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Q: A broken drain pipe spilled sewage into the house's crawlspace. Plumbers replaced the piping and put down a lot of lime to fight the smell. It helped, but 10 days later the smell is still unacceptable. Should I put down more lime?

A: Lime will help, but it won't necessarily solve the problem. Any raw sewage is a biohazard and should be removed and sanitized. Placing chemicals to mask the odor is not the correct method of repair. We recommend calling a reputable professional cleanup company, such as ServPro or PuroClean, to clean up any sewage and make sure the water is all dried out. Homeowner's insurance will probably cover this procedure.

Q: How is a composite marble shower pan made?

A: Composite shower pans fall into several material groups; cultured marble, fiberglass, acrylic and solid surface. Generally all are manufactured by fabrication of flat sheets, thermal-formed from a single piece of material, or molded or cast to form a one-piece unit. The one-piece construction has no seams, which reduces the potential for leaks. All composite shower pans install on a flat, level floor, which eliminates the need for a sloped mud base (required for tiled shower floors). Cultured marble pans are made by spraying a "gel-coat" onto a mold. This coating is about 1/64 inch or less in thickness. The gel-coat is covered with pigmentation and backed with calcium carbonate. The calcium carbonate gives the pan its strength. Also, in the casting process it is infused with air pockets to lower the density and weight. The cultured marble pan is cast separately from the sidewalls. The incorporation of a shower pan liner is essential to ensure a watertight, leak-free installation for the shower pan.

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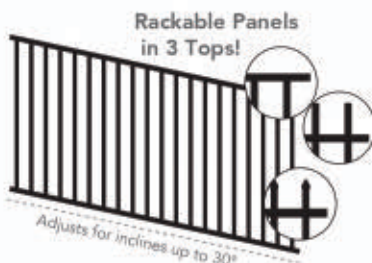
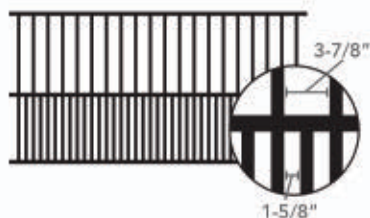
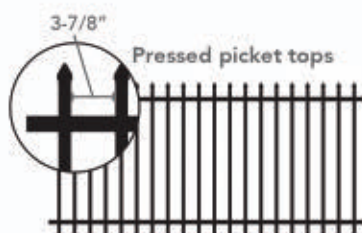
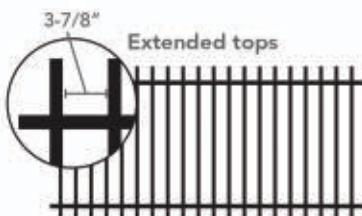
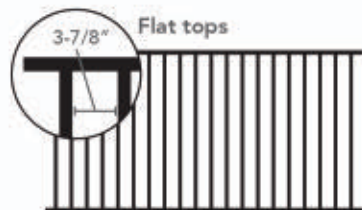
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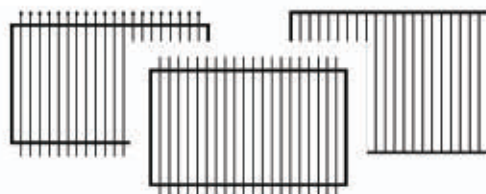
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Q: I'd like to cover my deck shade with clear polycarbonate panels. Do the panels handle snow loads in the winter?

A: Your local building codes should provide the details for design loads that you will have to follow for your deck cover. A wide range of polycarbonate sheets are available and are engineered differently, some

with multiple thin walls while others have a single thick wall. Consult with the manufacturer rep about the various panels' specific snow-load recommendations. Another factor is the method of installation regarding sheet spacing, clamping and fastening. Keep in mind that not only should the panels be suitable for handling the snow load, but the underlying structure should be constructed to support the extra weight as well.



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Q: I'd like to strip the veneer off a piece of furniture to refinish it. What's the best method for removal?

A: Soak a towel with a mixture of equal parts water and vinegar. Place it on the furniture surface to saturate the veneer. Allow it to soak overnight, keeping the towel wet. The soaking should release the adhesive, and in the morning you should be able to peel up the veneer easily with a putty knife or chisel. **EHT**



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Older Windows: Repair or Replace?



Photo courtesy Simonton Windows

New windows offer some big advantages for homeowners. Replacement units offer smooth operation, tasteful decorative options, more energy efficiency and less routine maintenance. The problem is that new windows are expensive, and contractors charge nearly as much to install them as the units cost to purchase. Although a DIY'er can save money by doing the work, depending on the size and location of the window, even a single replacement can be a challenging job for a novice.

Repair and maintenance options for old windows may be more fea-

sible for homeowners on a tight budget. Old windows can usually be restored if you're willing to invest the time and energy (and can locate the right hardware).

However, sometimes repairing the windows may not be worth the effort, and replacement makes more sense. In some cases, hard-to-find parts that have been discontinued are only available from online suppliers, if at all. Replacing rotted wood can be a difficult job, and extensive damage may leave wood windows irreparable. Fogged double glass panes cannot be repaired and must be

replaced—sometimes requiring an entirely new sash.

Another consideration is energy efficiency. Single-pane windows provide poor thermal insulation and result in cold spots in a room. New windows constructed with double-paned Low-E glass filled with harmless Argon or Krypton gas can reduce the home's power bill in the years to come. The gasses are denser than air and serve as an excellent thermal barrier, reducing the transfer of heat and cold through a window.

Poor performance can be another hassle. If the window sticks or fails to open easily, replacement parts may fix the problem, but not always.

Condensation that regularly collects on the glass can impede the view, but the new gas-filled glass packages help to combat this annoying problem.

Finally, the routine maintenance of older windows is one of the biggest complaints of homeowners, particularly of those with wood-framed windows. Painted windows require regular TLC—scraping, painting, glazing—to seal out the weather and protect the wood from rot. New windows made with aluminum or vinyl can eliminate this hassle.

Routine window maintenance and the need to repair rot is one of the main reasons homeowners across America are opting for "non-wood" window replacements.

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Learn how to make this butcher block kitchen island. Featured in *Woodcraft Magazine*, Feb./March 2012 Issue, Vol. 8, No. 45.

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quality vinyl and require almost no maintenance. In fact, an occasional washing will keep them looking like new for years. Plus, they offer increased comfort and lower utility bills, provide headache-free operation and add value to your home. New windows may be a big investment, but one that may pay off handsomely if you plan to live in the home for years to come. **EHT**

LEARN MORE ONLINE

For a variety of window installation and replacement articles, including step-by-step photography and advice from professionals, visit the *Extreme How-To* website at www.extremehowto.com.



DIY WINDOW CHECK

The experts at Simonton Windows offer these do-it-yourself tips to gain an initial impression of how well your current windows and patio doors are functioning:

Tip #1 - Examine the inside of your windows and patio doors for hot and cold “drafty” spots. This indicates air infiltration that can lead to wasted energy.

Tip #2 - Check every window and door to make sure there is adequate weather-stripping and caulking around the units. This helps eliminate air infiltration and ensure a weather-tight seal.

