BY ANDY ENGEL

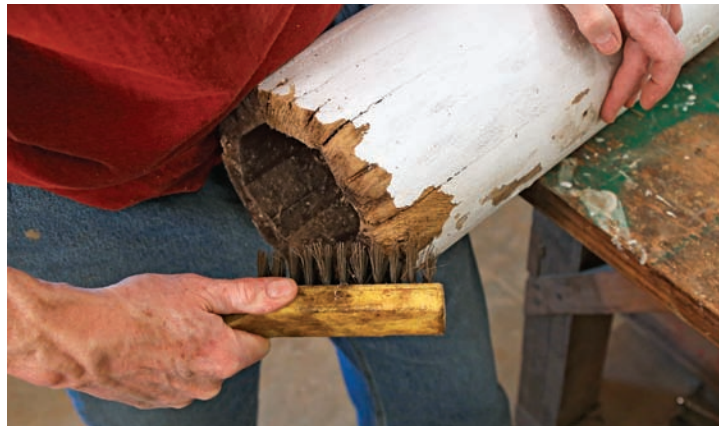
Repairing rot with epoxy

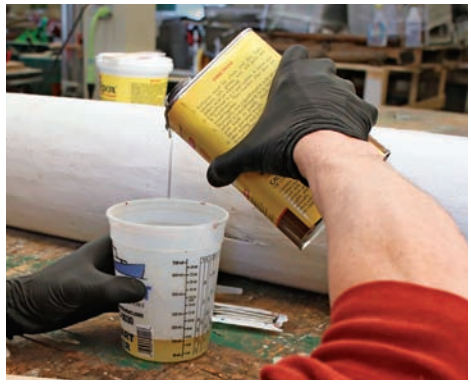
Wood rots—particularly wood that gets and stays wet. In many cases (for example, when considering a rotted piece of 1x trim) the fix is straightforward: Replace the decaying material and address the detail that failed and allowed in water. With historic houses, however, replacement isn't always simple. Stock replacements for historic elements may not exist, and having custom replications made can be pricey. Even if you can take one of these approaches, odds are the wood available today won't be as stable nor as rot resistant as the original, making the longevity of the repair questionable. In some cases, PVC or cement-based products can be used, but these may not lend themselves to being machined to replicate existing elements.

Another option is to repair the rotted area with epoxy. Epoxy repairs make a lot of sense with old moldings, columns, and windows

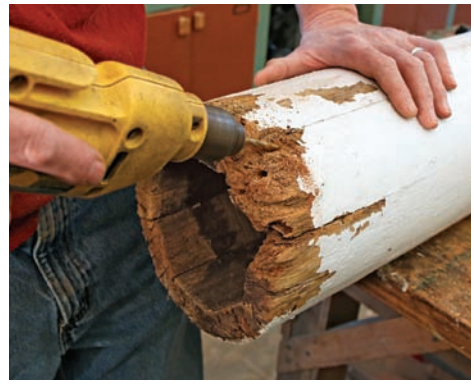
STEP BY STEP

1 ***Remove the worst rot.*** *Use a wire brush, scraper, or pick to get rid of anything that's loose or particularly wet—the material should feel dry to the touch.*

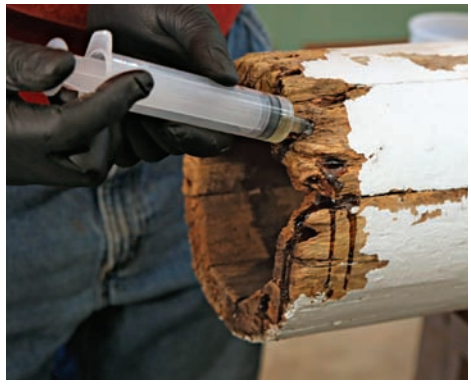




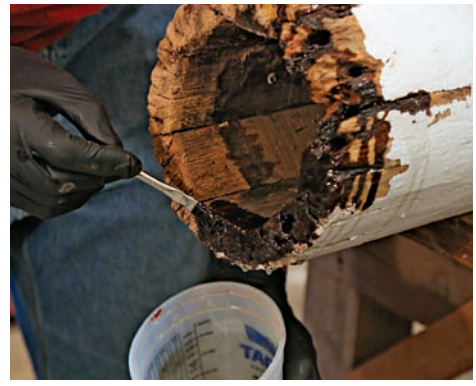
2 ***Mix the liquid epoxy consolidant.*** *Mix equal amounts of resin and hardener, then let it sit for about 10 minutes to be sure the components are well blended.*



