WOOD MYTHS: FACTS AND FICTIONS ABOUT WOOD

> *Please note: This older article by our former faculty member remains available on our site for archival purposes. Some information contained in it may be outdated.*

Setting the record straight on common misbeliefs about the material we use everyday.

by Paul Fisette – © 2005

It is said that perception is reality. If you say something loud enough and often enough, somehow it becomes true. As builders, we spend much of our time cutting wood, carrying it around or pounding it full of nails. We think of ourselves as wood experts. But even experts can be mistaken, and you may be surprised to learn that some of what you know about wood is wrong. In the following article, we'll consider some common notions about wood, and see how they compare with the cold, hard facts.

---

1) Kiln dry (KD) and S-DRY lumber means dry lumber.

Virtually all problems with wood-based building materials are moisture problems. Peeling paint, rot, warp, cracks and general shrinkage are all related to water in wood. Conventional wisdom tells us when wood absorbs water it swells and when wood dries it shrinks. But wood will only shrink and swell below its fiber saturation point, which is around 28% moisture content (MC). Wood shrinks and swells in response to liquid water and relative humidity.

Seldom do we buy "green" fully swollen lumber. We pay manufacturers to remove at least some moisture. Builders may think they're getting a deal buying the least expensive S-GRN (surfaced green) lumber. But they're buying shrinkage problems and callbacks. S-GRN indicates that the wood was surfaced to its finished shape when the MC was above 19%. How much above 19% is anyone's guess. Believe it or not, I have been called to examine rotten joists in brand new homes. In a recent case, S-GRN Douglas Fir 2×10's were shipped from the west coast, box-piled for months and then installed in a rotted state. The installed MC was over 50%! The remedy was expensive.

Builders can also specify lumber stamped S-DRY (surfaced dry) or KD (kiln dry). This means that the lumber was surfaced when it was at or below 19% MC. Other choices are lumber stamped MC 15 or KD 15 for lumber surfaced at 15% MC or lower. But these designations only indicate the MC of the lumber when it was manufactured. You don't know its current moisture condition!

The MC of lumber can soar when is stored at a lumber yard without a protective cover and/or stacked over wet ground. Lumber stored in a very humid environment like next to the ocean can sponge water too. A KD stamping means very little if the lumber has been left sitting in the rain at a distribution center, reload yard, retail yard or building site. Spot check the lumber you are using with a moisture meter. It is important to match the MC of the wood you are using with the equilibrium conditions it will see in service. The in-service MC or equilibrium moisture content (EMC), can be benchmarked to relative humidity:

• RH 25% ~ MC 5%

• RH 50% ~ MC 9%

• RH 75% ~ MC 14%

• RH 90% ~ MC 20%

Wood used inside of homes as finished trim, cabinets and flooring, should be installed at a MC close to 8%. Wood used in exterior applications is a different story – it depends on where you live. In New England 14% MC is a good target. In Tucson, a 6% MC would be a better mark. The USDA Forest Products Laboratory in Madison has a pamphlet (FPL-RN-0268) listing outdoor EMC's for about 350 cities worldwide.

---

2) Cedar and redwood are rot resistant.

Like fingernails on a blackboard, homeowners bubble, "I have cedar siding." Don't get me wrong cedar is my choice for siding too, but let's get something straight. Not all siding, decking and trim made from cedar, redwood or other species famous for durability are in fact rot resistant. Only the heartwood of certain species is naturally decay resistant. Untreated sapwood of virtually all species has very little decay resistance. You can expect a short service life if you use sapwood in decay-producing exposures.

Large old-growth trees are a thing of the past. We now harvest smaller second-growth material that contains a high percentage of sapwood. Heartwood lumber is essentially unavailable in many species. Specify "all-heart" and you may be in for a dose of sticker shock. But if durability is important to your design, you should make heartwood part of your budget.