Tip #3 - Look for “burnt out” or faded areas on your furnishings and carpeting. This could indicate harmful, damaging UV rays are entering your home through your windows or doors. You may want to consider replacement with more energy-efficient units containing Low-E coatings on the glass.

Tip #4 - If your windows no longer open or close easily—or if they need to be propped open—it could mean key components within the units are damaged or need adjustment. It could also mean the unit needs to be replaced entirely.

Tip #5 - Check the “fit” of your current windows or patio doors by having someone stand outside the units at night. With a small flashlight, stand inside and “travel” around the edge of the units. If the person outside sees light coming through the edges, this indicates a poor installation and is resulting in energy loss.

If your evaluation turns up one or more problem areas, it may be time to consider replacing your windows or doors. Visit www.simonton.com for more details on vinyl windows with energy-efficient glass options.

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Here is *EHT*'s annual list of gift ideas for the home-improvement enthusiast. We've collected tools and gadgets galore to help with projects big and small. Did we compile this list to help guide your holiday shopping, or for you to pass along to your family as a wish list? Maybe a little bit of both.

From our staff to you and your household, have a wonderful holiday season.

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shop. The included storage shelf includes a ventilated metal grid and side braces (200-lb. capacity) that can be adjusted to any rung height along the ladder sides. With its large, easy-rolling casters, the 4-in-1 Scaffold Bench can also be used to cart equipment and supplies around the jobsite. Weighing 161.5 lbs., this durable steel bench is solidly built to withstand the daily rigors of a demanding work site. The unit is sold in a flat box for convenient shipping, but assembly is easy and requires no tools. The shelves adjust with handle-pull cotter pins, which simplifies assembly and day-to-day operation. Visit www.homedepot.com.

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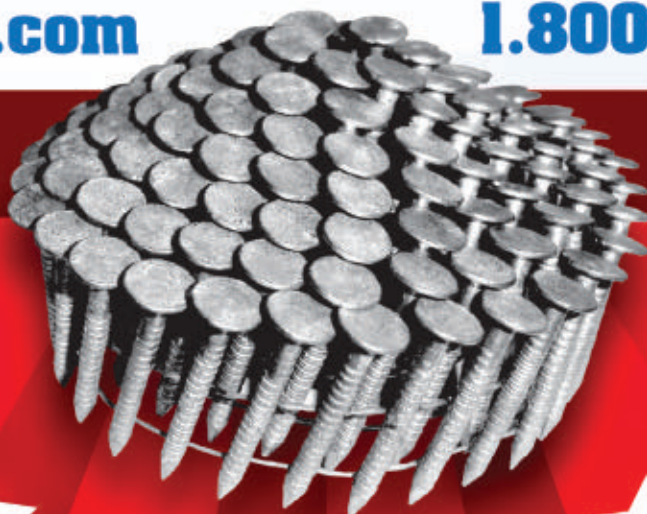
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lighting is protected with a lifetime warranty. Additionally, Mighty Mule's smart technology allows for control anywhere with a Mighty Mule MMW200 wall station, and is compatible with Amazon Alexa, Google Assistant, and IFTTT control. The top-of-the-line MM9545M model includes one MMW200 wall station, two transmitters (that are compatible with Mighty Mule Automatic Gate Openers), a MMK100 Keypad, 7' Belt Rail, and built-in battery backup. It also includes a 1-1/4 HPe (horsepower equivalent) DC motor with a steel

reinforced belt drive for super quiet operation. The triple LED has a lifetime warranty and is dimmable to adjust the brightness. Remote entry and monitoring can be granted utilizing the transmitters, wireless keypad, the Mighty Mule app, and voice skills. Visit www.mightymule.com.

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Designed for professional applications, Johnson's JLX series of programmable digital levels are engineered for inspectors, supervisors and flatwork contractors alike. Eliminate guesswork with the pre-programmed ADA compliance, drainage and roof pitch modes that simplify measurements for the most common digital level applications. They can also be easily customized to meet jobsite needs. The levels feature dual backlit LCD displays on the top and front, and both displays automatically invert when you are taking overhead measurements. They have push-button removable end caps for flush or finish carpentry work, and non-marring wall grips hold the levels securely in place with just one hand. The IP65 construction provides complete protection against dust and water. This level is easy to use with its simple, three-button operation and can tackle tough jobs like setting ramp angles for ADA compliance, setting drain pipe angles for proper slope, and quickly measuring the slope of any surface. Visit www.johnsonlevel.com





WORX STORAGE STEP STOOL

The new Worx Storage Step Stool is a compact, portable tool box that doubles as a step stool. The 13-in. step stool doesn't sound like much extra height, but it provides a shorter person the advantage of handling those out-of-reach jobs. The 7.15-lb. step stool isn't limited to DIY projects. Use it for the hard-to-reach items in kitchen cabinets or pantry shelves. As a painter's helper, the extra step means one step closer to painting trim around windows and doors. Outside the home, the Storage Step Stool is a handy stool for detailing a car's wheels, as well as marine and trailer maintenance. Unclasp the top of the stool, and inside there's a deep cavity of built-in storage. Beneath this storage bin is a shallow, pull-out drawer for storing frequently used tools and parts. With a storage capacity of 28 lbs., both the storage bin and pull-out drawer can be customized and outfitted with the tools and accessories necessary to tackle the job. Visit worx.com.

RIDGID MEGAMAX BRUSHLESS 18V MULTI-TOOL

The Ridgid MegaMax Brushless 18V Power Base features Octane Tool Functionality, so if connected to a Hyper Octane Battery, the user will get over 65 percent more power in high-demand applications. This Power Base automatically identifies each MegaMax Attachment Head, including the Right Angle Drill, SDS Plus Rotary Hammer and the Recip Saw, and configures the tool settings to match. The MegaMax Power Base is the first Octane tool, meaning the battery technology increases performance and runtime. This unit is covered



for life with registration under the industry's only lifetime service agreement. Features include four directional head positions to optimize the ergonomics, an LED communication panel, heavy-duty brushless motor, and tool-free die cast interface. The MegaMax has a lock-on function, two-finger variable speed trigger, and a grip light, which engages a LED light independently of the trigger to illuminate a work space. Visit www.ridgid.com.



AIRESHARE TRANSFER FAN

The AireShare is designed to distribute heated or cooled air for greater comfort, energy savings and ventilation rates from room-to-room through interior walls or level-to-level through floors/ceilings. AireShare Transfer Fans provide an unobtrusive, cost-effective way to circulate heated or cooled air from fireplaces, stoves, electric baseboards, split system "ductless" A/C and window A/C units to adjacent rooms. The net result is extended comfortable living space from existing heating or cooling equipment. AireShare Transfer Fans are available for two types of installations: horizontal air flow through stud walls and vertical air flow through floor/ceilings. All AireShare Fans feature a low profile, whisper-quiet intake blower and unobtrusive grilles. With Room-to-Room models, the blower draws heated or cooled air into an open wall cavity and distributes it to an adjoining room through a streamlined air diffuser installed on the opposite side of the wall (available for plug-in and hard-wired installation). The Level-to-Level model moves air up or down from one level to another through a sleeve that adjusts to floor joist/truss thicknesses from 8-3/4 to 16-1/2 inches. Visit tjernlund.com.