3 ***Make reservoirs for the consolidant.*** *Bore holes every ¼ in. or so into the semi-sound wood. Don't drill all the way through or the consolidant will leak out.*



4 ***Fill the holes.*** *Use a syringe to flood each drilled hole with consolidant, repeating this step several times until the holes are thoroughly soaked.*



5 ***Brush epoxy onto the surface.*** *Use a plumber's flux brush to paint the consolident onto the surface until the wood stops sucking it in.*

Photo upper left: Randy O'Rourke, repurposed from *Understanding Wood – 2nd Edition* by R. Bruce Hoadley, published by The Taunton Press

Special materials, simple tools

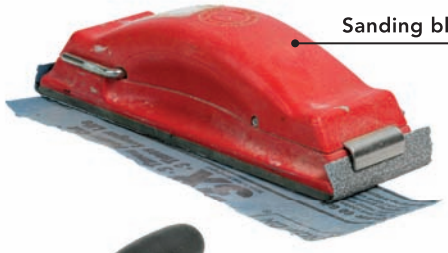
Sources for epoxy rot-repair products include Abatron, TotalBoat, and West System. A kit containing quart-sized tubs of consolidant and putty costs about $130.

Putty, parts A and B

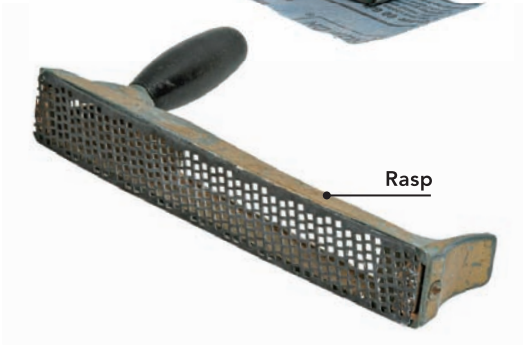
Consolidant, parts A and B

Glue or basting syringe

Flux brushes

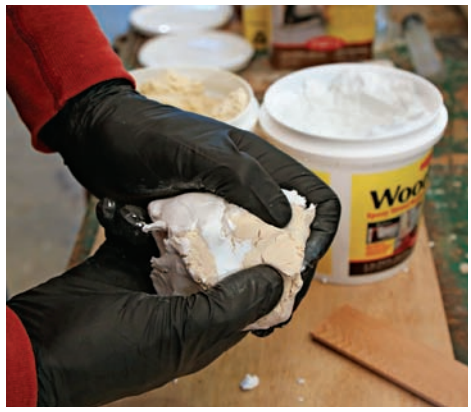


Sanding block

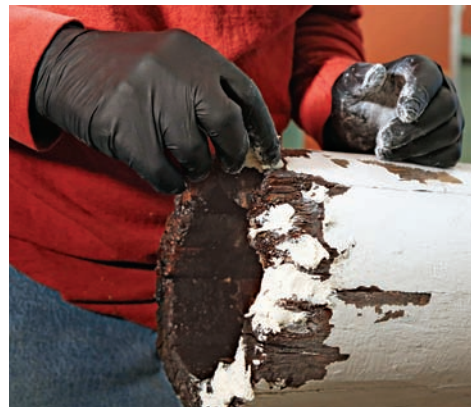


Rasp

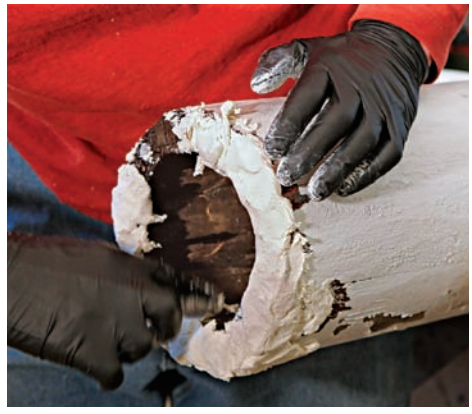
STEP BY STEP



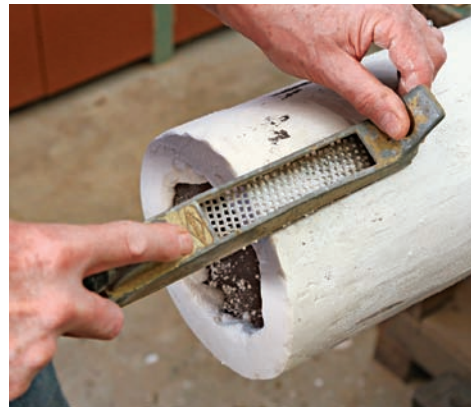
6 ***Mix the putty.*** *Like the consolidant, epoxy putty consists of two roughly equal parts that are kneaded together. Wear gloves—once set, epoxy is essentially insoluble and impossible to remove.*



7 ***Squish the putty into any voids.*** *Be sure to completely fill any holes in the wood, working in the putty and trying to avoid capturing big air bubbles.*



8 ***Build up the surface.*** *Form the putty roughly into the shape of the original element. Make it a little larger so it can be shaped once the putty has hardened, which takes about an hour.*



9 ***Remove the extra.*** *Hardened epoxy can be shaped with standard woodworking tools, from routers to rasps and sandpaper.*

where exact-match replacements can't be found. After fixing the issue that allowed the piece to stay wet in the first place, an epoxy repair is a four-step process that includes removing the loose decayed material; hardening the mostly sound remaining wood with thin, liquid epoxy (also called consolidant or rot stabilizer); filling the voids with epoxy putty; and, finally, shaping the hardened epoxy to match the original details. Once it has set, epoxy is as strong as the wood it's replacing.

One complication with epoxy is that the material and the ambient temperature generally need to be between 50°F and 90°F. If it's colder than 50°F, the epoxy won't set. Above 90°F, it can set too fast and become difficult to work with. You can use heat to your advantage, however. Once you've finished applying the consolidant or putty, the setting time can be accelerated by using a heat gun or halogen lamp to warm the area.

