

VARIOUS FACTORS THAT INFLUENCE DRYING RED ALDER

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Red alder is a hardwood that is sawn into lumber and kiln dried for use in the furniture and cabinet industry. At Northwest Hardwoods our first and main influence in drying Alder is what our customers needs are. Currently over the last 5 years our customers want an Alder lumber product that is a uniform light, honey brown color. The trend has been to use a natural or lighter finish over the lumber, and it does not look like it's going to change anytime soon. As most manufactures of lumber know, wood exhibits on it own, quite a bit of variability in grain, texture and color without any man made causes during manufacturing.

However, how Alder is handled from log to finished lumber can dramatically make a difference between a high value piece of lumber going into furniture or a low value frame grade going into upholstered furniture. The Arlington mill processes logs into a random width, kiln dried, sanded two face, rough lumber product for sale. The purpose of the sanded 2 faces is so the graders can see the defects better when grading out the lumber. The log source is delivered to the mill from a roughly 60 mile radius, with the bulk of it transported by log truck. There's approximately 20% delivered in raft form from the Olympic Peninsula that is transported over into Everett and held in the bay.

In 1996 we kiln dried 32 MMBF of lumber, 29.2 was dried in house and 2.8 MMBF was dried on the outside by custom lumber drying sources. At the end of the third quarter of 96 we added production of a high-yield sawmill capable of producing 8-10 MMBF more lumber to be dried in 1997. The expected kiln dried lumber output for 1997 should be around 42 MMBF. Lumber sales from alder went 67% for national consumption and 33% for export. The make-up of kiln dried sales goes into lower end frame grades like upholstered furniture; mid grades like panels, dimension, case goods and kitchen cabinets; high grade, or what we call superiors, that provide longer cuttings for stiles and rails. There's also, to a smaller extent, specialty businesses such as hi-end furniture products.

Alder comprises 97% of our production with the remaining 3% consisting of Maple and Birch. Between the two sawmills our production is 43% 4/4A, 44% 5/4A, 12% 8/4A and 1% 12/4A. Grade out of lumber at the sander is done on a proprietary basis with usually 11 basic grade sorts. One of the grade sorts pulled is color grade, which due to nonuniform color, is pulled separately. This sort, even though it has the same clear face cuttings as the noncolor grade, has the potential to be devalued by as much as \$300 per MBF. Last year the Arlington plant produced a 2% color product. The breakdown of this colored product was 70% from old logs, i.e., (bluestain and red heart), 20% sticker stain, and 10% from raftwood, (blotchy nonuniform coloring). The kiln department's main concern is with sticker stain and it's prevention (as much as possible).

Alder, when sawn, goes from an ivory white appearance to a yellow, orange brown color, while sitting out in the green yard. This reaction is likened to the biting into an apple and letting it sit or oxidize. Once sawn the ideal situation is to let the lumber sit anywhere from 2-9 days in the green yard to let this reaction happen before it goes into the kiln. The time frame depends on what season of the year it is. It is more critical when the ambient temperatures are warmer from spring into early fall. This is particularly true, for the raftwood that we manufacture, during the summer months, as mold can occur within four days of sawing. Thus our raftwood when sawn, is separated from non-raftwood and identified on each load so that the kiln operators know how to handle it. Generally our goal with green production during the fall and winter months is to not let it sit more than 2 weeks in the green yard. During the spring and summer months we don't want the lumber to sit more than one week. Stickers used to stack the lumber loads are to be stored under cover and out of the rain when not in use. The top load of lumber in our green yard has a cover board placed on top of it to prevent surface checking of the top layer of lumber and to some extent restrict warpage of that layer of lumber.

The main factor to overcome is to kiln dry, in a timely manner, the production of our two sawmills. The two sawmills average combined production per week has been around 850 MBF. The kilns at Arlington were drying on the average 590 MBF a week. The 260 MBF surplus has to be dried on the outside by custom dryers. However, it can be a problem to find the capacity that we need on the outside. The custom dryers that we've been using are basically lending out their surplus kiln capacity and this fluctuates with their market conditions and raw material supply. The package sizes used by the custom dryers are different than ours, thus we need to keep an extra inventory of odd size kiln sticks. The trucking and drying costs bring the drying costs significantly higher than in house.

