by Tom O'Brien

Weatherstripping Double-Hung Windows

Stop drafts and restore the operation of old wood windows with this straightforward approach

There's money to be made from replacing old windows, and sometimes a complete replacement makes sense for the homeowner, too, especially if the windows in question were never built to last. But in most cases, the hoped-for energy savings simply don't justify the expense of tearing out and disposing of an otherwise sound wood sash. In my experience, any window that's old enough to have weights and cords deserves an upgrade rather than a toss in the dumpster.

Homeowners considering a window replacement almost always bring up energy concerns, but their bigger beef is that the units operate poorly — usually because over the years too much paint has been applied in the wrong places. After I've cleaned and weatherstripped an old sash, it fits tightly, yet goes up and down with the touch of a finger.

Double-Hung to Single

Back in the days before A/C and active ventilation systems, double-hung windows promoted air circulation when the bottom sash was raised and the top sash lowered. Most of the older windows I encounter have top sashes that haven't moved in decades and storm windows that are only screened for the lower sash. So unless the owner insists on having two operable sashes, I simply make sure that the upper unit is square and secure. If it's loose, I toenail it in place with a pair of 3-inch trim screws driven upward through each side of the bottom rail, then caulk the edges.

Figure 1. A lead-safe work zone is needed when working with old double-hungs (A). A spring clamp prevents the sash cord from dropping into the pocket; on the window shown (B), the trim was in bad shape and was removed for replacement, allowing the author to insulate the cavity with XPS and spray foam. To improve the window's operation, old paint is removed from all running surfaces; here the author uses an infrared paint-stripping tool (C). Paint is also removed from the inside of the window frame and the edge of the stop (D); raw wood surfaces will be waxed.

Removing the Sash

Taking out a lower sash simply requires prying off one stop and disconnecting the cords, but I remove both stops because they will need to be ripped down slightly to accommodate the thickness of the weather seals. After I disconnect each sash cord, I attach a spring clamp to prevent the weight from falling to the bottom of the weight box (**see Figure 1**). If I'm working on more than one window, I mark an indelible code on each of the pieces to ensure that everything goes back in the right place.

Since old windows of this type typically have some lead paint on them, I set up a lead-safe work space around each of the window frames, and take appropriate safety measures while preparing the sash and stops for weatherstripping.

Sashes that are in rough shape — with extensive wood rot, flaking paint, separated joints, cracked panes, or crumbling glazing — need to be completely stripped and repaired. But if the sash is generally sound, I simply remove the paint from the surfaces that are to be fitted with weather seals or that are subject to abrasion. For this task I use an infrared paint remover

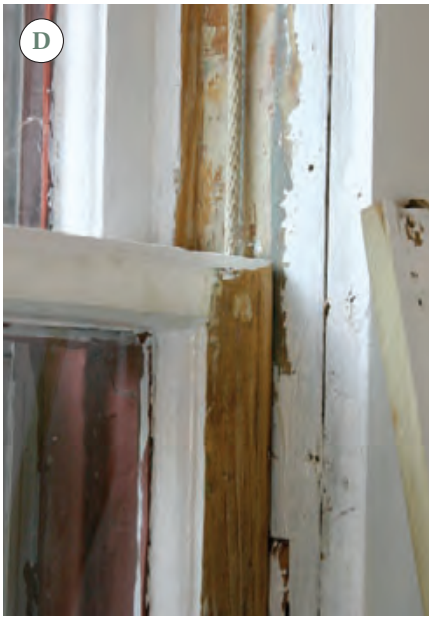

Figure 2. After years of weatherstripping old windows and doors, the author has settled on three seal profiles for most jobs: a polypropylene brush seal for the sides; a 1/4-inch tube seal (white or bronze) for the meeting rail, and a white 3/16-inch tube for the bottom (A). Slots for the seals are cut with a 3-millimeter slot cutter (B); the seals are installed with a screen tool or by hand (C).

