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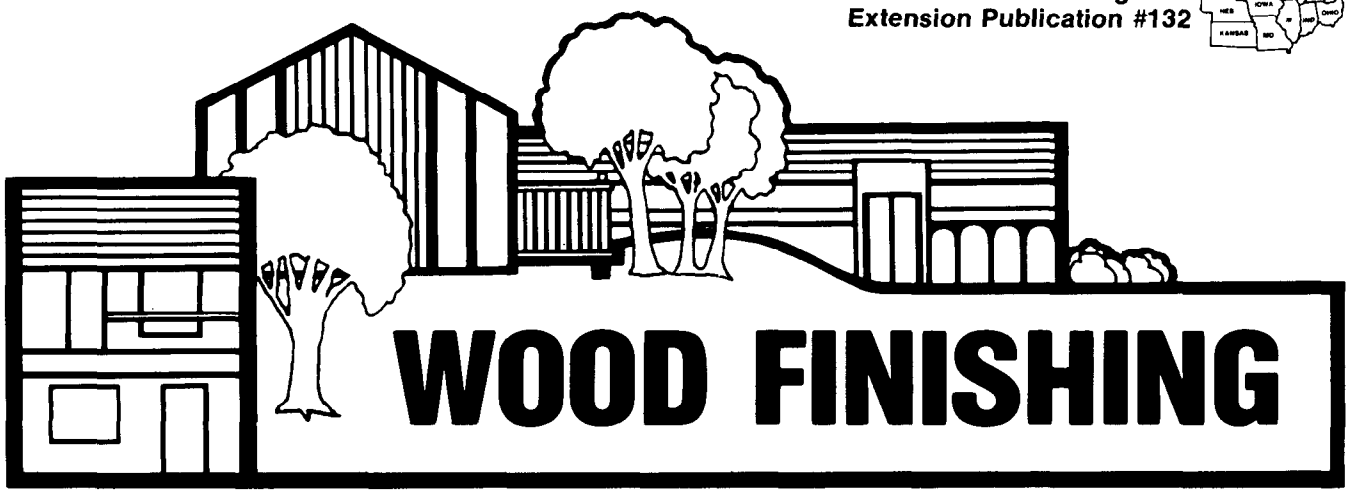

Finishing Exterior Plywood, Hardboard and Particleboard

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Plywood, hard board and particleboard (waferboard and chipboard) are manufactured or reconstituted wood products as compared to solid wood (Figure 1). These products were introduced to the construction industry in the 1940s and are so common today that nearly every new house has at least some plywood, hardboard and particleboard in it. Like solid lumber, these manufactured products will give satisfactory performance if properly finished, but certain precautions must be taken — even before the building is constructed.

CARE AND PREPARATION BEFORE CONSTRUCTION

Long life for an exterior wood finish begins during construction. Building products, whether they be plywood, particleboard (waferboard and chipboard), hard board or solid lumber, should be protected on the building site. If possible, store them in a cool, dry place and out of the sunlight and weather. If stored outside, keep the material off the ground by stacking it on 4 × 4's or similar material, and cover with polyethylene to prevent wetting by rain. Provide for good air circulation to prevent condensation under the plastic covering.

Plywood, hardboard and particleboard all tend to absorb moisture through the ends and edges of the panel faster than through the surface. While the panels are still in a stack, seal the ends and edges with a liberal amount of a water-repellent preservative or water repellent applied with a brush. Allow at least two days for the water-repellent preservative or water repellent to dry before painting. If the panel faces are to be primed and painted, apply the same finish to the edges. Any edges which are cut during construction should also be sealed.

Ferrous nails can leave unsightly rust stains on plywood and other board products. Use high quality galvanized nails on surfaces to be painted. Aluminum, stainless steel or high quality galvanized nails should be used if a water-repellent preservative, water repellent or semitransparent penetrating stain is to be used.

Regardless of the type of finish used, the surface to which it is applied should be clean and dry. Do finishing work only in clear weather. Avoid applying finishes to exceedingly hot or cold surfaces. Paint should not be applied to a cold surface which will soon be heated by the sun since temperature blisters are likely. Brushing a finish on gives better penetration.

