

Thermally-modified wood

Wood is a biodegradable and dimensionally unstable material. These are fundamental properties of wood and they can cause a lot of problems for wood products in service. Although there has long been interest in trying to change the nature of wood, it is only recently that *thermal modification* has become a commercial treatment process.

Wood that is exposed outdoors must be protected against attack by insects and fungi (rot). Wood that is subject to wetting and drying – even due to changing humidity indoors – will shrink and swell, potentially causing problems. Many techniques can be used to manage these risks: To protect against rot, naturally durable wood species (e.g. cedar or white oak) can be selected or preservative chemicals can be added to susceptible species such as pine. Coatings (paints, deck finishes, etc.) can be applied to wood to slow the wetting and drying cycles that can lead to swelling and shrinking, warp and checking. These practices can work but in essence they are trying to work against the natural properties of the wood.



Thermally-modified yellow poplar decking

Wood modification involves chemical or other treatments to fundamentally change the properties of wood. *Thermal modification* is one modification method, and involves heating the wood to high temperatures (400 degrees or more). Oxygen is excluded to prevent the wood from burning, and the heating causes the wood to become much less hydrophilic (water-loving). Because the presence of water in wood enables rot and is responsible for shrinkage and swelling, thermally-modified wood is less susceptible to decay fungi (rot) and is much more dimensionally stable.

Any wood species can be thermally modified. The process turns the wood brown, which can make some otherwise non-descript woods quite attractive. On the downside, the treated wood can have a lingering “burnt wood” odor. The strength and stiffness values of thermally-modified wood are lower than the original wood but are sufficient for many uses.

Thermally-modified lumber has been commercially available for a few years in Europe, where it is used for siding, decking and outdoor furniture. Recently a few companies in the US have started producing thermally-modified wood products, including a mill in Tennessee.

Thermally-modified wood is a special material with many of the advantages of wood (beauty and versatility) but with some additional advantages (dimensional stability and rot-resistance) over normal wood. We may start seeing thermally modified wood products in outdoor wood products where the rot resistance and lack of warp and checking are particularly valued.

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