(around $500 from Eco-Strip, 703/476-6222, eco-strip.com), which breaks the bond between the paint and substrate without releasing lead fumes. The tool is an investment, but worth it if you plan to do a lot of this work; nothing is faster.

After the paint is gone, I give the bare wood surfaces a light sanding with 100-grit paper in a random orbit sander attached to a HEPA vac.

Materials

Over the years, I've experimented with a variety of materials and techniques for weather-sealing double-hung windows. What's worked best for me is a combination of silicone-rubber tube seals on the top and bottom surfaces and polypropylene pile brush seals on the side rails (**Figure 2, page 2**). I use the brush seals because the side-mounted weather seals have to be able to withstand abrasion when the sash is raised and lowered. The other weather seals are only subject to compression. I've been weatherstripping windows and doors for decades, so I've built up a substantial inventory of shapes, sizes, and colors of seals that I can rummage through to fine-tune a fit, or solve a problem. It often doesn't matter what color you use, but it's nice to be able to put a bronze tube seal on the meeting rail

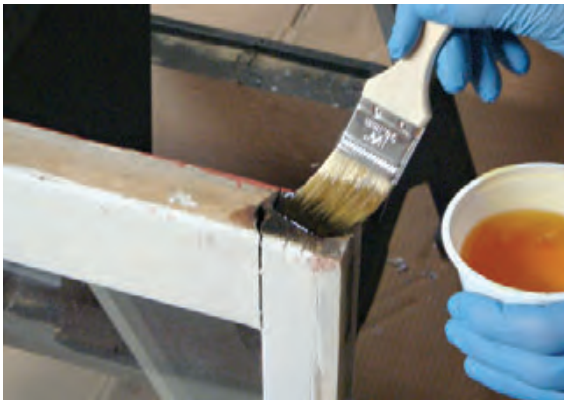

Figure 3. The bottom edge of the sash must be trimmed by about 1/8 inch to account for the thickness of the weather seal (above). After the cut, the end grain gets a treatment of epoxy consolidant to prevent rot infestation (left).

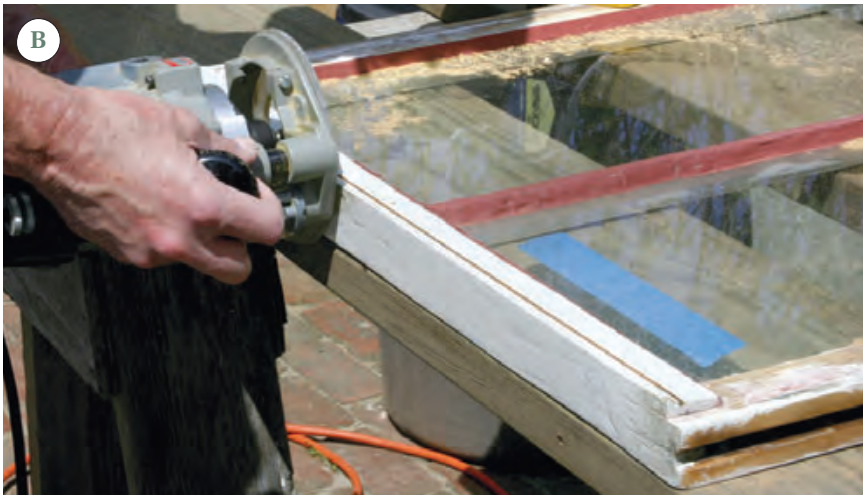

Figure 4. Using a plunge router, the author centers the slot for the bottom tube seal 5/8 inch from the face of the sash (A); the slot for the meeting-rail seal is centered 3/8 inch below the top edge (B). The side brush seals are placed as close to the edge as practical — 1/4 inch (C). Any closer and the thin strip of wood left behind may break off.

of a dark-colored window, so that it's not noticeable when the window's opened.

For most windows, I use a 1/4-inch tube seal (white or bronze) for the meeting rail, a white 3/16-inch tube for the bottom, and gray 1/8-inch brush seals for the side rails. All these products, as well as the router bit that carves the mounting slots, are sold by Resource Conservation Technology (800/477-7724, conservationtechnology.com).

