

The Mechanics of Film Forming Stains

Understanding the evolution of the term "stain" from penetrating to film-forming is important. In the past staining wood meant that the wood fibers themselves became impregnated with color and that the color penetrated into the top layer of wood. Even today most oil-based stains work in this manner. Once stained if the surface is rubbed or scratched the color of the stain still remains since the solvents carry the colorants into the top few layer of wood which make the fibers beneath the surface the color of the stain.

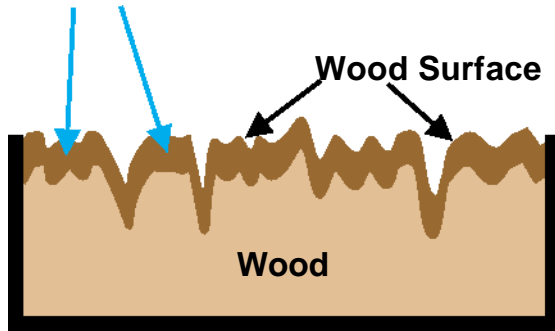
In contrast, LIFELINE™ water-based stains do not actually penetrate into the wood fibers. That is one reason we refer to them as film-forming stains rather than penetrating stains. Since the term "stain" has been used for hundreds of years, it is currently applied to both penetrating and film forming products. When we talk about LIFELINE™ stains, we are referring to their ability to fill the microscopic voids, fissures and pores on the surface of the wood. This enables the film to adhere tightly to the wood's surface. If the film is scratched or rubbed off, the original color of the bare wood will be visible.

This distinction is important, since we have had customers call us thinking that our product was defective. They were able to rub or scrape off the film and there was no color under the film. In their mind the wood had not "taken the stain." That is because they had never worked with a water-based film-former stain before and were accustomed to the results produced by a penetrating oil-based stain.

So how can we best explain how our products work? Most people are familiar with the use of latex paint. If a film of paint is peeled off a wall, the bare substrate is revealed. Water-based film-forming stains behave similarly, in that if the stain is scraped off of the surface, bare wood becomes visible. The benefit is that the protection offered by a film on the surface of the wood is superior than that provided by a product that soaks into the wood leaving the surface of the wood exposed to the sun and weather.

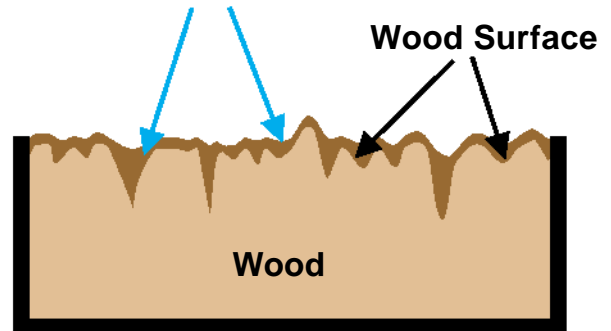
Microscopic Cross-Section of Wood Surface

Oil Stain in Top Layers of Wood



Penetrating Oil-Based Stain

Film Forming Stain on Top Surface of Wood



Film Forming Water-Based Stain

The wood surface absorbs an oil-based penetrating stain into the top layers of wood fibers carrying the pigments along with it. The fibers themselves are thus "stained" with the pigments.

A water-based, film forming stain sets on top of the wood surface and fills in many of the small cracks and fissures resulting in a smoother surface; however, the wood fibers themselves retain their original color.

A simplified view of the film formation process for waterborne coatings centers on the latex binder. A latex binder consist of polymer particles dispersed in water. After the coating is applied to a substrate, water starts to evaporate with the converging of the polymer particles. As water continues to evaporate, the particles become densely packed. When essentially all the water has evaporated, the boundaries of the particles disappear with the interdiffusion of the polymers. When this process is completed, the film has formed.