It's difficult to precisely rate the decay resistance of heartwood for different species. But broad groupings have been made based on years of research and field performance. Common woods considered to be decay resistant include: all cedars, old-growth redwood, old-growth baldcypress, white oak, and locust. Heartwood of these species generally provide rot-free performance in an untreated state. Water repellent treatment is still a good idea on all wood exposed to the weather. Water repellent helps keep wood dimensionally stable.

---

3) A deck built with pressure treated wood will last a long time.

Promotional literature promises lifelong performance for pressure treated wood. The Forest Products Laboratory and other research groups have shown that treated wood stakes placed in the ground for more than 40 years remain rot-free. But young pressure-treated decks, many less than 10 years old, are being shoveled into landfills. A recent technical report in the *Forest Products Journal* (November-December 1998) indicated that the average pressure-treated deck only lasts 9 years. Why? As the old song says, "It's not the meat, its the motion."

Pressure treating does make wood rot resistant. But — it doesn't make wood water resistant. Pressure treated wood still soaks and looses moisture. And as a result, the wood moves, cracks, twists, bends, cups and virtually tears itself apart. There is hope.

You can enjoy pressure treated decks for a very long time. All it takes is a little extra care during installation and a yearly dose of maintenance. Keep the wood stable by applying a coat of water repellent treatment onto all surfaces before installation. Securely fasten the deck boards with long corrosion-resistant screws. Brush-treat raw wood that is exposed when cutting and drilling. Retreat the tops of the boards with a good brushing of water repellent every year. The water repellent will keep the boards looking bright and will minimize the uptake of water. As a result the boards will have fewer cracks, splits, cups and twists.

Better yet, buy treated wood that has water repellent chemicals included as part of the pressure-treating process. UltraWood by CSI, Charlotte, NC and Wolmanized Extra by Hickson Corp., Smyrna, GA are 2 examples of this product. The repellent gets injected deep into the wood along with the preservative. This type of decking will perform better for a longer period of time. UltraWood guarantees water repellency for 50 years! I'm a skeptic, but that is quite a promise. It is a great idea to purchase KDAT lumber (kiln dried after treatment) whenever the budget allows. You will have less initial shrinkage and the deck will look much nicer for years. These recommendations are good for all wood decks, but pressure treated southern pine seems particularly sensitive.

---

4) Hardwoods are hard and softwoods are soft.

The terms hardwood and softwood are misleading. We typically think that softwoods come from trees with needles like pine, fir and hemlock. Hardwoods come from trees with leaves like maple, ash and cherry. However, density is the most important predictor of hardness and strength. This is significant because dense woods are more difficult to cut, machine and fasten. They also shrink and swell more than less dense woods.

Most technical handbooks express the density of wood as specific gravity. Specific gravity is a ratio of the weight of wood fiber to the weight of water – water being 1 gram/cubic centimeter. Usually “hardwoods” are more dense than “softwoods”, but you may be surprised by this comparison of some common woods:

Hardwoods?	***Softwoods?***
• butternut 0.38	• hemlock 0.45
• poplar 0.40	• Douglas-fir 0.50
• black ash 0.48	• larch 0.52
• red maple 0.49	• longleaf pine 0.60

---

5) Dry rot.

There really is no such thing as dry rot. Wood needs 4 things to decay: water, oxygen, food (wood) and favorable temperature (40F – 105F). Wood can be too wet to decay. Waterlogged wood will not allow oxygen in to support the growth of fungi. Marine pilings kept fully submerged may never rot. And wood can be too dry to decay. Keep wood below 22% MC and you are generally safe. But the fact remains: wood needs water to rot.

Carpenters replacing a sill or corner post in an old house often find a brown, crumbly rot they call dry rot. It may be dry when it’s discovered, but don’t be fooled. There was or is a moisture problem that needs fixing. Most likely there is intermittent wetting. A source of moisture is to blame. Inspect carefully for signs of leakage, dampness or chronic condensation. There are a few strains of fungi that have water-conducting strands that carry water from soil into building elements. But these forms are quite rare.

---

6) Rot is catchy.

