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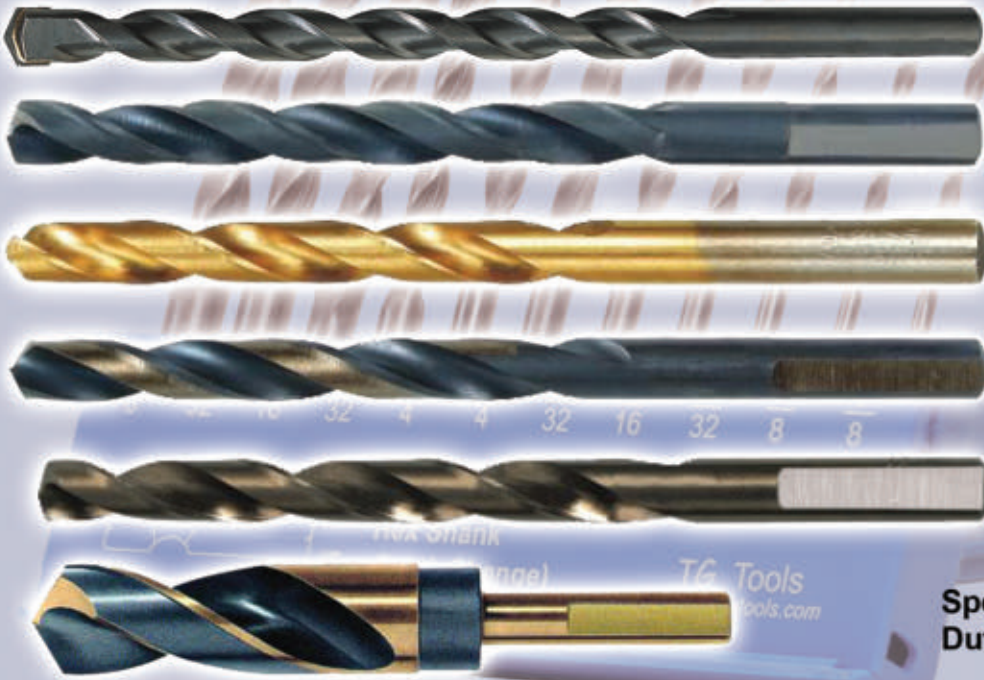
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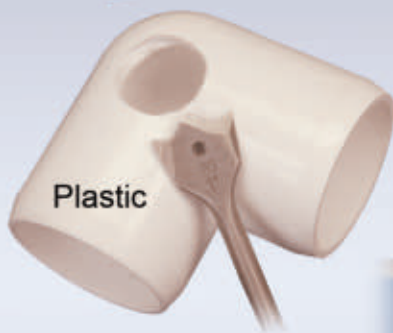
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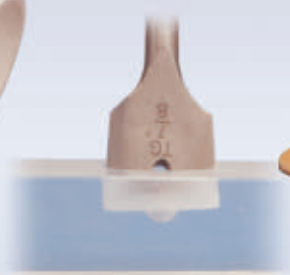