The custom dryer's kilns and/or heating systems are different than ours, thus the first few kiln charges of alder dried are a learning process during which drying and conditioning times needed for whatever size of lumber that's being dried are determined. You also have to follow up with the custom dryer on handling and proper rotation of green stock to minimize possible color problems at the sander, where it's too late to prevent. Then we, as the quality control step of this drying loop, have to get back to each custom drying mill, to send their kiln charts, dry checks and stress test results for our record keeping and follow-up on their quality of custom drying. The importance of keeping in touch with these outside dryers can not be over stated as to our mill's overall bottom line performance, because roughly 30% of our kiln dried product is done by custom drying operations.

The kiln drying facilities at our plant consist of a 700 HP Cleaver-Brooks fire tube boiler operating at 21 PSI that's fired by sander dust with a gas fired back-up system. There are 9 kilns, 2 60 MBF and 2 40 MBF package kilns, with cross shaft fan systems and 2 heat zones for overhead and centercoil control. Then there are 5 track kilns 68 feet long with line shaft configuration, 2 are single track, 2 zone, control and 3 are double track kilns with 2 zone, overhead and center coil control. The average holding capacity is 760 MBF for the nine kilns. The kiln control system is a PLC to P.C. based system which controls all 9 kilns. Once lumber is loaded in the kiln and the kiln is started up, we want the initial dry-bulb and wet-bulb temperatures to be achieved as fast as possible. We do not pre-steam the lumber charge or even open up the steam spray valve to help bring the kiln up to

temperature. Pre-steaming is used only on green lumber that's newly sawn and hasn't had time to change color. The results have been good with this method, but we very rarely find ourselves in this type of situation. The only other time we pre-steam is when drying 12/4 alder. It generally takes 2-3 weeks for the sawmill to produce the 12/4 and molding of the lumber can happen. The initial drying step used isn't high enough to kill the mold, so pre-steaming is used with a 0° wet-bulb depression (WBD). The initial WBD on 4/4, 5/4, and 8/4 alder is 10 degrees in the first step of drying.

The drying schedules are on time steps until 30% moisture content, where moisture probes can jump the schedule or it can follow the time schedule, which ever jumps first. The final drying conditions are at a 3.7% equilibrium moisture content (EMC), where at the kiln operators discretion, he'll go in and dry check the lumber with a moisture meter. If it's not dried to the desired 6-9 % moisture content, then the kiln will be restarted and put on an equalizing schedule with an EMC of 5.0. If the lumber is dry then we'll cool the kiln down with vents open and kiln doors open for around an hour. Then we'll condition the lumber on an EMC of 10-11% for however long it needs for proper stress relief. When the conditioning period is over, the kiln operators will go into the kiln and pull a couple of boards to do a transverse and longitudinal stress tests and an oven test for shell and core differential. If it's to his liking, then the kiln charge will be pulled and stored in the dry discharge area.

The oven test results are written down on a moisture content and case hardening record sheet along with the date in, date out, drying hours, conditioning hours, hot check print out, kiln history chart printout and picture of the stress samples. This procedure is followed for every kiln charge dried at our mill and will be looked back upon if a claim should be filed for moisture content, by a customer. At the sander, moisture checks are done with a hand held moisture meter periodically over the shift and those are compared with the kiln final hot checks by a quality control person, if needed. The lumber graders also fill out a product attitude sheet for each shift listing any discrepancies in sizing, color, or moisture content in the lumber that was run on the shift. With these procedures we can track any kiln charge through the sander and find out what possible problem could have caused a non-uniform color to an alder production run.

In conclusion, drying red alder for the furniture and cabinet industry has various factors that influence its drying. The first and foremost is the customer's needs and that will influence the breakdown process through to the end product. The demand by the customers for a uniform, light colored wood for furniture and cabinets makes us at the kiln department carefully monitor all steps from the green yard to kiln dried lumber to ensure this happens. Hopefully our efforts have given our customers confidence in our ability to deliver a high value product that will make him a profit.