Well this may be true, but not in the sense that many people think. If you install a new stick of lumber against a piece of rotted wood the new piece of lumber will not begin to rot. Rot fungi are “seeded” by the spread of single-celled spores. These spores are everywhere. Essentially all wood is exposed to the seed stock. Only when conditions are right will the infection develop into rot. The moisture content (MC) of wood needs to be above 28% to be initially infected. Since all lumber is above 28% MC at some point in its life, all lumber is infected. When the MC of wood drops below 22% the rot fungi goes dormant. It’s harmless, but is will be reactivated when the MC rises above 22%. The solution is: keep wood dry or poison it with a chemical treatment.

---

7) Durability is the same as strength.

Durability is a term sometimes used to connote strength. Technically it refers to the ability of wood to resist rot. It can describe the ability of a finish to protect wood products from the exposures that cause rot or describe the wood itself. The term is also used to explain the character of a glued-connection as in the durability rating of a glue-laminated beam. But durability should not be confused with strength. In fact many of the rot-resistant species are not particularly strong.

---

8) When you buy mahogany you get mahogany.

Order mahogany at your local lumber yard and you'll probably get a pretender. True mahogany or American mahogany (Swietenia spp.) comes from the West Indies, Mexico, Central America and South America. It is a premium furniture and shipbuilding material. True mahogany is prized for its beautiful dark red appearance, dimensional stability, termite resistance, machining qualities, and decay resistance. A related African mahogany (Khaya spp.) is also available, but is not as durable as true mahogany. The real problem is that many lumber yards sell you Meranti (Shorea spp.) as mahogany. Philippine mahogany is meranti. It is not mahogany.

Merchants separate 125 species of Shorea into 4 groups of meranti. It is separated according to color and weight: dark red, light red, white, and yellow. The grain is usually interlocked. White meranti dulls cutters because it has a high silica content. The dark red and yellow varieties tend to warp. Dark red is only moderately resistant to rot. Light red, white and yellow versions are not durable in exposed conditions. So if you buy mahogany clapboards or decking, beware. Ask: what species?

---

9) Install decking boards bark-side up.

There's no shortage of conflicting advice on this topic. Some manufacturers insist that boards should be installed with the bark-side up. An equal number say bark-side down. The truth is it doesn't matter.

Wood shrinks and swells twice as much in the direction parallel to the growth rings as it does perpendicular to them. The combined effect of these different rates of movement cause lumber to warp, twist and deform. Deck boards are typically flat-sawn so they are very likely to cup. A good way to remember how wood cups it to imagine that growth rings try to straighten out as a wet board dries. If you install a wet piece of lumber (like most treated decks) with its bark-side up, it will cup to hold water as it dries. However, a dry board moves in the opposite direction when it gains moisture. Dry lumber installed bark-side up will cup to shed water as it is wet. The MC of the board when it is installed and its exposure after installation controls a board's shape.

Decay resistance is a consideration too. Heartwood is more resistant to decay than sapwood. Clearly you would want to install lumber bark-side down to expose the more resistant heartwood portion of the board to the elements. But heartwood is difficult to treat with wood-preserving chemicals and sapwood is easy to treat. It follows that treated wood should be installed bark-side up.

Growth rings are made of earlywood and latewood layers. The more central layer of each growth ring is made during the early part of the growing season. Repeated cycles of wetting and drying can cause the earlywood to separate from latewood. "Shelling" is most likely to occur in flat-sawn yellow pine and Douglas-fir that is installed bark-side down.

Knots originate at the center of the tree. Knots sometimes show on the pith-side of a board and not on the bark-side. So if you want to see fewer knots, install all boards bark-side up. But wane results on the bark-side of a board. To reduce the probability of exposed wane, install boards bark-side down.

Fluctuating humidity and exposure affects the stability of wood. The underside of a deck sees damp ground and high humidity. The upper surface is baked by the sun and dried by prevailing winds. This action causes boards to cup to hold water bark-side up or bark-side down.