M18 FUEL 18V LITHIUM-ION BRUSHLESS CORDLESS COMBO KIT

The Milwaukee M18 Fuel 2997-23 cordless three-tool combo kit delivers advanced 18-volt cordless cutting, drilling and fastening



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eliminate the need to pre-drill, and nibs under the head for countersinking. Everything can now be completed in one simple operation; just drive the screw and you're done. Plus, Muro has screws for practically any construction application, even offering tools that can drive screws up to 4 inches long—another first in the industry. Visit www.muro.com. **EHT**

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The Writings on THE WALL

Building a Built-in Bookcase

By Matt Weber

I've been a big fan of built-in bookshelves for a long time. I'm a guy who reads a lot and writes a lot, plus I've got all sorts of reference books for work that I need to store. A built-in bookcase provides a triple-duty solution to my storage needs—it looks good, it adds to the salability of the home and, by removing the studs and using the depth of a partition wall, it occupies limited space within the room. Storage shelves can be built of many different materials and designed in all sorts of styles. This article will touch on some basic techniques for opening a wall and constructing a basic shelf case from paint-grade materials outfitted with wood-stained shelves.

This particular case was built in a partition wall located in a finished basement and adjacent to a split-level staircase. Before removing any wall studs, make sure the wall is not load-bearing. Exterior load-bearing walls are not appropriate for built-in cases because removal of the wall eliminates insulation (and would require construction of a load-bearing header). If you want to locate shelves over a load-bearing wall, then build the case over the studs like a piece of furniture.

I decided to center the case on the wall and plotted my design on paper for a quick visual reference. I wanted a large case, so I designed it 6 feet wide and extending the

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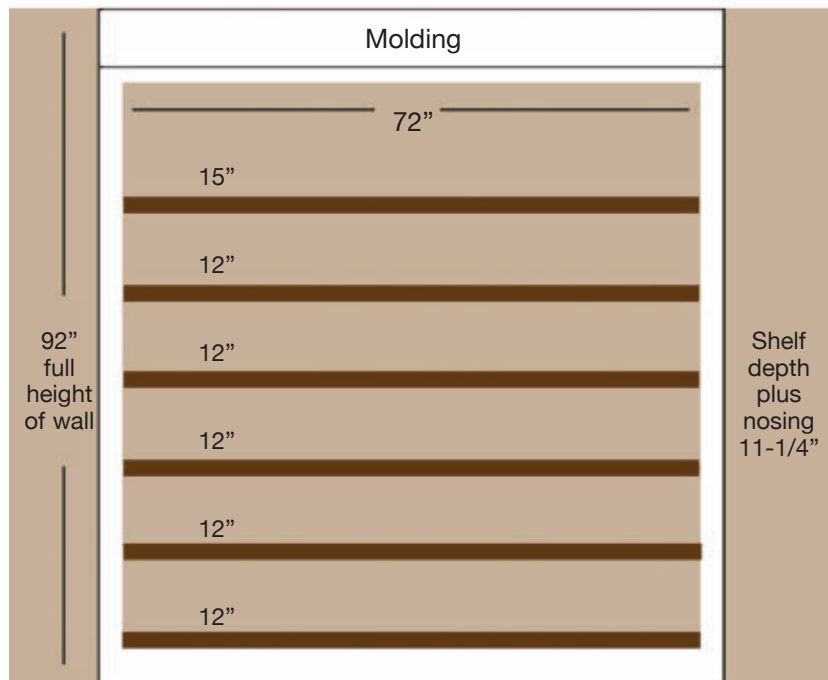


full wall height from floor to ceiling. I had some large books, so I went for 12-in. deep shelves and planned for roughly 14-in. of space between each. Some of these measurements would "evolve" slightly throughout the project based on what obstacles I encountered during construction.

By the way, I'd like to thank Lowe's Home Improvement Store (www.lowes.com) for sponsoring this project. I'm lucky enough to have a Lowe's within two miles of mi casa, and that's where I picked up all the necessary materials:

- 4x8 1/2" plywood for back
- 12" edge-glued side panels
- 4x8 stain-grade 3/4" birch plywood for shelves
- 1x oak hardwood for the shelf edging
- 1x No. 1 pine for the face-frames

- 2x4 studs for the bottom
- Baseboard, cove and stop molding
- Wire molding
- Minwax wood stain and wood putty
- Valspar Signature Paint/Primer
- Kreg pocket screws



WALL DEMOLITION

I outlined my case area on the wall with painter's tape, a T-square and a pencil. I would be removing a large square of wall paneling, plus molding at the top and bottom.

I knew this would be a dusty job, so I enveloped my work area with large vinyl sheeting held tightly to the ceiling with a couple of T-Jaks. The vinyl membrane kept most of the airborne demolition dust contained to my immediate vicinity and not circulating throughout the house.

Also, before cutting into a wall, always disconnect electrical power in case you accidentally cut into a wire.

My tool for slicing into the paneling was the new Rotosaw from

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Rotozip. With its small 3-5/8-in. wood-cutting wheel I was able to control the cut while penetrating quickly through the depth of material.

When it comes to demolition, it's smart to work gingerly. People on remodeling TV shows like to swing a lot of sledge-hammers, but you can bet some other crew member is responsible for cleaning up the dusty mess. On our project the paneling concealed 5/8-in. drywall and, to keep the jobsite as tidy as possible, you should make surgical cuts and remove it in as large of sections as possible. Use a flat bar to pry it away from the fasteners whenever possible.



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I then used a Bosch Multi-X with a flush-cut blade to slice through the nails that fastened the studs to the drywall on the opposite wall. The opposite wall was finished and painted, so I had to be careful when removing the framing.



CASE CONSTRUCTION

I then repurposed a couple of the old studs to use as trimmer studs, which frame the new book case. I was able to relocate one of the electrical lines to the top of the bookcase area, but another line ran right through the center, which required me to drill access holes through the new trimmer studs. Make sure to install the studs perfectly plumb.



The lower section of the wall beneath the staircase was unfinished, and the stair stringers were not framed flush with the rest of the wall. Hopefully your project won't have the same substrate problems, but this required me to add all sorts of creative shims and blocks to create a flush, plumb nailing surface for the plywood backing.

I laminated sheets of 1/2-in. plywood over the exposed drywall and blocking using a combination of Liquid Nails construction adhesive, plus some strategically placed drywall screws.

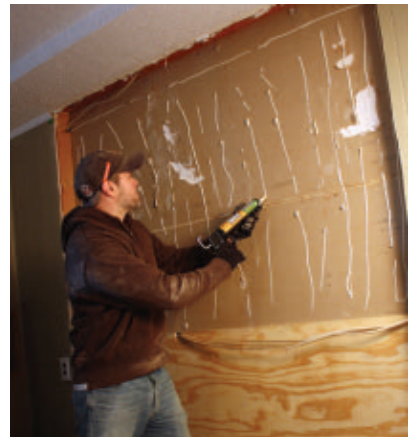
A little bit of forward planning was important at this phase of the project. I knew I had to conceal both the seam of the plywood panels plus an electrical line which was routed through the bookcase to a light switch. Therefore, I routed the wire along the plywood seam so I could eventually conceal them both using a single shelf.

