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Better Homes and Gardens®

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Lumber Aisle

The Ultimate Outdoor Wood

Photo courtesy: Radiance Wood Products

No toxins? No plastic? No kidding. Thermally modified wood may be the best thing since sliced cedar.

The holy grail of outdoor woods: rot-resistant, weather-resistant, insect-resistant, strong, and dimensionally stable. And to make the quest more challenginge, let's add beautiful, non-toxic, and sustainable. Impossible, you say? Well take a look at thermally modified wood. That elusive and legendary perfect wood for outdoor projects might be closer than you think.

Beyond kiln-drying

The idea of thermally modifying wood is nearly as old as toolmaking. Early hunters heated wooden spears over the fire to harden them. But it wasn't until the 1990s that Scandinavian wood processors and kiln manufacturers, such as Stellac Oy, took the process into the lab for closer scrutiny. The resulting technology has been employed for years in Europe, but is only recently making its way into North American retail markets via such companies as Radiance Wood Products (radiancewood.com), EcoVantage (ecoprem.com), Bay Tree Technologies (purewoodproducts.com), and Northland Forest Products (cambiawood.com).

The thermal modification process (see illustration *at right*) starts where kiln-drying leaves off, subjecting the wood to temperatures near 500° F. This "bakes" the sugars in the wood, making it unpalatable to rot-inducing microbes and wood-munching insects. Components in the wood's cell walls that normally absorb and release moisture become permanently water-insoluble during thermal modification. Robbed of ready moisture, the wood becomes not only less vulnerable to decay by biodegrading, but also more dimensionally stable and resistant to warping. And, just like those spears of old, the wood hardens as the cell structure is transformed.

The end-product is a lightweight, strong, durable, stable, and chemical-free wood. The process imparts a rich brown color that permeates the board and a pleasantly sweet, baked smell.

The wood is machined into deck boards, siding, or dimensional lumber after undergoing the process, and most of its tendency to warp gets left behind.

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The Thermal-modification Process

Kiln-dried wood with a moisture content ranging from 14–19% enters the computer-controlled thermal-modification kiln.

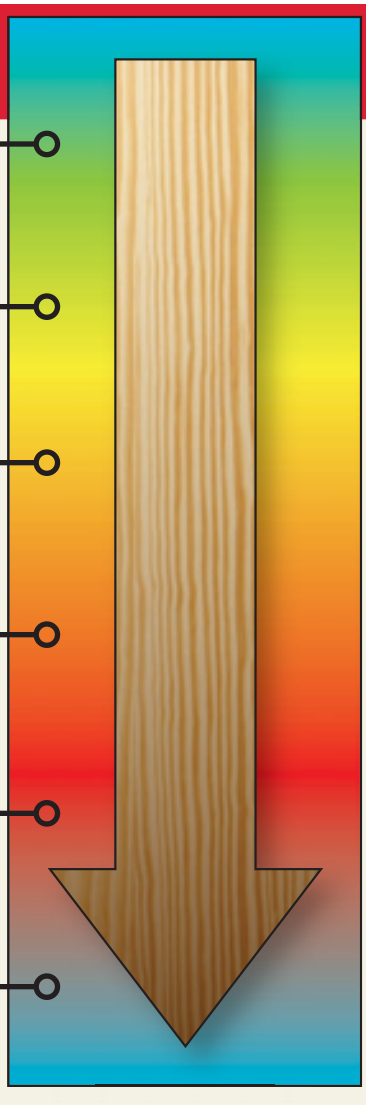
Initial heating: The temperature inside the kiln rises to 212° F, the boiling point of water.

Preconditioning and drying: The heat continues and steam is introduced to slowly bring the drying wood to a uniform 7–8% moisture content.

Thermal Modification: As the temperature of the kiln boosts to 480° F, the increased heat "bakes" the sugars and tannins in the wood making them inedible to microbes and insects. The wood darkens and hardens.

Conditioning: Steam once again is introduced to stabilize the wood and prevent it from drying completely in the high heat.

Cooling: Computers slowly lower the temparature of the kiln to minimize stresses on the wood as it cools. Only 24–48 hours after it entered, the wood is ready to be removed.



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Environmental impact

The thermal-modification process works on any species of wood, but most manufacturers utilize Southern Yellow Pine because of its low price and sustainability. The chemical-free process leaves behind no chemical waste at the kiln and nothing toxic to leach from the wood into your backyard soil.

One manufacturer, Radiance Wood Products, carries the green aspect a step further by adding a resin-based, volatile-organic-compound-free finish called One TIME in the factory. Bond Distributors, maker of One TIME recommends refinishing with their product within seven years.

Thermally modified wood weighs so little, a truck can hold more than two times the number of board feet compared to pressure-treated wood, saving fuel and reducing emissions. (Although the latter is offset somewhat by the increased fuel necessary to heat the kilns.)

Waiting for the other shoe to drop?

Here it is, but it's more like a moccasin than a work boot: The process that leaves the wood harder also reduces its splitting resistance; several manufacturers recommend predrilling screw holes, especially near the ends of boards. The wood becomes more vulnerable to UV light, fading to a silver-gray faster than unmodified wood, so refinishing is necessary every year or two.

One other caveat: Because the process is fairly new, most products have not yet been certified for ground contact. So for now, you'll still need to build your deck framework with pressure-treated lumber. That's why most manufacturers are focusing their product lines on 5/4 deck boards, posts, balusters, and railings, rather than standard dimensional lumber.

Availability and cost

Currently, thermally modified wood is making its way into lumber yards and specialty decking stores, with limited inroads into home centers. Its cost lands somewhere between that of cedar decking and composites. Warranties range from 20 to 30 years. Watch for increased availability and possibly lower prices as companies rev up production and distribution.

How thermally modified wood stacks up against other outdoor materials

Material	Pros	Cons	Cost per 1x6 Lineal Foot
Thermally modified wood	Hard, lightweight, stable, rot-resistant, insect-resistant, and chemical-free.	Care must be used to avoiding splitting when driving fasteners, and it grays quickly if not regularly finished. Limited availability.	$2
Pressure-treated pine	Strong, inexpensive, and readily-available, pressure-treated wood has a long and proven track record of impressive rot- and insect-resistance. You can buy it certified for ground contact.	Pressure-treating wood saturates it with water-based preservatives, leaving it heavy, wet, and warp-prone. The chemicals accelerate corrosion in fasteners and necessitate special handling procedures.	$1
Western red cedar	Even-grained with some natural decay-resistance. Widely available in the West and Midwest. Look for comparable redwood in the West and cypress in the Southeast.	Tannin bleeding can make finishing problematic without some additional prep work. Care must be used to avoiding splitting when driving fasteners.	$1–2
White Oak	Dense, strong white oak has a decay-resistant, moisture-resistant heartwood and it accepts finishes readily.	You won't find white oak in dimensional lumber for deck-building, so save it for benches, arbors, and chairs. Heavy.	$2
Ipe	Super-dense, strong, and stable, ipe can last 40 years or more even if left untreated. It resists warping, cracking, decay, even denting.	Expensive and sometimes hard to find, ipe's hardness also accelerates dulling of tools, blades, and bits. Heavy.	$3–4
Wood/plastic composites	Rotproof, defect-free, dimensionally stable, and widely available in home centers. No splintering.	It lacks rigidity so it can't be used for structural purposes. Weighs more than most woods and can experience expansion, especially along the length in hot weather. In the sun, becomes hot to the touch.	$2–3