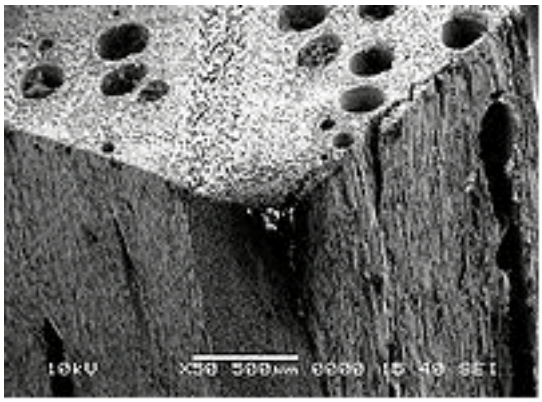
CUTEK™ The best solution for wood protection

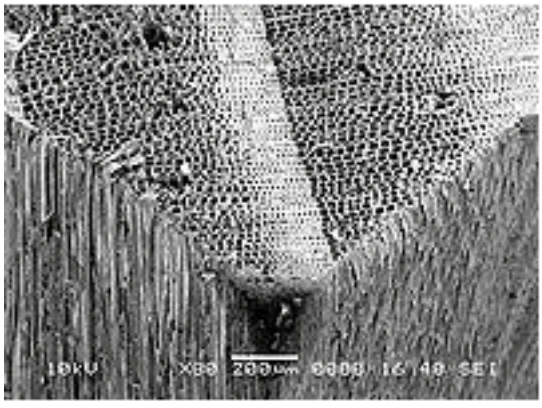
Important Information: Problems with Wet Wood

Water And Wood

Wood is divided, according to its botanical origin, into two kinds: Softwoods from coniferous trees and hardwoods from broadleaved trees. Structurally softwoods are generally simple in structure and lighter whereas hardwoods are generally complex in structure and harder. Softwood (like pine) is much lighter and easier to process than heavy hardwood (like fruit tree wood). The density of softwoods generally ranges between 350-700 kg/m³, while hardwoods are 450-1250 kg/m³. Both consist of approximately 12% moisture. Due to the more dense and complex structure of hardwood, the permeability is very low in comparison to softwood, thus making it more difficult to dry. The wood of living trees and freshly felled logs contains a large amount of water, which often constitutes more weight than the actual wood. Water has a significant influence on wood. Wood continually exchanges liquid and gas phase moisture (water) with its surroundings, although the rate of exchange is strongly affected by the degree wood is sealed. Dried lumber that is coated with deeply penetrating hydrophobic (water resisting) CUTEK™EXTREME demonstrates a dramatically slowed rate of moisture exchange.



Hardwood



Softwood

Why Do We Dry Wood?

Drying, if carried out promptly after the felling of trees, protects wood against primary decay, fungal stain and attack by certain kinds of insects. Organisms, which cause decay and stain, generally cannot thrive in wood with moisture content below 20%. Several, though not all, insect pests can live only in green lumber. Dried wood is less susceptible to decay than green wood (above 20% moisture content). Apart from the above important advantages of drying wood, the following points are also significant:

- Dried lumber is lighter, and hence the transportation and handling costs are reduced.
- Dried lumber is stronger than green lumber in most strength properties.
- Wood selected for impregnation with preservatives has to be properly dried if adequate penetration is to be accomplished, particularly in the case of oil-type preservatives.
- In the field of chemical modification of wood and wood products, the material should be dried to certain moisture content for the appropriate reactions to occur.
- Dry wood works, machines, finishes and glues better than green lumber. Paints and finishes last longer on dry wood.
- The electrical and thermal insulation properties of wood are improved by drying.

Fiber Saturation Point

Fiber saturation point is a term used in wood mechanics and especially wood drying, to denote the point in the drying process at which only water bound in the cell walls remains - all other water, called free water, having been removed from the cell cavities. Further drying of the wood results in strengthening of the wood fibers, and is usually accompanied by shrinkage. Wood is normally dried to a point where it is in equilibrium with the atmospheric moisture content or relative humidity, and since this varies so does the equilibrium moisture content.

Equilibrium Moisture Content

Wood is a hygroscopic substance. It has the ability to take in or give off moisture in the form of vapor. The water contained in wood exerts a vapor pressure of its own, which is determined by the maximum size of the capillaries filled with water at any time. If the water vapor pressure in the ambient space is lower than the vapor pressure within wood, desorption takes place. The largest sized capillaries, which are full of water at the time, empty first. The vapor pressure within the wood falls as water is successively contained in smaller and smaller sized capillaries. A stage is eventually reached when the vapor pressure within the wood equals the vapor pressure in the ambient space above the wood, and further desorption ceases. The amount of moisture that remains in the wood at this stage is in equilibrium with the water vapor pressure in the ambient space, and is termed the equilibrium moisture content or EMC. Because of its hygroscopicity, wood tends to reach a moisture content that is in equilibrium with the relative humidity and temperature of the surrounding air. The EMC of wood varies with the ambient relative humidity to a lesser degree with the temperature. EMC also varies very slightly with species, mechanical stress, drying history of the wood, density, extractives content and the direction of sorption in which the moisture change takes place (i.e. adsorption or desorption).

Moisture Content Of Wood In Service

Wood retains its hygroscopic characteristics after it is put into use. It is then subjected to fluctuating humidity, the dominant factor in determining its EMC. These fluctuations may be more or less cyclical, such as diurnal changes or annual seasonal changes. In order to minimize the changes in wood moisture content or the movement of wooden objects in service, wood is usually dried to a moisture content that is close to the average EMC conditions to which it will be exposed. These conditions vary for interior uses compared with exterior uses in a given geographic location. The EMC is recommended to be 17% for the majority of North America. The primary reason for drying wood to moisture content equivalent to its mean EMC under use

conditions is to minimize the dimensional changes (or movement) in the final product. Dried lumber that is coated with CUTEK™EXTREME is less susceptible to dimensional changes because the deeply penetrating hydrophobic (water resisting) nature of CUTEK™EXTREME minimizes the free absorption and desorption of liquid and gas phase moisture.