Note: When securing the panels I wanted to use as few screws as possible to minimize wood-putty repairs. So, to help hold the plywood in place while the adhesive dried, I tacked on a frame of temporary scrap 2x4 cleats along the edges.

I then screwed together a simple rectangular box for the case foundation made of 2x4 stud material and strengthened with blocking. This "toe-kick" box would raise the bottom shelf a few inches off the floor and provide room for some decorative base molding at the bottom. The box was screwed into the lower plywood panel.

Because I planned to build the shelves with a 1-1/4-in. nosing overhang (1/2 in. taller than the 3/4-in. shelves), I installed 1/2-in. plywood over the toe-kick box to serve as a shim for the bottom shelf.

The next step is installation of the side panels. Since I planned to



paint the case, I used some economical edge-glued panels cut to fit over the toe-kick and flush with the ceiling. These required a little wood-filler and sanding prior to installation. The sides were mounted into the trimmer studs with 3-in. self-countersinking R4 screws from GRK Fasteners (excellent fasteners if you can find 'em). The sides must be perfectly plumb and square to the back.





At this point I puttied and sanded all fastener holes. I then primed everything with a coat of semi-gloss Valspar Signature, which serves as both primer and paint in a single product. For the plywood carcass I painted with a foam roller, which achieves thorough coverage without leaving brush marks or the stippling effect of a roller nap.

MAKING SHELVES

The shelves were made of stain-grade 3/4-in. birch plywood that I ripped to width and length in my shop. A nice, big table saw will do the trick of keeping the cuts straight and smooth, but I cut mine with a Festool plunge-cut saw equipped with a ripping guide. I ripped the shelves 3/4-in. narrower than the sides of the case to leave room for the nosing.

When it comes to drilling pilot holes for the pocket screws, you



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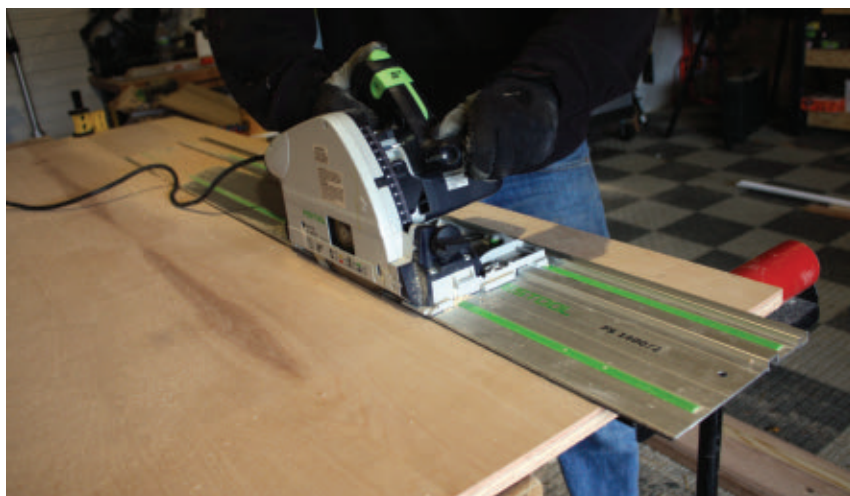
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must decide if they'll go on the top or bottom of the shelves. If the holes go on the top, you'll need wood plugs to hide the screws. If they go on the bottom, the shelves won't have as much holding power with the screw

heads angled downward. I decided to hide the screws on the bottom, which would still cinch the shelves tightly to the cabinet case. Then, once installed, I would install additional support from the sides and below to bolster the



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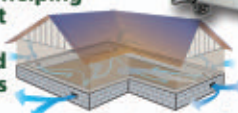
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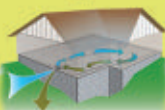
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shelves' holding power. I used the General E-Z Pro Pocket Jig to guide the holes for the pocket screws, spacing them 12 to 18 in. apart along the sides and back.

Next, finish-sand the shelves in the direction of the wood grain, progressing to finer paper to at least 220-grit. Dust with a tack cloth, then apply wood stain and



polyurethane until your heart is content.

I ripped the 1x oak nosing on my table saw to 1-1/2 in. and then cut at length to match the shelves. Note: Leave the nosing off the shelves at this time. I installed the first two shelves with the nosing pre-attached, and the extra material made it difficult to position the shelves when fastening. From that point forward I found it much easier to mount the shelves first, and then attach the nosing later.

SHELF INSTALLATION

Start at the bottom. The first shelf rests on the toe-kick box. Instead of using pocket screws, it's fastened through the face to the plywood shim and 2x4 box using countersunk trim-head screws. The tiny screw heads are easy to hide with wood filler.

The next shelf must conceal the joint between the plywood panels in the rear of the case. To

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help guide the layout I used the Acculine Pro laser-line generator from Johnson Level to cast a guideline over the case and show exactly where to locate the shelf



so the seam was hidden behind its edge. Once this critical shelf was mounted, I used it as a control point to install the remaining shelves at an equal distance apart from each other. (Note: The top shelf has extra overhead space—roughly 14 inches between the fascia board—to leave room for larger decorative items.)

When installing, make sure the shelves are level in every direction. It helps to have an assistant, but since I was working alone I had to stabilize the shelves with a variety of Bessey clamps and supports, such as a Mini T-Jak.

Fasten the shelves tightly along the edges using pocket screws and a pocket driver bit. (Later during



construction the shelves will be strengthened with additional fasteners and support strips.)

Note: When locating the shelves, remember that if your



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shelf nosing is taller than the shelves, then the vertical midpoint of the completed shelf will not be the same as the center point of the plywood shelf. You must



account for this during layout or your measurements will be off.

Once all the shelves were mounted I installed the nosing, which I had stained and varnished in my workshop. Make sure the upper edge of the nosing is flush



with the shelf surface so it doesn't snag your books.

I fastened the nosing with a combination of wood glue and finish nails.

Finally, I supported each shelf with a full-length horizontal support strip or "cleat" measuring roughly 1 by 3/8-in. I ripped this strip from some No. 1 pine and fastened it flush against the underside of the shelf with a combination of wood glue and pin nails.

TRIM WORK

I covered the edges of the side panels with vertical face-frames ripped to 2 inches wide. These face-frames were nailed to the case sides as well as to the nosing of the shelves, with their outer edges flush with the sides. The face-frames gave some visual weight to the case for a more substantial look.

I wrapped the 2x4 toe-kick box

with baseboard molding mitered at the outside corners. The new trim matched the room's existing baseboard profile and intersected with cope joints.

At the top, I nailed and glued a "cap" panel of plywood flush inside the case to hide the ceiling. I then wrapped the top of the case with 1x6 pre-primed MDF stock that was mitered at the corners. The MDF was installed flush with the ceiling and served as fascia for the case.