Preparation

Weather seals are most effective — and least likely to bind — when they're gently compressed, not squeezed tight. So before I rout the grooves that will house the various materials, I trim the bottom edge of the sash by about 1/8 inch to allow for the tube seal that goes on the bottom (**Figure 3, page 3**.

Before the sash is reinstalled I'll make space for the seals that mount on the three remaining surfaces of the sash by ripping the stops and planing the face of the stool. Typically these cuts also remove about 1/8 inch, but if I notice before the sash is removed that it fits loosely in the frame, or if the tops of the meeting rails weren't flush, I'll modify the cuts accordingly.

Rot treatment. After trimming the bottom rail, I repair any damaged spots with epoxy wood filler and slather the vulnerable end grain with epoxy consolidant to prevent rot.

Installing the Seals

The weather seals have barbed tails that snap into a 3-millimeter groove that can be cut with a self-piloted router bit. The placement of each groove (relative to the edge of the window) is different for each type of weather seal. If I'm upgrading only a couple of windows, I'll chuck the router bit into a plunge router and adjust the stops to match the offsets. If it's a bigger job, I'll outfit three routers with separate bits and label them as to location, so all I have to do is reach for the one I need.

Layout. The placement of the top and

bottom slots isn't critical, but for the side slots it matters; too far from the edge and the weatherstripping won't line up with the stop; too close to the edge and the slotting bit leaves a narrow strip of wood that's vulnerable to breakage. So I center the slots on the sides exactly ¼ inch from the outside edge.

For aesthetic reasons, I center the tube on the meeting rail ⅜ inch below the top edge; this puts the top of the seal just below the top rail of the window, where it won't leave an unsightly gap. I center the tube under the bottom rail ⅝ inch behind the face of the sash.

Slotting. The router bit's top-mounted pilot makes it easy to control, even on face cuts (**Figure 4, page 4**). To ensure that all of the weather seals snap in without any fuss, I make two smooth, steady passes for each slot, then vacuum out the cavity. After the cutting is done but before installation, most of the window — except the gliding surfaces — gets primed and painted.

I measure each seal by laying it in position on the sash, marking the end with a Sharpie, and cutting it with scissors. It's important to avoid stretching the tube seals or they'll shrink and leave a gap. A plastic-wheeled roller makes it easy to firmly seat the weatherstripping in the groove, but you can also use a screen tool or just finger pressure.

Figure 5. Before the weatherstripped sash can be reinstalled, the stool must be scribed and trimmed to allow for the thickness of the brush seals on the face of the side rails. A 1/16-inch-wide gap, scribed with a carpenter's pencil, allows for expansion (top). A bullnose plane with a removable toepiece cuts away the excess stock with a minimum of dust (above).

Putting It All Back Together

Once the sash is ready to be reinstalled, I always take the time to double-check the condition of the sash cords. If they're frayed, or stiff from years of sloppy painting, they should be replaced. To ensure that all the moving parts glide smoothly, I lubricate the inner workings of each pulley with a squirt of Tri-Flow, and rub a block of paraffin wax (the kind that's used for canning) along all of the running surfaces, including the stops.

After attaching the cords, I temporarily place the sash in the opening and let it rest on top of the stool. While applying gentle pressure against the stops, I scribe the stool to determine how much stock must be removed to allow the window to close (**Figure 5**). In most cases, it's a hassle to remove the stool, so I trim it in place using a Veritas bullnose plane with a removable toepiece that lets me work right up to a corner (veritastools.com). A multi-tool and a detail sander work well too.

The final step is to replace the stops. I start by tacking each one in place on the top with a hand-driven 4-penny finish nail. Next, I close the window and push the bottom of the stop tight enough to gently compress the brush seal. Then I tack the bottom and drive two or three more nails in between. I don't set the nails until I'm satisfied with the fit and the operation of the sash. A properly installed sash lock ensures a tight seal at the top; the only place the stop must tightly engage the sash is at the bottom.

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