PLYWOOD -- FINISHING AND REFINISHING

Exterior plywood is commonly used for siding. For this application it should have a rough sawn surface (textured) or be overlaid with a stabilized, resin-treated paper called medium density paper overlay (MDO). Smooth sanded plywood is not recommended for siding, but it may be used for soffits. Depending upon its intended end use, plywood may be manufactured from several different wood species. Southern pine and Douglas-fir textured plywood are commonly used in siding applications. The grade of siding used determines the appearance as well as the wood color. Cedar and redwood are

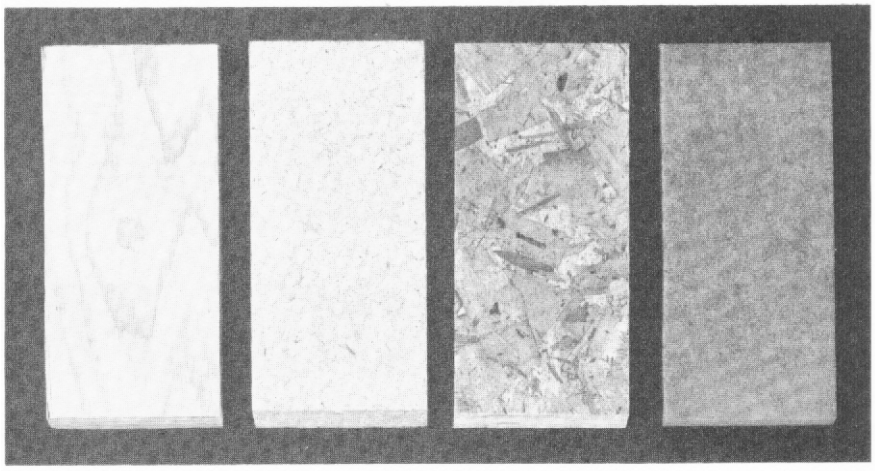

Figure 1. *Plywood (left), particleboard, waferboard and hardboard (right) are manufactured or reconstituted wood products, When painting or staining, special precautions should be taken.*

Figure 2. Moisture enters plywood through lathe checks (above) and early paint failure can result (below). Paint will flake from the dense summerwood first.