My original design called for crown molding at the top. However, the existing crown that lined the room posed a problem. It had a small profile that seemed disproportionate to the size of the cabinet. However, a new larger crown profile for the case would not intersect with the smaller crown in a fluid manner. The junction would look mismatched. So, I opted to install an inverted base molding





that had a flat face to intersect the crown at a square joint, which looked much more organic. Combined with the added girth of the fascia, the inverted base gave a "crown" impression. I added a smaller strip of inverted stop molding at the lower edge of the fascia, and the double-decker design seemed to pull the installa-

tion into a cohesive whole.

I chose a pre-primed cove molding to line the edges of the sides and conceal the small gap where I originally sawed through the wallboard.

After assessing my progress I found the 1x6 fascia to have a slight bend in the middle. To keep the fascia square without bowing, I installed a 1x4 block at the mid-point flush between it and the back of the case. On each side of the block I then installed a small crown molding profile to conceal the joint between the back and cap panel.

Once all the trim was installed, I puttied all fastener holes and caulked all joints. I used Lexel



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The Writings on THE WALL



sealant, which is a very adhesive and paintable product with excellent elasticity to resist cracking at the joints. I then sanded the repairs and added another coat of finish paint.

Lastly, I had to address the cable that ran right beneath one of my shelves. The "corner wire molding" I purchased at Lowe's is a two-piece plastic channel with a right-angle strip that tucks

beneath the rear of the shelf and fastens with adhesive strips. I ran the wire along the channel and snapped the face-piece over it to conceal the wires in an orderly manner. The plastic channels took a little massaging to connect, but once they were locked together they stayed that way, keeping the ugly wires out of sight while satisfying electrical codes in my area.

Finally my wall for reading was complete. As an afterthought, I ran a 6-ft. string of LED rope lighting through the top of the case, fastened with clips and concealed behind the fascia for a soft, ambient effect. I think it was a nice touch. **EHT**

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FEATURE

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Installing a Hardwood Border and Feature

By Rob Robillard

Hardwoods floors offer an unrivaled sense of quality that survives home building trends and decorating fads. Hardwood flooring includes many species of wood and finishes, ranging from traditional classics such as oak and ash to contemporary styles like maple and the unusual patterns of exotic hardwoods like Brazilian Tigerwood or African Sapele.

If your personal style is more cozy and rustic, you might want to consider hickory or cherry hardwoods. Add a hardwood border and feature strip to any hardwood flooring installation and you're talking high-end curb appeal. A border usually consists of 8 to 12 inches of similar flooring material running along the wall. A feature strip is an accent that highlights and shows off the decorative borders as well as enhances the hardwood flooring installation.

WHY USE A BORDER AND FEATURE STRIP?

Adding a border and feature strip to your next hardwood floor installation is a great way to create a floor that either follows a classic design or showcases your artistic flair.

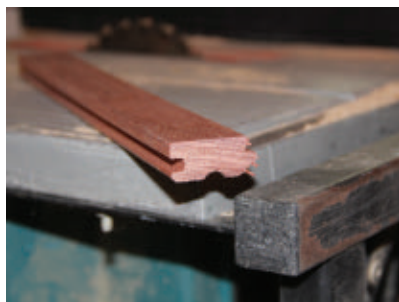
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When I see a border and feature strip installed in a hardwood floor I immediately think “high-end and quality.”

Border and feature strips are becoming more popular these days and are mostly associated with expensive homes and remodels. Borders are typically done in the same material as the rest of the floor or “field”. A border frames the “field” of the flooring much like a picture frame, enclosing the ends of the rows with flooring that runs perpendicular to the rows, so the rows do not terminate into a wall.

A feature strip, which can highlight the border, is usually darker and can be made from many different materials, shades or sizes. Walnut and mahogany seem to be the most popular in my neck of the woods, probably because they’re offered in many shades. (This project shows Santos Mahogany.)



For this project the feature strip was made from a dark Santos Mahogany.

The feature strip connects to the flooring with a tongue-and-groove joint.



In hardwood floors, a border frames the “field” of the flooring much like a picture frame, enclosing the ends of the rows with flooring that runs perpendicular. A feature strip is a course of flooring made from a different (usually darker) material that accentuates the border.

When considering installing a feature strip in your hardwood floor, the best time to do it is when the floor is being installed. The cost of installing a feature strip is mostly labor since the amount of materials used is minimal.

People often ask where a feature strip should be placed. That’s a personal choice but many if not most features strips run along the borders of walls, typically 6 to 12 inches off the wall but not so far that it disappears under the outer perimeter of an area rug.

One rule of thumb that I follow is to use one strip in smaller areas and double strips in actual rooms or larger spaces. Typically I use standard width boards for blind-nailing purposes. Thinner strips can also be used by milling down strip flooring and installing face nails.

Adding a border is usually a separate labor charge, and the

feature strip can add anywhere from \$1.50 to \$10.00 per lineal foot depending on the material cost.

DESIGNING A BORDER AND FEATURE STRIP

When deciding on a border and feature strip, make sure to research and choose a material with a density similar to your flooring so it will wear evenly. If you choose different density materials you may be unhappy in a few years when they wear at different rates.

Layout is also important. The border and feature strip planning and measuring must be done before a single board is laid. One small mistake can grow exponentially into an installation disaster later.

Use a combination of 3-4-5 triangle measurements, large squares and parallel measurements to determine the layout of

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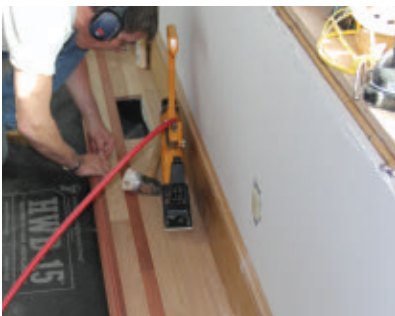
FEATURE

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your border and feature strip.

There is an old carpentry rule that a small error in the foundation can compound itself and become a big error by the time you build the roof. This is also true for hardwood flooring.

Be sure to allow a minimum expansion gap of 3/4 inch around all vertical obstructions.



Eight to 12" out from the wall is a good place to end the border and start your feature strip.



The flooring was fastened over a moisture barrier using a heavy-duty flooring stapler.



The ends of the intersecting rows of the border use a consistent and overlapping pattern in the corners, not unlike a herringbone pattern.

COLOR, SHADE AND JOINTS

Hardwood flooring comes in boxes, and often you might receive different cuts or "lots" of wood from a flooring manufacturer. Take the time to open and install the flooring from several cartons at the same time to ensure a good mix of color and shade.

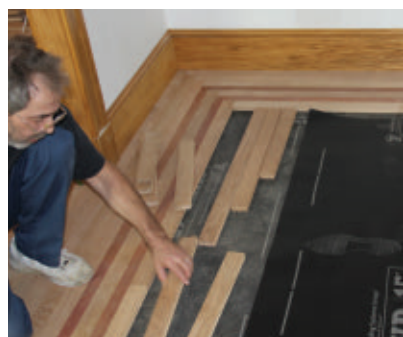
The layout of your flooring is important. Be attentive to joint spacing and staggering the ends of floor boards at least 4 to 6 inches, between adjacent rows. This small detail will make a big difference once the entire floor is in. By installing the floor with random joist spacing you will achieve an overall nicer looking installation.

