

## Wood and Moisture

Wood has an affinity for moisture. Water moves up the trunks of trees through the pores and fibers of the wood – drawn from the ground by the transpiring leaves. The amount of water in wood is measured as a per cent by weight. When the tree is alive and the trunk is carrying water, the wood fibers and cells are saturated. About 30% of the weight of a piece of such wood is water. In the trade, we say that such wood is at 30% moisture content.

After a tree is cut, water continues to move through wood, moving again from wet to dry until the wood reaches equilibrium with its environment, that is, no water moves in or out. In a conditioned home, at perhaps 75 degrees and 55% relative humidity, wood reaches equilibrium at about 8% moisture content.

**Wood changes dimension as its moisture content changes. This is the bane of woodworkers.** For example let us imagine that you have a white oak board on your porch, and because of the ambient relative humidity out there, it comes to equilibrium at 14% moisture content and measures 12" wide. Then you bring it inside for the winter. You turn up the heat, driving the relative humidity to 25% and keeping it there. The wood comes to equilibrium at 5% moisture content and the board measures 11½" in width! The wood fibers do not change in length. All change in dimension is across or perpendicular to the grain. Finishes slow this movement of water in and out of wood, but do not stop it.

You can see that precision in woodworking is tenuous. We must anticipate and design for some dimensional changes in use. While I want my work to be fine, I do not want it to be so precious that it must be kept in a museum. The wood in most homes in the U.S. will generally come to equilibrium around 8% moisture content, higher in the low humid South, and lower in the high dry West. The wood in many homes will be subjected to changes in moisture content from 6-10%, so we are careful to build our furniture at 8% moisture content to strike an average and reduce the differential. The furniture can stand periods of high or low humidity where the wood might reach 12% or 4%, but further extremes and rapid changes will likely cause cracks, raised grain, dull finishes, or worse. In cases of abandonment outdoors or in moldy garages, loose joints and delamination may occur.

While our furniture will not be structurally damaged by the normal range of moisture contents, you may notice some effects. We often work one piece of wood seamlessly into another as our rocking chair arms are shaped and faired to flow out of the back legs. Worked and shipped at 8% moisture content, the joint cannot be felt. After several seasons of humidity swings or maybe after one substantial one, you may feel a slight ridge or offset – very small but perceptible. This is normal and inherent. The only way to avoid it is to build of plastic or resin or some such. I have no interest.

### HOW WE MITIGATE THE EFFECTS OF CHANGES IN MOISTURE

We store our lumber, work in progress, furniture parts, and finished furniture in conditioned space maintained at 65-78 degrees and 55% relative humidity. Wood does not spend the night out in the more open shop space. Unless we are working on it, wood is in the conditioned space. We measure the moisture content of every shipment of wood with an electrical resistance meter or, in questionable situations, by the gram scale and oven dry method. No wood is worked above or below 8% moisture content. We let all parts and sub-assemblies acclimate after milling before laminating. We let all assemblies and laminations acclimate before working further so that water from the glue can leave the wood. We maintain the same controlled conditions in the finishing room as in the assembly room.

### MY ADVICE TO OWNERS OF FINE FURNITURE

If you own fine furniture, you should be aware of the effects of humidity on wood. Knowing that, common sense will see you through. Keep the furniture in the house. Close the house when the weather is extreme. If your lips are chapped and your nasal passages dry, add moisture to the air. In the summer, keep your air conditioner maintained and run it during periods of high temperature and high humidity. Find the cause of any mildew and cure it. Make peace with the imperfections that may occur when everyone does everything right. Wood is a most wonderful and sacred of materials because it was living. But because it was living, elements of "personality," unpredictability, and surprise remain. Enjoy your furniture. Use it. Relax.

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