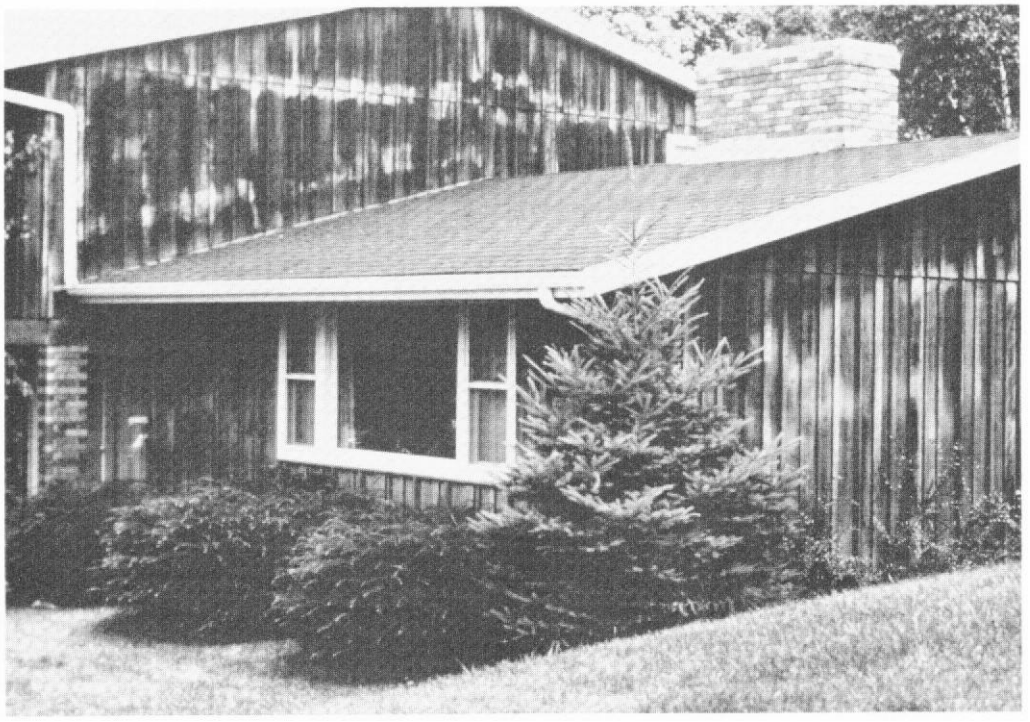

Figure 3. Lap marks result with the improper applicatlon *of a penetrating stain.*

also commonly used where appearance is important. Textured-plywood surfaces are probably the most common for exterior siding.

Sanded and roughsawn plywood will develop surface checks, especially when exposed to moisture and sunlight. These checks, coupled with the flat grain pattern (wide bands of dark, dense latewood) characteristic of nearly all plywood, can lead to early paint failure (Figure 2). These paint failures can be minimized by the use of top quality acrylic latex paint systems.

Semitransparent Stains

Unlike paints, semitransparent penetrating oil-base stains cannot check and peel from plywood surfaces. These stains penetrate the wood and do not form a continuous film or coating like paint. Semitransparent penetrating stains allow most of the wood grain to show through, and the color can be controlled by pigments added to the stain. A properly chosen stain can accentuate the architectural intent of the textured plywood. Penetrating stains also perform well on weathered surfaces. New, smooth surfaces may also be stained.

Oil-base penetrating stains have a longer life expectancy when properly applied to roughsawn or weathered surfaces. Semitransparent stains may be brushed or rolled on. Brushing should give better penetration and performance especially on textured surfaces. These stains are generally thin and runny, so application can be a little messy. Lap marks will form if stains are improperly applied (Figure 3). Lap marks can be prevented by staining only a small number of boards or a panel at one time. This method prevents the front edge of the stained areas from drying out before a logical stopping place is reached. Working in the shade is desirable because the drying rate is slower. The penetrating stain should be stirred frequently during application. One gallon will usually cover about 300-400 square feet of smooth surface and from 150-250 square feet of rough surface.

For long life with penetrating oil-base stain on rough sawn or weathered lumber, use two coats and apply the second coat before the first is dry. Apply the first coat to a panel or area as you would to prevent lap marks. Then work on another area so the first coat can soak into the wood for 20 to 60 minutes. Apply the second coat before the first coat has dried. (If the first dries completely, it may seal the wood surface so that the second coat cannot penetrate into the wood). About an hour after applying the second coat, use a cloth or sponge to wipe off the excess stain that has not penetrated into the wood. Stain which did not penetrate may form an unsightly surface film and glossy spots.

Note: Sponges or cloths that are wet with oil-base stain are particularly susceptible to spontaneous combustion. To prevent fires, bury them, immerse them in water, or seal them in an airtight container immediately after use.

A two coat wet system on rough wood may last as long as 10 years. If only one coat of penetrating stain is used on new wood, its expected life is 2-4 years, but succeeding coats will last longer.

Refinishing semitransparent penetrating oil-base stains is relatively easy. Excessive scraping and sanding are not required. Simply use a stiff bristle brush to remove all surface dirt, dust and loose wood fibers, and then apply a new coat of stain. The surface should be free of mildew. A longer service life can be expected for penetrating stains the second time they are applied since they will penetrate the many small surface checks which open up as wood weathers.

Water-Repellent Preservatives

Water-repellent preservatives can also be used as a natural finish for plywood. Water-repellent preservatives are mixtures of a solvent such as mineral spirits or other paint thinners, wax, a resin or drying oil and a wood preservative such as pentachlorophenol or copper naphthenate. These finishes, like semitransparent stains, penetrate the wood and do not form a surface film, so peeling will not be a problem. Since they do not contain any coloring pigments, they will allow the natural wood color and grain to show through. Expected service life is only 1 to 2 years, and frequent reapplication is necessary to protect the wood surface.