INSTALLING A BORDER AND FEATURE STRIP

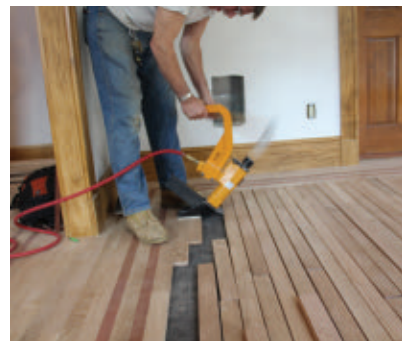
As with any hardwood floor installation, take the time to orient or, if needed, cut and scribe the first border boards to ensure the row is parallel to the opposite wall. Check and double-check this before starting the installation.

Contrary to popular belief, there is no need to "square" your border around the walls of the room. Borders don't look right if not running parallel to the walls.

Use the same flooring material



Stagger the joints of floor boards at least 4 to 6" between adjacent rows.



When completing the field of the floor, work from the two opposite longest rows toward the center of the floor.



Where the field rows terminate into the exposed tongue of the border, carefully mark the length of the final boards.

on the borders as in the middle "field" boards.

When installing the border and feature strip, use a consistent and overlapping pattern in the corners. This pattern, not unlike a herringbone pattern, is a pleasing finish detail.

Generally you will follow the walls with your feature strip and avoid going into small nooks with it, which makes it look too busy. In these situations, fill in the nook with a larger border ("field" boards).

When installing the feature strip you can either install a full width board and blind-nail the board or rip it smaller to a desired width and face-nail it in place. Since the feature strip is highlighted in the floor I prefer to hide the nails.

For a good finish, it helps to sandwich the feature strip between two similar direction border boards. This keeps all the end joints of the field boards off the feature strip.

FILLING IN THE FIELD

Complete the entire border and feature strip on at least three if not all four walls prior to filling in the middle “field” boards.

When you reach the opposite end of the room, use a tongue-and-groove router bit to rout the ends of the field boards so they fit onto the border tongue and lock in place. When doing this, hold the last two boards slightly off the floor at their joint. Slowly lower the two boards down and then slide the boards into place over the previously installed board tongue.



Use a tongue-and-groove router bit to shape the ends of the boards as needed.

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With grooves cut into the ends, the final boards in the field should lock onto the tongue of the border.

It's a good idea to use construction adhesive to glue down the final center board.



Routing the last board is better than gluing and nailing it in place. Routing this board provides a much better joint and allows for natural and seasonal movement without breaking apart. If a glue bond fails, then you will end up with gaps.

One method that works well is to install both sides of the field at the same time and work toward the middle. Working to the middle ensures that the outer edges are consistent and leaves the last board in the center. This ensures that you do not install the last, and most likely thinner, board next to the highly visible feature strip.

When you get closer to the middle, instead of finishing the field with one really thin narrow strip, you can always rip a little material off several boards and re-groove them to finish the floor without bringing attention to a much narrower strip.

Usually, however, a slightly narrower board will not be picked up in the middle of the floor and is usually hidden under an area rug.

For the last piece: On a table saw, rip the tongue off the second



Use a table saw to rip the tongues off the boards in the final row to finish the field. It may be necessary to rip the final row to a width that will fit.

You may need the assistance of a wood block to "persuade" the final board into place.

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Face-nail to fasten the final row securely.

to last piece and install it. Then, rip the last piece to the necessary width and install it using construction adhesive and face nails. Many times you will need the assistance of a wood block to “persuade” this final piece into place. **EHT**

Editor's Note: Robert Robillard is a remodeling contractor based in Concord, MA. He is also the editor of a www.AConcordCarpenter.com. Visit his website to learn practical solutions to your home improvement problems.

One rule of thumb is to use a single feature strip in smaller areas and double the strips in big rooms or larger spaces.



The border and feature can follow the walls throughout a home for a consistent decorative effect.



Shown is the completed floor after finish has been applied.



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Keeping Water Where You Want It

Liquid Waterproofing and Vapor Barriers for Tile Showers



By Rob Robillard

When remodeling a shower, most people are more concerned with the aesthetic aspects—tile color, fixture selection, glass door style—and pay little attention to construction methods. They assume that the contractor will do things right. However, a lack of waterproofing measures is clearly evident in the many showers I remodel every year. Some contractors waterproof correctly, but most don't.

When folks get excited about choices in aesthetics, they often overlook how the contractor deals with water infiltration as well as the other hidden details needed to

ensure a long-lasting and quality job.

Over the past 20 years the tile industry has shown great advances in waterproofing tile-related products, especially with methods of constructing tile showers. Paint-on liquid waterproofing products now enable contractors and DIY'ers to waterproof a shower easily and efficiently. These paint-on systems, when combined with a copper shower pan and proper substrates, all work as a system to keep water in the shower and out of the wall cavity.

LIQUID WATERPROOFING

In my neck of the woods there are several liquid-based, "paint

on" waterproofing products available. Some of the more popular brands are Laticrete Hydro Ban, Custom RedGard and MAPEI AquaDefense.

My local tile store sells Hydro Ban, which comes in a gallon bucket and is applied with a paint roller or brush. Hydro Ban can be used over cement board, fiber-cement board, concrete, mud work, and other areas where you would be installing tile. It's a two-coat system and costs nearly \$100 a gallon, with 5-gal. containers being better priced.

Hydro Ban is a thin, load-bearing waterproofing/crack-isolation membrane that does not require the use of fabric in the shower wall field, coves or corners. The product is a single-component, self-curing liquid rubber polymer that forms a flexible, seamless waterproofing membrane and bonds directly to a wide variety of substrates. It also has an anti-fracture protection of up to 1/8 in. over shrinkage and other non-structural cracks.

WHERE TO USE IT

Liquid waterproofing should be applied to all surfaces in the shower area that meet water or moisture. I basically paint all of the surfaces that will receive tile in the shower, including horizontal areas exposed to moisture such as shower benches, shelving, half-walls, niches and especially the shower floor.

When installing horizontal surfaces in a shower such as shelves, half walls and niches, ensure that these surfaces all have a slight

pitch to the drain in addition to applying waterproofing. These surfaces are extremely susceptible to leakage, and the pitch ensures positive drainage while the liquid waterproofing prevents moisture from getting past the tile and grout.

Liquid waterproofing is an outstanding redundancy barrier to the tile installation and allows you to skip the plastic sheeting behind your substrate. (Note: I still recommend installing a vapor barrier behind the substrate, and if you plan on installing a steam generator, you will definitely need a vapor barrier.)

APPLICATION

Most of us hate reading instructions, but I highly suggest that you follow the manufacturer's instructions for the brand and type of waterproofing that you are using. With some waterproofing, the



Prior to installing the shower pan I cover the subfloor with Ice and Water Shield to protect the copper from the wood. I also wrap 4 to 6" up the walls to protect the pan sides.



The substrate should be tile backer board and recommended corrosion-resistant fasteners (typically 1-5/8" minimum).



There are all types of shower pans from acrylic to galvanized, rubberized membrane and copper.

