

## Establishing New Dry Kiln Schedules

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Since the subject of my paper concerns methods of preparing new schedules for drying of lumber, particularly the more-newly used species, some of the statements made by me may seem rather elementary. In my own experience of learning from teachers who knew their particular subject extremely well, I found that the fundamentals of a subject new to me, were often passed over lightly by the teacher and I was the loser. So if what I say appears simple or obvious to the old-timers, it may give beginners some assistance in their problems.

### Lodgepole Pine

First, I shall discuss briefly a topic assigned to me, namely, that of drying lodgepole pine.

Information about kiln-drying Lodgepole is not abundant. In most areas the trees cut are small in diameter and wide boards, few. Hence the variety of grades is small. In contrast with Ponderosa pine, lodgepole is more nearly white, especially when dry. Selected pieces with small tight knots are suitable for paneling.

The average mill handling lodgepole in the kilns does not receive enough at one time to build up a full charge. So often the stock is dried along with other species, such as Ponderosa pine.

One mill that I contacted recently was drying 6/4 x 6 inch lodgepole mixed with ponderosa. It was suggested, however, that a mild ponderosa schedule be used. Under severe heat conditions, lodgepole may show more tendency to warp, perhaps due to the nature of its normal grain, in the knotty pieces.

### Problems of Mixed Charges

As I planned what I was to say here, I began to realize that I had been organizing new drying schedules during the entire period of my drying experience and that has been a long time. Many of these schedules were for mixed lots of lumber. To me, every new charge of lumber that is placed in the kiln becomes a new case to deal with and may need some adjustment of schedule. The schedules that I employ are rather flexible, although I try to keep them within the safe limits that experience has taught me to observe.

Although Mr. Knight of the Western Pine Association gave an excellent presentation of the subject of mixed charges at this convention, yesterday, added discussion of the matter here seems worthwhile.

### Early Trials With Mixtures

I consider myself very fortunate to have attended a series of lectures on the theories of kiln drying of lumber, given by Mr. Harry S. Tieman, Engineer with the U.S. Forest

Products Laboratory of Madison, Wisconsin and Hiram Henderson, at the New York State College of Forestry, about 30 years ago. Many of you are undoubtedly familiar with Henderson's book on kilndrying, a copy of which I have here.

With this basic training, I tackled my first operating job some time later, and soon encountered many problems in drying hardwoods for automobile body frames. My kilns were all hand-operated, with no automatic controls and no forced circulation. Because of the long drying period necessary, it became necessary to mix lots considerably, as some woods were used only in small quantities. The outcome was not always too good, but improvements in kiln schedules continued to be made.

For instance, sometimes there would be mixtures of basswood, which is a light porous species, always cut only one half inch thick, with two or three varieties of elm from Wisconsin or Illinois, light oak from the highlands of West Virginia and heavy swamp oak from Texas, yellow poplar and Hackberry from Missouri and Arkansas, or birch and hard and soft maple from Michigan. Or it could have been light and brittle "punkin" ash and hard, heavy white ash, black gum or southern red gum.

Shortly after I began this job, I had a charge of red gum, 12/4 stock in the kiln. Red gum is somewhat similar to sugar pine in its high moisture content and drying behaviour. According to my basic training, my beginning schedule seemed O.K. But soon a representative of the dry kiln manufacturer came along and took over, horrified apparently at my kiln settings. He accordingly changed everything, and I continued the run his way. After 96 days, I removed the Red gum; but the mill foreman raised a cry that the wood was still all wet. Some of it was so badly casehardened it had shrunk into concave patterns on the sides and edges. When resawn a wide thick piece still had a water pocket an inch wide and six inches long at its center. The water couldn't escape through the outer dry crust.

#### Arranging New Schedules

In devising a suitable schedule for certain lumber, give careful consideration to the character of the wood to be dried. What species is it and what is its peculiar nature as to wood structure and general behaviour under changing conditions?

Weigh all the factors involved in the thickness of the stock, its average green moisture content, method of piling, sticker thickness, and purpose for which it is to be dried and final grade value. Familiarize yourself with the kiln in which the wood is to be placed. Are all the parts efficient and in good working order? Is there enough heat, circulation and ventilation available? Will it respond to the schedule as desired?

When ready to start drying, set the kiln temperature reasonably low and humidity fairly high (as you might for some similar species). During the first few hours, watch the stock closely and observe its reaction to kiln conditions. Particularly note surface or end checking. If much of this appears, slow down by lowering temperature or raising the humidity. If the material is subject to kiln burn or brown stain, the humidity must be kept down until the moisture content of the wood reaches fiber saturation point. F. S. P. is given by the Western Pine Association as 26.8 percent moisture for ponderosa pine.

At arbitrary intervals, continue to raise the temperature slowly. Make frequent periodic moisture content tests by whatever methods that can be used at the time. If these tests are made at the same part of the board as drying progresses, the data obtained will have greater value for arriving at a proper drying schedule.

When deemed sufficiently dry for removal from the kiln, examine the lumber in detail for defects such as shrinkage, checking, stain, case-hardening and warp. Adjust the drying conditions for future charges of the same class of material in accordance with these findings. If many defects appeared, slow down next time. Keep detailed records of all operations performed and notes on the condition of the lumber during the

run and at the end. When the severity of the schedule reaches a point where the effects seem to become detrimental, swing back to a more conservative arrangement and a safe, fast schedule for drying is in the making.

#### Summary

In building new drying schedules, consider the following:

1. Know the equipment and what may be expected from it.
2. Weigh all factors, such as kind and grade of lumber.
3. Start easily, with low temperature and high but safe humidity.
4. Watch stock closely.
5. Make frequent and final tests of moisture.
6. Have schedule flexible and change conditions if necessary at any time.
7. Keep detailed records for future assistance.