Wood Defibration

One form of deterioration previously noted in several temperate places of the world is a disruption of wood surfaces that leaves the wood with a furry appearance suggestive of mechanical abrasion. The damage has been referred to as defibration of wood. When the affected wood is wet, it appears as if the surface cells have pulped. The damage is referred to as defibration of wood caused by a non-biological form of deterioration. Very few studies of this phenomenon have been reported despite its general occurrence on wood in or near marine environments. The general belief is that the damage is due to mechanical abrasion or weathering processes such as wind, freeze-thaw damage, and solar radiation.

A brown, fuzzy condition of wood surfaces was reported on preservative-treated marine pilings, salt and fertilizer warehouses, and chemical plants. It was found to occur just above the water line on preservative-treated pilings and wharves exposed to the ocean. The possible results are due to damage caused by the growth of salt crystals within the wood cells. Accumulation of high-salt concentrations appear necessary for defibration, wood receiving sufficient rain will leach out salt before concentrations are high enough to cause significant damage. As moisture evaporates, the salts accumulate. Concentrations of salts exceeding 50,000 ppm were found in the defibrated wood.

Given sufficient time, for example, five years of exposure on some wharf pilings in the southern United States, the salts can severely affect the strength and physical condition of the wood. These chemicals are dissolved in water and rapidly migrate into the porous structure of the wood. After the wood has absorbed the solutes, evaporation carries the salts to the wood surface, where they precipitate and accumulate in high concentrations. Chemical reactions that cause defibration of wood appear to involve a sequential degradation of hemicellulose and lignin. This attack causes a separation of wood cells at the middle lamella regions.

Defibration is a progressive form of deterioration. The attack starts on wood surfaces and will progressively degrade all of the wood if the conditions are favorable for a sufficiently long time.

References:

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