The Outdoor Finish

How and when to paint or stain

by William Feist

If you've ever admired an old barn whose siding has survived 100 years or more of weather with not a touch of paint to protect it, it's easy to wonder why exterior finishes need to be applied at all. But the cracks, fissures and airspaces that give weathered barn siding its character wouldn't be acceptable on most houses.

While you can't completely arrest or reverse the weathering of exterior wood, you can slow the process dramatically by using the right type of finish, Appearance, durability, cost, surface type, ease of application, and maintenance are all things you should consider when selecting an exterior finish.

There are two basic types of finishes or treatments used to protect wood surfaces from weathering—those that form a film or coating on the wood and those that penetrate the wood surface and leave no distinct layer. Film-forming materials include paints and varnishes. Penetrating finishes include preservatives, water repellents, pigmented semi-transparent stains and chemical treatments.

Paints -- Of all finishes, paints provide the most protection for wood against ultraviolet (UV) degradation and simple erosion. Depending on the porosity of the paint and the number of coats applied, the painted finish retards the penetration of exterior moisture into the wood. Likewise, it seals into the wood the natural resins and other oils that can otherwise be weathered out. Paint isn't a preservative though it won't prevent decay if conditions are favorable for fungal growth.

Oil-base or alkyd paints are essentially suspensions of inorganic pigments in an oil or resin vehicle that binds the pigment particles and the bonding agent to the wood surface. Latex paints are suspensions of inorganic pigments and various latex resins in water. Acrylic latex resins are very durable, and today it's generally accepted that a good acrylic latex outdoor house paint will outlast a good oil-base house paint. Latex paints are also more porous, and the fact that they can breathe slightly (while still shedding water) may contribute to their longevity. If water gets into the wall from an interior source, it's more likely to get trapped in the wood beneath an oil-base coat, and eventually can cause the paint to blister.

Varnishes -- Varnishes also qualify as surface-film finishes. These clear finishes have always been popular because they accent the grain and color of the wood. Unfortunately, all types of varnishes (oil-base, alkyd, urethane and acrylic) require frequent maintenance to keep up this attractive appearance. The culprit is ultraviolet light from the sun, which degrades both the varnish and the wood fibers directly beneath it. New synthetic-resin varnishes have been made with special UV inhibitors, but some UV still gets through the clear film. Eventually, the varnish begins to crack, peel and flake off, taking with it the fibers of photochemically degraded wood. Cleaning and revarnishing have to be done as soon as this breakdown occurs, and this can be within a year under severe conditions.

If you're partial to varnish but want to avoid frequent scraping and recoating, the best approach is to provide reliable shade for varnished exterior surfaces, A varnished exterior door, for example, could be recessed in its opening or shaded by a porch or with a small entry roof. Wide overhangs at gables and eaves are also effective in limiting UV exposure.

Penetrating finishes -- These finishes are designed to be absorbed into the wood, saturating the surface fibers and filling, partially or completely, the pores closest to the surface. Many penetrating finishes contain wafer repellents, usually in the form of paraffin wax that is dissolved in mineral spirits or other solvents.

Water repellents are usually clear, and can be used alone as a natural penetrating finish, or as a preliminary treatment for wood that's to be painted rather than stained. Here you'll have to check your label, though, since some water repellents can't be painted over.

Most clear penetrating finishes contain wood preservatives in addition to water repellents, and these make a much more effective exterior finish. The preservatives control the growth of mildew and other fungi, and some preservatives will also discourage insect infestation. This is especially important in moist, shady locations.

When inorganic pigments are added to clear penetrating finishes that contain wood preservatives, water repellents, or both, the mixture is classified as a semi-transparent penetrating stain. These stains penetrate into the wood without forming a film, allowing much of the wood grain to show through. Latex-base stains are film-forming and won't perform like true penetrating stains. Solvent-base semi-transparent stains still allow the wood to transmit water vapor, so the finish won't blister or peel even if the wood's moisture content is high. The pigment in a semi-transparent penetrating stain greatly increases the durability of the finish, chiefly by absorbing much of the UV light that would otherwise act on the wood fibers. But it's the total mix of pigment, resin, preservative and water repellent that determines the durability of any exterior stain system.

