drying green from the mill.

Lumber should be pre-air-seasoned to approximately 50% moisture content before placing in the kiln for final drying.

It has been shown in experimental work that relatively rapid air-seasoning may be obtained, at least down to the average moisture content range of 25% to 50%, provided the stacks have adequate air circulation. The principal consideration in laying out the yard is to get as much free air space around the stacks as possible; and to provide for the maximum air circulation it is advisable to run the main alleys in the direction of the prevailing wind. The foundation should be at least 12" off the ground to allow all the circulation under the stacks possible.

The redwood industry has a great variation in air drying conditions that creates problems that the Redwood Seasoning Committee are now working on. Plants that are located away from the coast where the temperature is very high and the humidity down low in the summer months have the problem to prevent end-checking and surface checking; various kinds of end sealers have been tried without too satisfactory results; end boards are used to a good advantage when the stock can be boxed or stuck 100% to length.

The estimated cost for sticking, transporting to and from the yard for pre-air-seasoning, for a period of six months, would be approximately \$7.20 per M board feet. This would include all taxes, fire insurance, etc.

In closing, I wish to express my thanks to the host clubs for the privilege of serving on this panel discussion. We have all benefited a great deal from all the progress made by the work done by all the dry kiln clubs. Hope we can keep up the good work.

Thank you.