Water-repellent preservatives are best applied by dipping, but brush treatment to the point of refusal is also satisfactory. It is especially important to apply liberal amounts of the solution to all joints or other potential places where moisture might accumulate. Be certain to treat the horizontal bottom edges of any panels.

Refinishing water-repellent preservatives is accomplished by simply cleaning the old surface with a bristle brush and applying a new coat of finish. To determine if a water-repellent preservative has lost its effectiveness, splash a small quantity of water against the wood. If the water beads up and runs off the surface, the treatment is still effective. If the water soaks in, the wood needs to be refinished. Refinishing is also required when the wood surface shows signs of graying.

Water repellents are sometimes used in the same manner as water-repellent preservatives. However, they do not contain a wood preservative and will not protect against surface mold and mildew.

Note: Steel wool and wire brushes should not be used to clean surfaces which will be finished with semitransparent stains or water-repellent preservatives. Small iron deposits left on the surface can react with certain wood extratives to form a dark-blue, unsightly discoloration which is sealed beneath the new finishing system.

Paints

In some cases, painting of plywood is required or desirable. Top quality acrylic latex paints are the best choice for exterior surfaces. For best performance, use MDO plywood if it is to be painted. Paint on MDO will not fail from checking of the wood or from peeling because of the wide dark bands of summerwood. One primer coat and two top coats may last up to 10 years on MDO. Semitransparent penetrating stains are not effective on MDO.

Refinishing of MDO is usually required only to restore the eroded paint coat. First, remove all loose paint with a stiff bristle brush and then scrub with a soft brush or sponge and water. Rub your hand against the cleaned surface to determine if any residues remain. When necessary, scrubbing with a detergent or paint cleaner will usually remove additional residues. Then rinse well and allow to dry before repainting.

If non-overlaid plywood is to be painted, follow these tips. First, brush a liberal quantity of water-repelient preservative or water repellent onto all the edges of the plywood sheets. The surface should also be treated in the same manner. The water repellent will help reduce wood's tendency to absorb moisture through the end grain and surface lathe checks. Allow the water-repellent preservative or water repellent to dry for at least two warm days. Then prime the plywood surface with a high quality paint recommended for use on woods which contain extratives. The primer should be applied thick enough to obscure the wood grain pattern. Two coats of a high quality acrylic latex house paint should be applied over the primer. Allow at least two days but no longer than two weeks between the primer and top coat. The primer and topcoat should be compatible and preferably from the same manufacturer.

Mildew frequently forms in soffits and on ceilings of porches and carports. Mildew is common in many areas, and it is probably best to always use a mildew resistant paint. Always remove the mildew before refinishing.

Refinishing painted plywood requires proper surface preparation if the new paint coat is to give the expected performance. First, scrape away all loose paint. Use sandpaper on any remaining paint to "feather the edges" smooth with the bare wood. Then scrub the remaining paint with a brush or sponge and water. Household bleach (5% sodium hypochlorite) used at the rate of 1 cup of bleach to 3 cups of water will remove mildew. Rinse the surface with clean water. Wipe the surface with your hand. If the surface is still dirty or chalky, scrub it again using a detergent or paint cleaner. Rinse the surface thoroughly with clean water, and allow it to dry before repainting. Areas of exposed wood should be treated with a water-repellent preservative or water repellent and allowed to dry for at least two days and

then primed. One or preferably two top coats should follow.

It is particularly important to clean areas protected from sun and rain such as porches and side walls protected by overhangs. These areas tend to collect water soluble materials that interfere with adhesion of the new paint. It is probably adequate to repaint these protected areas every other time the house is painted.

RECONSTITUTED WOOD PRODUCTS – FINISHING AND REFINISHING

Reconstituted wood products are those made by forming large sheets, usually 4 by 8 feet, from small pieces of wood or pulp. Specialized sizes or products such as beveled drop siding may also be produced. Reconstituted wood products may be smooth or textured to look like standard lumber. Depending upon the basic wood component used in their manufacture, reconstituted wood products may be classified as fiberboard or particleboard.