Penetrating stains are suitable for use on both smooth and rough-textured surfaces, but their protective qualities are best on roughsawn, weathered, or coarse-textured wood--just the type of surface that won't take paint very well. Siding, trim, exposed decking, fences and roof shingles are all suitable applications.

Treatment with preservatives -- severe outdoor situations usually call for preservative wood treatments that are beyond the capabilities of most builders or home owners. Manufacturers of structural wood poles, pilings, railroad ties and similar products use either pressure treatment or a dipping process to saturate the wood with relatively strong preservatives that provide long-lasting protection against all types of decay and infestation. Pressure-treated wood will outlast wood that's been dip-treated. There are three main types of preservatives used: oils like coal-tar creosote, organic-solvent solutions that contain pentachlorophenol (penta), and waterborne salts such as chromated copper arsenate (CCA). These waterborne treatments are known commercially as Wolmanized or Osmose-treated lumber. Wood that has been pressure treated with CCA is frequently used for outdoor porches and decks, and after a few years some of the boards may check or crack as part of the natural weathering process. When this happens, it's a good idea to apply a semi-transparent penetrating stain that contains a water repellent. Creosote-treated wood usually can't be painted. You can stain it, but only after the wood surface has weathered substantially and no longer has an oily surface.

Wood properties -- Certain types of wood or wood products go well with certain types of finishes. Wood surfaces that shrink and swell the least are the best for painting because there's less chance that the paint will crack as a result of wood movement. Vertical-grain or edge-grain wood will shrink and expand less than flatsawn lumber. Wood swelling due to moisture changes is also directly proportional to wood density, so low-density woods are better for painting than denser species. Western red cedar and redwood

are the best woods to use; pine, fir and other softwoods are good, as long as they're not roughsawn or knotty.

In general, painting is best done over a fairly smooth and stable surface. Flatsawn and dense woods can be stabilized with a resin-treated paper overlay, This type of lamination is most frequently done over exterior plywood or stabilized fiberboard, and it makes an excellent surface for painting.

Roughsawn exterior-plywood siding is best treated with a semi-transparent penetrating stain or solid-color latex stain.

Application details -- A successful painted finish is fairly difficult to achieve compared to a good penetrating finish. Before painting, wood siding and trim should be treated with a paintable water-repellent preservative or simple water repellent. This can be done by brush after the siding or trim is up, or by dipping before it's installed. If you work by brush, all lap and butt joints in solid wood or all panel edges (if plywood is the surface to be painted) should be especially well saturated.

Allow at least two warm, sunny days for adequate drying of the treatment before applying the primer paint coat. If the wood's been dip-treated, you should let it dry even longer—about a week. Woods like redwood and cedar have water-soluble extractives that can bleed through top coats fairly easily. The best way to prevent this is to seal the wood well with an oil-base primer or a stainblocking acrylic primer paint. When applying the primer, follow the application instructions provided by the manufacturer. A primer coat that is uniform in thickness will distribute the wood's swelling stresses evenly, which helps to prevent premature paint failure. Research has shown that the optimum thickness for the total dry paint coat (primer and two top coats) is 3.5 to 5 mils, or about the thickness of a sheet of newspaper.

TWO coats of a good-quality acrylic latex house paint should be applied over the primer. In general, qualify is directly related to price.

Brush application is always superior to roller or spray application, especially with the first top coat. If it isn't practical to apply two top coats everywhere, just do it where they will be needed most—on the south and west sides of the house where the most sunlight will hit. Areas exposed to rain wetting should also get two coats.

To avoid future Separation between paint coats, the first top coat should be applied within two weeks of the prime coat, and the second top coat should be applied within two weeks of the first. Otherwise, the slick, soaplike substance that can form on a recently painted surface will inhibit paint adhesion (this is especially true with primer paints). If this film is detectable, it should be scrubbed off with water and a stiff-bristled brush before you recoat.

If you're using oil-base top coats, don't paint on a cool surface that will be heated by the sun within a few hours. This will probably cause temperature blistering. The blisters usually show up in the topmost coat anywhere from a few hours to a few days after the paint is applied.

