The Problem: How can sticker stain in hardwood lumber be prevented?

The Answer: By Edward C. Peck, Technologist

Sticker stain generally occurs during air drying and appears as blackish or brownish streaks across the faces of boards, particularly after planing. Although it is generally limited to sapwood, stain occasionally occurs in heartwood. It is less conspicuous in the darker colored heartwood. Sticker stain is a chemical stain, and it is not to be confused with the sap or blue stain that is caused by fungi. Sticker stain, however, is sometimes accompanied by blue stain, which develops under similar conditions. Because of the increasing popularity of natural and light finishes on interior trim and furniture, sticker stain has become a serious problem.

Sticker stain results from the concentration of certain materials contained in the sap, probably forms of sugar, and oxidation of these materials. Microscopic examination of wood containing chemical stain discloses the presence of amber-colored particles in the parenchyma cells of the wood rays. If these particles remained widely dispersed, their oxidation would not result in the conspicuous dark sticker marks. Although chemical stain usually appears as sticker stain, it can also appear as dark streaks or patches on the lumber between the tiers of stickers.

Complete information on the subject of sticker stain is not available, but the conditions under which it is likely to occur are known. Retarded air drying, either in the whole board or in sections of the board, encourages sticker stain. Temperature influences the formation of sticker stain, and lumber piled during the late fall and winter is less likely to stain than that piled during the other seasons of the year.

Ways to Prevent Sticker Staining

The best way to prevent sticker stain is to kiln-dry the lumber direct from the saw. Sticker stain seldom occurs during kiln drying. Since it is seldom practical to kiln-dry hardwood lumber direct from the saw, the next best way to combat sticker stain is to accelerate the air drying.
Sticker stain sometimes develops in kiln truckloads and packages of green lumber that are held for some time before going into the kiln. This amounts to an involuntary air-drying process, and the stain reduction methods that are recommended for air drying apply here. The use of an open shed to protect truckloads and packages of green lumber waiting to go into the kiln tends to reduce staining.

Air drying can be accelerated by encouraging the movement of air through the lumber yard and piles. A number of measures can be taken to encourage rapid movement of air in a lumber yard.

1. The ground should be kept free from vegetation and debris.

2. The piles of lumber should be raised a foot to 18 inches off the ground on pile foundations of open construction.

3. Rear alleys 6 to 8 feet wide should be provided in yards where the piles are built by hand.

4. The piles should be spaced so that they are several feet apart. Rows of package piles should be spaced so that there are passage-ways several feet wide.

Rapid circulation of the air within the lumber piles can be promoted by building vertical flues or chimneys into handstacked piles and by using stickers that are 1 inch thick or thicker. Flues or chimneys are probably unnecessary in package piles that are relatively narrow. The lateral spaces between package piles allow air to reach the sides of the piles. Lateral movement of air within the piles is created by differences in air pressure across the piles. When rain or snow penetrates the pile, the consequent wetting tends to retard drying. Rain entering a pile often collects near the stickers and retards further the drying of these portions of the boards. Protecting the lumber in the piles with roofs or placing the piles in open sheds will prevent wetting and discourage sticker staining. End racking helps prevent sticker staining, because it promotes rapid drying except where the boards cross. End racking, however, encourages warping.

The use of narrow, dry stickers tends to prevent sticker staining. Some mills not only use narrow, dry stickers, but also machine a lengthwise groove in the faces of the stickers. This reduces the bearing area and encourages more rapid drying of the area that would normally be in contact with the sticker. Using lumber for stickers often causes sticker staining, because the portions of the boards in contact with the wide, green stickers

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are slow to dry. Because of the moisture movement in these portions, materials in the sap are deposited and concentrated a short distance beneath the surface. When oxidation occurs, the sticker stain appears.

The results of an air-drying study of 4/4 sugar maple flooring stock in upper Michigan show that narrow, dry stickers reduce sticker staining. The lumber piled with lumber stickers stained four times as much as that piled with dry 1- by 2-inch stickers. Roofed yard piles stained slightly less than piles that were not roofed, and piles that were air-dried within an open shed stained about one-half as much as yard piles.

Subjecting lumber to a high-temperature treatment before air drying may help prevent chemical staining. The lumber is generally steamed. Steaming tends to darken the sapwood of some species, however, and this darkening may be detrimental for some uses.

Unlike sap or blue stain, chemical stain cannot be prevented by dipping in solutions of antistain chemicals.