Rot prevention is a battle

The organisms that cause rot need four things: food, water, air, and convivial temperatures. Eliminate one or more of these things and wood can't rot. Air and liveable temperatures are necessary for human life, so that leaves only deprivation of food or water as practical ways to thwart rot.

Rot-causing organisms eat wood itself. Nature has made some wood species highly rot resistant by loading them with chemicals called extractives that make the wood inedible (cedar and redwood are among

these species). Humans have mimicked nature's approach by introducing chemical preservatives ranging from creosote to a variety of compounds containing metals such as copper or chromium that make wood inedible. However, it's rare to find preservative-treated wood of trim quality.

In fact, a lot of wood used for exterior trim on houses incorporates no preservatives. Instead, builders try to prevent rot by keeping the wood dry using good installation details and paints. This approach can work if well executed and maintained, but rot is relentless and eventually something is likely to go south.

Old wood really is better

Wood used 50 or more years ago was more resistant to rot than most of what's available today, including species we don't think of as particularly rot resistant. This is because antique wood came primarily from large-diameter old-growth trees.

Trees grow outward from the center, adding layers each year. These layers are classified as either sapwood or heartwood. Sapwood consists of several annual layers of living cells just under the bark that carry water and nutrients between the leaves and the roots. Young trees are all sapwood, which is why they're called *saplings*. Once a tree is harvested, sapwood tends to be rot-prone, even in cedar and redwood.

As trees age, the cells in the innermost layers of sapwood die and become heartwood. Heartwood no longer transports anything between the roots and the crown of the tree and has a high concentration of extractives. Rot-resistant species have a high concentration of extractives already, but even rot-prone species generally have some level of extractives in their heartwood.

Because of their slow growth and large diameter, old-growth trees have a greater ratio of heartwood to sapwood than modern lumber, which tends to come from fast-growing trees harvested at much smaller diameters than would have been cut half-a-century ago. The lack of sapwood is what makes old-growth wood more rot resistant.

Senior editor Andy Engel once made his living fixing old houses. Photos by Rodney Diaz, except where noted.