Fiberboards are produced from mechanical pulps. Hardboard is a relatively heavy type of fiberboard and is used for exterior siding. Many grades are available.

Particleboard are manufactured from whole wood in the form of flakes, shavings, chips or splinters. Waferboard and flakeboard are two types of particleboard made from relatively large flakes or shavings.

Reconstituted wood products can be purchased unfinished, primed, with a top coat, or stained. Because of the many different types of fiberboard and particleboard products available, most retail lumber dealers do not carry a complete line but can order any special items.

Only some fiberboards and particleboard are manufactured for exterior use. Be sure to check with the supplier, and follow the manufacturer's directions in using and finishing these board type products. Film-forming finishes such as acrylic latex paints and solid color acrylic latex stains will give the most protection. Other finishes such as semi-transparent stains allow a more rapid deterioration of the surface to take place.

To paint hard board and particleboard, follow good finishing practices as recommended for plywood. Be sure to seal *all* edges with a water-repellent preservative or water repellent. The surface should be treated with the same solution. Then apply a primer coat recommended for use over wood, followed by at least one high quality top coat of acrylic latex house paint.

Some reconstituted wood products may be factory primed with paint and some may even have a top coat. Factory primed boards should not be allowed to weather for more than a couple of weeks before top coating. If excessive weathering does occur, clean the factory primed surface, and then reprime and follow with two top coats.

Reconstituted wood products may be refinished by following those procedures recommended for plywood.

ADDITIONAL READINGS

(Available from the Forest Products Laboratory, Box 5130, Madison, Wisconsin, 53705)

1. "Forest Products Laboratory Natural Finish." *USDA Research Note FPL-046.* 1979 (revised). 8 pp.
2. Painting and Finishing - Chapter 16 from the *Wood Handbook: Wood as an Engineering Material.* USDA Agr. Handbook No. 72. 1974. 13 pp.
3. "Wood Finishing: Discoloration of House Paint - Causes and Cures." North Central Regional publication 134 or Forest Products Laboratory publication, number to be assigned.
4. "Wood Finishing: Selection and Application of Exterior Finishes for Wood." North Central Regional publication 135 or Forest Products Laboratory publication, number to be assigned.
5. "Wood Finishing: Paint Failure Problems and Their Cure." North Central Regional publication 133 or Forest Products Laboratory publication, number to be assigned.
6. "Wood Finishing: Water Repellents and Water-Repellent Preservatives." *USDA Research Note FPL-0124.* 1978. 8 pp.
7. "Wood Finishing: Weathering of Wood." *USDA Forest Service Research Note FPL-0135.* 1975 (revised). 4 pp.

Slide Presentation

Exterior Finishes for Wood. Bureau of Audio Visual Instruction, Box 2093, Madison, Wisconsin 53701. (Purchase Price $23.00).

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WARNING

Do not mix bleach with ammonia or with any **detergents or cleansers containing ammonia!** Mixed together the two are a lethal combination, similar to mustard gas. In several instances people have died from breathing the fumes from such a mixture. Many household cleaners contain ammonia, so be extremely careful with what types of cleaners you mix bleach.

Use caution with wood finishes which contain pesticides. When used improperly they can be injurious to man, animals and plants. For safe and effective usage, follow the directions, and heed all precautions on the labels. It is advisable to wear unlined protective gloves and to cover nearby plant life when using any material containing pesticides. Do not use any wood finish containing pentachlorophenol indoors.

Avoid spraying a pesticide wherever possible. Drift from a pesticide, applied as a spray, may contaminate the surrounding environment.

Store finishes containing pesticides in original containers under lock and key—out of reach of children and pets — and away from foodstuffs. Follow recommended practices for the disposal of surplus finishing materials and containers.

Note: Registrations of pesticides are under constant review by the Environmental Protection Agency and the Department of Agriculture. Use only pesticides that bears Federal registration number and carry directions for home and garden use. Since the registration of pesticides is under constant review by State and Federal authorities, you should consult with a responsible State agency as to the current status of the pesticides discussed in this report.

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