Finishing: Exposure to light alters any wood or finish.

When planning a job, factor in the color-changing effects of UV rays or fluorescent tubes

By Bob Flexner

A finisher friend called with a problem. A conference room with walnut paneling was being redecorated and the color of the wood under each hanging picture was darker than the rest of the paneling. How could he fix it?

Woods and finishes are organic materials, which, like all organic materials, change color when exposed to the elements. It’s important to understand what’s happening so you can try to slow the change, explain it to your clients so they don’t blame you, or — in a case like that of the paneling — give the client a solution to the problem.

The cause of color change is oxidation, the natural chemical process in which oxygen is increased or hydrogen is decreased. Fortunately, oxidation alone occurs extremely slowly. But it’s accelerated significantly if exposed to an energy source such as heat or light. Heat is not a big factor in normal environments, but light is. It’s common to account for color change solely by exposure to light.

The type of light responsible for the greatest impact comes from the ultraviolet (UV) end of the spectrum, and the biggest offenders are sunlight and fluorescent light. Color change caused by incandescent light (regular light bulbs) is much slower.

Shedding some light
To understand what was happening with the walnut paneling, let’s look at the impact of light on wood and finish.

The primary source of color in wood is extractives. These are non-structural elements that give a distinctive coloring to various species of wood: walnut, cherry, oak, etc. When the extractives on the surface of wood are totally washed or bleached out, only the cellulose is left. It is light gray or white, the color you see in wood that has been exposed to the outdoors for several years.

The surface of all woods eventually turns white, but the initial color change varies, depending on the wood species: light-colored softwoods such as pine darken; dark woods such as walnut usually lighten; some dark woods such as cherry and mahogany darken; many light hardwoods such as oak, maple, birch, ash and poplar change very little.

Because walnut lightens, the obvious explanation for the walnut in the conference room is that the exposed wood had lightened because of the effects over time of the fluorescent lighting. Direct sunlight hitting the paneling would have caused the same to happen. Normal light coming through windows would have had much less impact.

Considering the finish
The word “finish” can refer to a clear coating, or it can refer to a coating in combination with a stain, or a coating with colorants added, such as toners and glazes.

Clear finishes vary in initial color and in how fast they darken as they age. Water-based finishes have no significant color when initially applied, and don’t “yellow” as they age. Oils and varnishes begin with the most color and yellow the most as they age.

In between are the following: conversion varnish and CAB-acrylic lacquer, which yellow very little; water-white lacquer, which yellows slightly more; pre-and post-catalyzed lacquer, which yellow still more; and finally, nitrocellulose lacquer. Shellac comes in various shades from light yellow to orange and continues yellowing very slightly as it ages.

So the finish on the walnut paneling exposed to the fluorescent lighting probably yellowed a little simultaneously
to the wood becoming lighter. When you are trying to match a color on an old finished object, you often have to take into account a slight yellow caste.

The fade factor
Much more susceptible to light than the finish itself are the colorants used within the finish, especially dyes. All dyes fade fairly rapidly in sunlight and slightly less rapidly under fluorescent lights. By “fairly rapidly,” I mean you will notice some fading within six months to a year.

Non-grain-raising (NGR) dyes are more resistant to fading than other dyes, but the difference is rather insignificant when you are talking about objects that are intended to stay in service for decades.

Pigment is far more resistant to fading in sunlight and fluorescent light, though some pigment types fade more rapidly than others. Without information from manufacturers, however, you just have to assume the pigment in the products you’re using will fade extremely slowly – similar to the pigment in paint applied to houses and cars.

To put this information to use, you may want to choose a finish for the color it will add to the wood you’re finishing. For example, if you’re finishing maple and you don’t want any yellowing, you would choose water-based finish first, then conversion varnish or CAB-acrylic lacquer. (There probably will be other factors involved such as the desired durability of the finish that will influence the decision.) If you are finishing a dark or dark-stained wood, any finish will be all right, but the finishes that yellow add warmth.

If you are using a stain or toner and you know the object will be placed in sunlight or fluorescent light, you might want to talk to the client first if you intend to use dye. There will be some fading.

UV blockers
Some manufacturers supply UV-resistant finishes, at least finishes that are marketed as UV resistant. These finishes can provide some temporary help.

For situations where you know the object will be replaced on a regular basis, a UV-resistant finish can be of great help. But because the built-in UV resistance deteriorates itself, changes in coloring will only be retarded.

To convince yourself of this — so you can deal realistically with exaggerated claims from some manufacturers — consider the varnishes used on wooden boats.

Boat owners will pay almost anything for a varnish that requires less maintenance, so they are getting the best that can be made. And still the UV blockers are broken down by sunlight and the boat owners have to sand off deteriorated topcoats and recoat every year or two, depending on how far north or south they are.

Interior objects aren’t damaged nearly as quickly as boats because glass windows block some of the UV rays from sunlight, and fluorescent light isn’t as damaging as direct sunlight. But the UV blockers still lose their potency and cease to be effective.

The solution
So what does my friend tell his client? In my opinion there are three choices.

The least expensive is to cover all the dark areas with the same or new pictures. The next is to paint the paneling. The third option: replace the paneling.

Stripping and refinishing is not a good option because all the lighter areas would have to be sanded to a point below the fading to achieve totally even coloring, and this would be almost impossible to do without sanding through in some areas. Replacing would be a better choice.

Bob Flexner is the author of “Understanding Wood Finishing,” now in its second, fully revised edition.