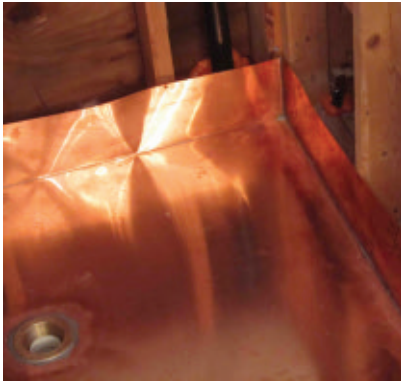
companies will want you to use a special fabric, along with the liquid, over the whole surface. Some will require the fabric to be used in all corners, while some don't require it at all.

You also need to pay attention to how many coats of the product are required and how thick those coats should be applied. Some products require three coats and some only two. (Hydro Ban is a two-coat system.)

Other manufacturers want their proprietary product to be applied to 30 mils thick when wet, and some only 20 mils. A wet film gauge comes in handy for measuring this if you choose that route.

SHOWER/BATH REQUIREMENTS

You will need to insulate all exterior walls, and consider installing pipe insulation to prevent the water pipes from sweating.



A local sheet-metal company fabricates the copper pan.



Complete the shower enclosure substrate from top to bottom.

The substrate should be tile backer-board and recommended corrosion-resistant fasteners (typically 1-5/8-in. minimum). You will also need:

- Alkali-resistant mesh tape
- Copper, galvanized, membrane, or other appropriate shower pan
- Thinset mortar
- Waterproofing material, enough for two coats
- 3-in. throwaway brush for cutting in edges and corners
- Paint roller / tray

THE SHOWER PAN

A well-constructed shower starts with a shower pan. There are all types of shower pans from

acrylic to galvanized, rubberized membrane and copper. I use a local sheet-metal fabricating company to create the pan.

I prefer to use copper pans and a pitched mud job for the floor in all showers that receive tile. Prior to installing the shower pan I cover the subfloor with Ice and Water Shield to separate and protect the



To create a shower floor from scratch, I use what is commonly called "dry pack mortar" or "deck mud", which contains three ingredients; Portland cement, sand and water. The mortar bed is pitched toward the drain.

WATERPROOFING MEMBRANES VS. VAPOR BARRIERS:

Water vapor . . . What's that?

Water vapor is water in a gas form. In a shower situation you recognize it as steam. Steam stays in a gas form until it cools down or hits a barrier such as a shower door, tile, ceiling or a mirror.

Water vapor that gets behind walls or travels up through light fixtures or HVAC grilles into an attic will turn back into water when it cools off. Over time, this will present itself as unhealthy mold and rot.

One very important feature to any shower is a ventilation fan with a timer switch. This ventilation fan should be sized according to the size of the bathroom and installed to vent to the outside of the house. There is a right and wrong way to vent a bathroom, and care should be taken when choosing a CFM fan size as well as to make sure you are venting all moist air outdoors.

Waterproofing does not stop water vapor. This can be a tough concept to grasp. Waterproofing seals a surface so water doesn't pass through it but it does not always stop water vapor from passing through. Waterproofing a shower stops water in liquid form, and vapor barriers stop water in gas (steam) form.

In the case of water vapor, you will want to consider installing a vapor barrier. Basically, any material rated at less than 1 perm is considered a vapor

barrier/retarder. A perm rating is a standard measure of the water-vapor permeability of a material. The higher the number, the more readily water vapor can diffuse through the material.

Examples of different wall coating products and their perm ratings:

- 6-mil plastic: 0.3 perms
- 15-lb. tar paper: 5 perms
- Laticrete Hydroban liquid waterproofing: 1.247 perms (2 coats, each 15-22 mils thick)
- Schluter Kerdi Waterproofing fabric: 0.75 perms
- Schluter Kerdi-board 1/2": 0.48 perms
- Noble Wall Seal sheet membrane: 0.22 perms

It's essential to take into account all forms of moisture when constructing a shower. For example, if you're planning a steam shower, waterproofing alone is not enough and you need a vapor barrier.

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Apply mesh tape to all corners and seams and then apply a coat of modified latex thinset mortar over them.



Note the mesh tape in the corner which strengthens the joints and helps bond to the thinset.



For the project I used the Hydro Ban waterproofing product from Laticrete.

copper from the wood. I also wrap 4 to 6 inches up the walls to protect the pan sides.

MUD FLOOR OR DECK MUD

To create a shower floor from scratch, I recommend using what is commonly referred to as "dry pack mortar" or "deck mud". Deck mud contains three ingredients: regular Portland cement, sand and water. That's it. A properly mixed and installed deck mud will create a shower floor that will last for years and years.

The ratio is very important to achieve the correct consistency and stability. You want 5 parts sand to 1 part cement. You want just enough water to dampen the mixture.

The easiest and most convenient way to get your mixture correct is to buy the Sand and Topping premixed bags which come already mixed at a 3:1 ratio. For a 60-lb. bag you need only add 30 lbs. of sand to get to the proper ratio.

DRAINS AND WALL PENETRATIONS

On mud floors the mortar covers all areas. Allow for a minimum 1/4-in. space between drains, pipes, lights or other penetrations and surrounding ceramic tile, stone or brick. To fill that gap, use a waterproof sealant and foam backer-rod to seal the space. Do not use grout, joint filler or thinset mortar, as it will not last with expansion and contraction movements around the pipe.

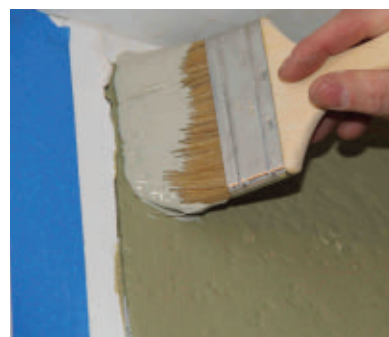
APPLYING THE WATERPROOFER

Apply mesh tape to all corners and seams and then apply a coat of modified latex thinset mortar over them. The mesh tape strengthens the joints and bonds to the thinset.

Allow the thinset to dry completely.

Apply the liquid waterproofing material with a 1/2- or 3/4-in. nap roller or brush. Thoroughly brush the corners to ensure complete coverage. Coat the walls completely. Then, coat floor to keep water out of the copper pan.

As I mentioned earlier I use the Hydro Ban product, and the first coat dries in 45 minutes. The second coat can be added after the first dries. One gallon covers 50 square feet for two coats.



Apply the liquid waterproofer with a brush or nap roller (1/2" or 3/4").



Thoroughly brush the corners to ensure complete coverage.



You can start at the top and work along the perimeter.



Complete the field of the wall. Hydro Ban is a two-coat product, and the second can be applied after the first is completely dry.

APPLYING TILE

Once the waterproofing membrane has dried to the touch, ceramic tile, stone or brick may be installed with thinset.

Allow the waterproofing membrane to cure for two hours at

70°F (21°C) and 50-percent relative humidity before covering with concrete, thick bed mortar, etc.

Note: Do not use solvent-based adhesives directly on the membrane, as it will dissolve the coating.

