

THE PHYSICAL PROPERTIES AND CHARACTERISTICS OF REDWOOD
WHICH AFFECT DRYING

By: I. G. Utschig

Mr. Chairman, Gentlemen:

Due to the fact that the Redwood group is presenting its part of the program in a brief series of topics, I will skip preliminary remarks and get directly to my subject, "Physical properties and characteristics of Redwood that affect drying".

As you know, all woods have certain characteristics which affect their seasoning, and while it is true some properties are common to many species, California Redwood has a few which are rarely found in other woods.

One of the main, and I might add stubborn, characteristics, is the slow rate at which moisture passes thru the cell walls, or low transfusion rate. It takes 10 days to kiln dry 1" all heart or clear grade lumber of 75% - 80% average moisture content. To dry 1" Heavy or so-called sinker Redwood often containing over 200% average moisture content, requires nearly 30 days, which in these days of high construction and operating costs, is not very economical use of kiln time. In the Coastal areas, where most of our mills are located, nearly one whole year is required to air dry this same stock.

Moisture content of Redwood has been known to vary from a low of around 40% to as much as 350% in the green state. Because of this great variation, we must segregate our lumber into several moisture ranges before drying. Some mills make 3 segregations, consisting of "light" with averages around 80%, "medium" up to 150% M.C. and the balance into a "heavy" group containing the real villains, "sinkers".

To further complicate the problem, a single board may contain a wide variance in moisture content, with narrow bands having upward of over 100% M.C. above adjacent wood, which we call "water streaks".

The prevalence of "Birdseye" in some trees, develop special problems in kiln drying the lumber from them. As most of you know, a single birdseye is a minute dormant branch bud which is always standing by, ready to develop into a real branch, should the tree lose a great many needles from some cause, such as fire. These buds remain as such and continue to exist so long as the tree lives. They are one of the reasons why a Redwood tree containing them has great recuperative power, if defoliation occurs because of damage. Cluster-birdseye and so called "Burl" are formed when these bud cells go berserk, 1 splits into 2, 2 into 4 and so on. Although it has high ornamental value for specialty uses, nevertheless it gives us plenty of trouble when kiln dried green from the saw. The wood surrounding the birdseye generally contains much more moisture than is average for the board. Abnormal shrinkage of the birdseye and the wood immediately around them, creates more complications and manifests itself in fibers being ruptured and torn apart as the piece dries.

Rate of growth, which determines the number of annual rings per inch and Specific Gravity, also has a pronounced effect on the drying rate of Redwood. Ring count has been known to vary as much as 500% in a single board of average width. Bands of compression-wood, which have a greater than normal shrinkage factor, also may occur.

But, because Redwood normally has one of the lowest shrinkage factors of all American native woods, we are not troubled as much as you people in the Fir and Pine region are, from this physical property. However, we do have our difficulties. We must produce from our kilns, stress free material since a high percentage of lumber from a Redwood tree is Clear Heart grade and manufactured into high quality products such as Sidings, Rustics and into many other items for use in interior and pattern work.

Several other characteristics which add to our drying problem in particular, are susceptibility of sinker Redwood to collapse if dried too rapidly and at too high temperatures, and the high concentration of water soluble color extractives in some boards which has a tendency to stain the wood in areas where it is deposited under the surface at the point where the moisture flashes into vapor. We understand you people in Sugar Pine have somewhat of a similar problem with "Brown Stain", so you can appreciate some of the things we have been up against in trying to eliminate, or at least, reduce degrade from this cause.

You have heard our Mr. Sherman tell how our group has carried on research work at the kiln operator level. As a group, we learned by experimental work, certain fundamentals about the characteristics of Redwood and their relation both to air and kiln drying. For example, we learned that boards containing massed birdseye, incipient decay (not dead wood), curly or cross grain, compress-wood, waterstreaks, high color extractive content or extremely fine grain, should be classed by themselves and thoroughly air seasoned before kiln drying to final low moisture content.

We learned that certain conditions such as too high temperatures and/or humidity; too low circulation rate in the kiln; using too thin or too wide stickers or allowing free water to accumulate and remain for some time on the surface, contributed to stain in some Redwood boards.

These and many other facts learned, or at least affirmed beyond doubt, about the physical properties and characteristics of Redwood by such research as the kiln operators themselves could conduct at their own plants, and use of an experimental kiln with its technical staff, contributed immensely to the progress made in the past 10 years in drying California Redwood.

Thank you.