The best advice is pick the best looking surface and install the decking best-face up. Securely fasten the deck boards and apply an annual coating of water repellent.

---

10) Pressure treated lumber is resistant to attack by termites and carpenter ants.

This assumption is half true. Entomological studies have shown that arsenical treatments like the CCA commonly used in pressure treated lumber does repel and can kill termites. Termites that eat treated lumber will die. However, termites may also decide to tube around CCA treated wood and survive to enjoy the more delicate studs and joists that lay beyond the poisoned barrier. Arsenical treatments do not repel or kill carpenter ants.

Ants are attracted to wet and decayed wood because it is soft and weak. It is easy to chew. That's why ants like foam insulation. Ants don't ingest wood, they simply hollow out wood and nest in it. CCA is fixed tightly to wood fiber, so it is not accessible to ants. Wood that is treated with borates is a different story. Borates are very soluble and can be picked up by ants as work their way through borate-treated wood. The

borates are ingested when ants groom themselves. They are poisoned at this point. The characteristics of borates and CCA are significant in other ways. Since CCA is held tightly by wood fiber, it provides very permanent protection from rot in moist environments. Borates will leach out of wood that is in contact with wet surfaces leaving wood unprotected in time.

---

11) There's no substantial difference in strength between No.1 and No.2 dimensional lumber.

This statement is blatantly false. It shocks me to hear builders and retailers talk about the performance of No. 1 and No. 2 grades of structural lumber as if there are equals. Only different in appearance. Strength, as the term is generally used, really involves 2 issues: the ability to resist loads without breaking and the ability to resist loads without bending excessively. Strength and stiffness are critical factors. Design values for bending strength (Fb) and stiffness (E) are values used to predict an acceptable level of performance. They are controlled by a variety of factors including margin of safety, species, use, MC, size and grade of material.

>A piece of lumber is only as strong as its weakest link. The larger knots and defects allowed in lower grades of lumber grossly affect Fb. Stiffness or E values are not affected as much by lower grades because all parts of the joist or beam make some contribution to its overall stiffness. But perhaps the best way to illustrate the difference in performance is through example. The following are maximum allowable spans for floor joists spaced 16-inches on center in a normal living room floor:

Species	***Grade***	***Maximum allowable span***
DF-L 2×10	No. 1	15′-8″
	No. 2	14′-8″
Hem-Fir 2×10	No. 1	15′-3″
	No. 2	14′-6″
SPF 2×10	No. 1	14′-6″
	No. 2	13′-7″

---

12) It's best to let siding weather for several weeks before painting.

Weathering is the deterioration of wood. Don't allow wood to weather before you paint. Research conducted by the Forest Products Laboratory in Madison, WI clearly shows that even a 3-week exposure to sun and rain is too much for new wood. Ultraviolet radiation from the sun alters chemicals in the wood and destroys lignin – the natural glue that holds wood cells together. Loosened wood fibers and decomposition of the surface prevents good bonding between paint and wood. Raw wood sucks moisture from rain, dew and high humidity. It swells. The sun quickly dries surface fibers. They shrink. As a result, the surface is stressed and when it is painted at a later time, the paint is much more likely to peel. Siding must be dry and clean before it is painted. Weathered wood should be sanded and washed. On the other hand, weathered wood it not such a bad idea if you plan to stain the siding. Loose fibers and the roughened texture absorbs penetrating stains better.

Building and Construction Technology provides students with an unrivaled university education, which prepares our graduates for rewarding careers in construction management, sustainable building systems, and building materials technology. We offer a B.S. major, a minor, as well as a thesis M.S., professional M.S., and a Ph.D. degree.

BCT is a program in the Department of Environmental Conservation, the College of Natural Sciences, and the School of Earth and Sustainability at UMass Amherst.

210 John W. Olver Design Building
551 N. Pleasant St.
Amherst, MA 01003-2901
+1 (413) 545-1976

Contact Us

THE COLLEGE OF NATURAL SCIENCES

SES School of Earth & Sustainability

AFFILIATIONS