KEEPING WATER IN THE SHOWER

In the future, whenever you remodel a shower, make sure to take a few extra steps to waterproof your shower.

If you use a paint-on system, you can do 100 sq. ft. yourself for \$150 worth of materials and two hours of your time.

If you're paying a contractor, expect to pay \$150 plus a minimum of four hours of their time to purchase the materials, coordination into the project schedule, labor expense, overhead and profit. **EHT**

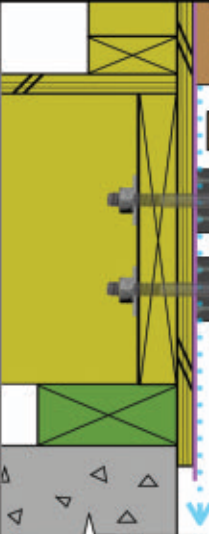
Editor's Note: Robert Robillard is editor of *A Concord Carpenter*. Visit www.aconcordcarpenter.com.



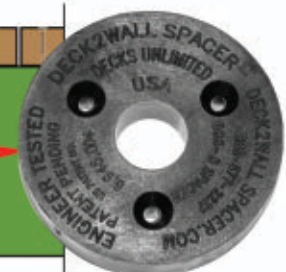
After the waterproofing is completed, the shower is ready for tile installation.

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Joint Health

Removing and Replacing Tie Rod Ends and Ball Joints



By Tim Walton Photos by Larry Walton

Worn out suspension components can lead to tire wear. This condition also makes the vehicle less responsive and generally unpleasant to drive. The number and location of ball joints can vary depending on what type of suspension your vehicle has. The ball joints allow movement in your suspension so it can conform to the contours of the road.

If a ball joint goes bad, it does not allow the wheel and tire of the vehicle to move as intended, which can not only cause undesired tire wear but also be potentially dangerous if the joint itself fails completely. Most of the joints are designed to be non-service-

able. However, if the boot wears out or is torn, they will lose their grease and wear at an accelerated rate. Some joints do have grease fittings where you can reapply grease and should be inspected when the vehicle is serviced.

A ball joint failing often makes a clicking noise, grinding noise or even a clunking noise when going over a bump. One way to diagnose ball joints is to lift the vehicle until the tires clear the ground and apply pressure to the wheel. You are feeling for extra movement or "slop". Check to make sure the movement is from the ball joint and not from something else such as the wheel bearing.

On the Subaru shown here,

we're also addressing another issue that comes with vehicles that have aftermarket suspension, which is to reduce bump steer that can occur when you lower the vehicle. The replacement kit from Whiteline includes extended ball joints and outer tie rod ends to move the pivot point of both suspension components to correct for the change in ride height.

When a vehicle is lowered, the angle of the tie rods and lower control arm can add more body roll in addition to the undesirable bump-steer feedback in the steering wheel. While this installation addresses these issues on a lowered car, the same installation process applies to replacing worn parts on a stock car.



Whiteline's Roll Center Adjustment Kit comes with a pair of outer tie rods and a pair of ball joints to replace the stock units. If you're replacing factory equipment parts with similar geometry, the parts will be sold individually rather than in a kit.



We removed the wheels from the vehicle. If you're not lucky enough to have a lift, be sure to place jack stands at the proper points to safely support the vehicle.



Removing the front sway bar end links allows the control arms to move independently, which gave us the movement in the control arm we needed to remove the lower ball joint.



The outer tie rod is connected to the spindle using a castle-type nut. A cotter pin holds the castle nut in place and must be removed before the 19 mm nut can be removed.



The cotter pin and castle nut needs to be removed from the bottom of the ball joint so it can be removed from the control arm.



We used a pneumatic impact wrench to make short work of removing the castle nuts that hold the lower ball joints in place.



A deep socket gave us the clearance (over the rotor and dust shield) to remove the castle nut holding the outer tie rod.



Depending on the age of the car and the amount of rust on the ball joints, they may come out easily or be a real challenge.



A ball joint removal tool makes short work of removing the ball joint. The tool can also save the stock ball joints and grease-filled boot, which in this case were still in good condition.



The constant force applied to the ball joint by the tool will pop it loose and won't damage threads or other components that might come with trying to hammer them loose.



Remove the bolt that holds the top of the ball joint in the steering knuckle.

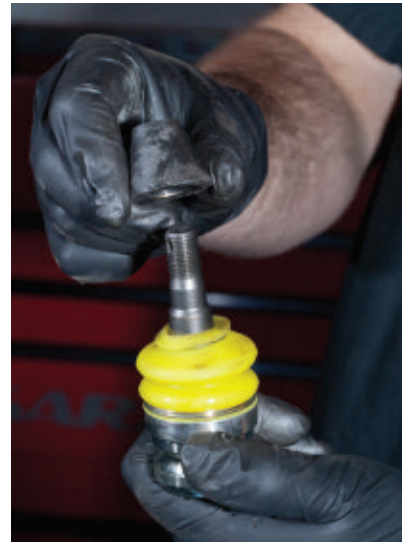


You can use a small pry bar or a sturdy flat-blade screwdriver to pry apart the knuckle to release the ball joint from the steering knuckle.

This model of Subaru Impreza, the STi, uses alloy sleeve inserts that fit over the steel tapered stud on the ball joint to adapt them to the aluminum lower control arms. Make sure to transfer them over to the Whiteline ball joints.

You can apply anti-seize on the ball joint to aid in removing them at a later time. It prevents the ball joint from rusting into the steering knuckle as well.

Installing the ball joint required some prying. A floor jack can help



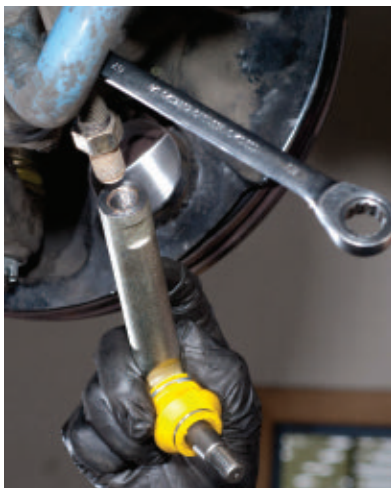
push the control arm into position, which allows you to insert the bolt to hold it into place.



Measuring and/or marking the length of the tie rod ends can help you keep the vehicle's alignment close to what it was before the install. However, you should take the vehicle to get an alignment check any time you do a major overhaul of the suspension components.



We used two wrenches to free the lock nut, which holds the outer tie rod end in place.



Once the tie rod is loose, you should be able to spin it off freely

and replace it with the Whiteline replacement tie rod end. Try to get it close to the same location as the original tie rod. We locked the tie rod end into place using the lock nut and manufacturer's torque rating.



We reinstalled the tie rod ends and ball joints using the new castle nuts supplied in the kit.



Tighten and torque the ball joint and tie rod end components to the manufacturer's specified torque ratings, which can be found with some research.



We reattached the sway bar, which we removed earlier to move the control arms. Double-check that everything is tightened and torqued.



You may have to rotate the castle nuts to get the cotter pins to fit into the holes. Bend them over so they don't fall out. **EHT**