Oil-base paint may be applied at temperatures above 40°F, while latex or water-base paints require application temperatures of at least 50°F. The temperature shouldn't drop below 50°F for at least 24 hours after a latex coat is applied. To avoid wrinkling, fading or loss of gloss, don't apply paint at the end of a cool day when heavy dews will form at night. Some latex paints are particularly susceptible to failure when applied under these conditions.

Semi-transparent penetrating stains may be brushed, sprayed or rolled on. Again, brushing will give the best results. These stains tend to be thin, so application can be messy. And the pigment may settle in an undisturbed can, so frequent mixing is important. To prevent lap marks, always avoid stopping in the middle of a board or panel. Working in the shade will give the best results because longer drying time means greater penetration.

For best results, roughsawn or weathered lumber should be treated with two coats of penetrating stain, with the second one applied before the first is dry. In fact, if the first coat has dried completely, it may seal the wood surface temporarily so that the second coat hardly penetrates at all. About an hour after applying the second coat, use a cloth, sponge or dry brush lightly wetted with stain to wipe off any excess stain that hasn't penetrated into the wood. This prevents surface deposits from drying into filmy spots. Remember that sponges or cloths soaked with oil-base or alkyd.base stains are particularly susceptible to spontaneous combustion; they should be buried, immersed In water or sealed in an airtight container.

Porches and decks - Exposed flooring can be painted using the same procedure described earlier for siding and trim. For the two top coats, though, you need a very good porch and deck enamel. These paints are especially formulated to resist abrasion and wear, and they're usually more expensive than regular house paint.

Water-repellent preservatives and the semi-transparent penetrating stains are alternative finishes that also work well on porches and decks. These finishes have to be reapplied more frequently than you'd need to repaint the same area, but reapplication is easy. You simply brush on a generous amount and then wipe off any excess that remains on the surface in 20 to 40 minutes. Repainting, on the other hand, calls for laborious surface preparation, mostly in the form of scraping through layers of peeling paint to reach a stable substrate. □

Exterior-finish suitability

Exterior surfaces	Suitability and expected life (years) NR = not recommended		
	Water-repellent preservatives	Semi-transparent stains	Paints *
Cedar and redwood siding			
Smooth (vertical grain)	High (1-2)	Moderate (2-4)	High (4-6)
Roughsawn or weathered	High (2-3)	Excellent (5-8)	Moderate (3-5)
Pine, fir, spruce siding			
Smooth (flat grain)	High (1-2)	Low (2-3)	Moderate (3-5)
Rough (flat grain)	High (2-3)	High (4-7)	Moderate (3-5)
Shingles			
Sawn	High (2-3)	Excellent (4-8)	Moderate (3-5)
Split	High (1-2)	Excellent (4-8)	NR
Plywood siding, Douglas-fir and southern pine			
Sanded	Low (1-2)	Moderate (2-4)	Moderate (3-5)
Textured (smooth)	Low (1-3)	Moderate (2-4)	Moderate (3-5)
Textured (roughsawn)	Low (2-3)	High (4-8)	Moderate (3-5)
Medium-density overlay	NR	NR	Excellent (6-8)
Plywood siding, cedar and redwood			
Sanded	Low (1-2)	Moderate (2-4)	Moderate (3-5)
Textured (smooth)	Low (1-2)	Moderate (2-4)	Moderate (3-5)
Textured (roughsawn)	Low (2-3)	Excellent (5-8)	Moderate (3-5)
Millwork			
Windows, shutters, doors, exterior trim	High	Moderate (2-3)	High (3-6)
Decking			
New (smooth)	High (1-2)	Moderate (2-3)	Low (2-3)
Weathered (rough)	High (2-3)	High (3-6)	Low (2-3)
Glue laminated members			
Smooth	High (1-2)	Moderate (3-4)	Moderate (3-4)
Rough	High (2-3)	High (6-8)	Moderate (3-4)
Waferboard	NR	Low (1-3)	Moderate (2-4)

Note: This table is a compilation of data from the observations of many researchers. Expected life predictions are for an average continental U.S. location; expected life will vary in extreme climates or exposure (desert, seashore, deep woods, etc.).

** Expected life is given for one primer coat and one top coat; two top coats will approximately double the life.*

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