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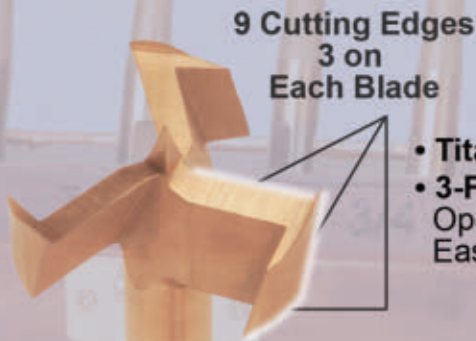
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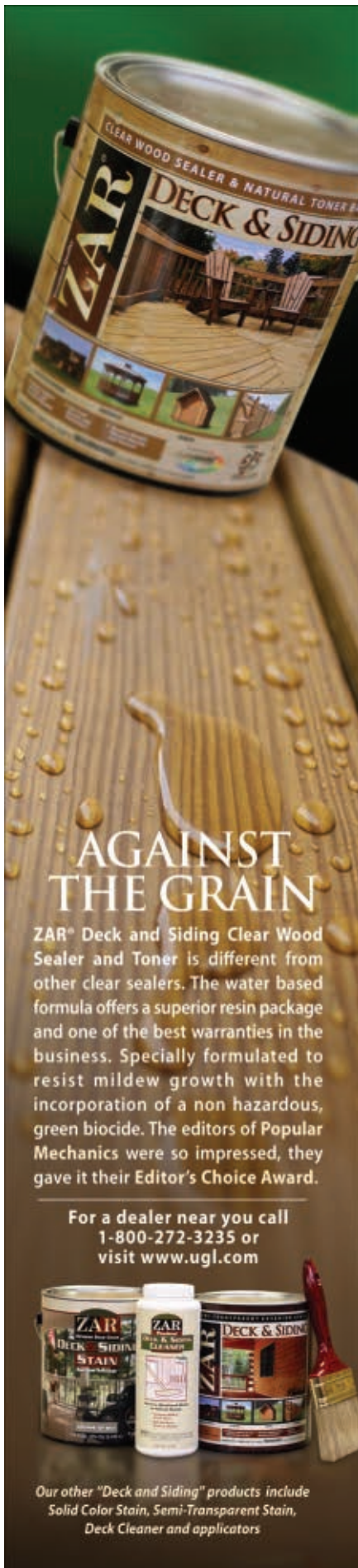
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Back in high school, chemistry was never exactly my strong suit. I was interested in volatile chemical reactions, such as frothing desktop volcanoes and the excitement of a possible classroom explosion. But once all the letters and numbers got involved, the lengthy equations caused my eyes to glaze over. I lost all interest. It's a good thing that's not true of everyone, because the wonderful world of chemistry has given rise to a trio of the most innovative home-improvement technologies that I came across at this year's National Hardware Show in Las Vegas.

For example, a new product called Fast2K comes in a small book-sized pouch but replaces 50 lbs. of concrete for setting deck and fence posts. Having built both the deck and fence around my house, I know too well the sweaty, hard work involved with mixing concrete and setting a post, and it doesn't get any more fun when you have dozens more to go. With the new Fast2K product, just break the seal on the two-part pouch, mix for thirty seconds, position the post and then pour the product around the bottom. I watched a demonstration and was amazed at how the product expanded within two minutes to completely fill the space around the post, setting it securely. Check out www.Fast2K.com.

Another innovative product is Bondic, which is a liquid synthetic material that hardens in seconds using an ultraviolet LED. Unlike conventional glues that require the application of pressure or a lot of time for them to harden, Bondic offers an impressively simple alternative. Although the liquid adhesive appears and applies similarly to super-glue, it cures in a completely different way. The Bondic set includes a mini UV LED that emits precisely calibrated wavelengths of light. You can decide when and how soon you want the Bondic to harden using the LED. This type of repair enables users to fill in gaps left by missing fragments before hardening, in order to restore an object's function or appearance. Visit www.bondic.de.

Also, I discovered FiberFix, which is marketed as "100X stronger than duct tape". This patent-pending product looks much like fiberglass tape (the kind doctors use to cast broken bones) but is designed to provide the strength of epoxy. Just get the tape wet to activate the product, wrap the object to be repaired, and after 10-15 minutes of cure time

the FiberFix tape "hardens like steel". The repair is waterproof, sandable, paintable and resistant to heat and cold. Go to fiberfix.com.

My hat's off to the worlds' chemists. They stole the show at this year's convention. I'm always impressed by the real world solutions those savvy scientists devise using all those crazy equations.



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Q: I replaced the flooring in a bathroom. I reinstalled the toilet afterward, but the inlet to the tank is now 1/4 to 1/2 inch away from the water supply line, which is a rigid pipe that isn't long enough and refuses to budge. Can I inch the toilet backward to reach the supply line?

A: Assuming you've used a conventional wax ring gasket to install the toilet, you cannot reposition the toilet without compromising the gasket, which will likely result in a leak. Some newer toilet gasket products from companies such as Sani Seal are wax-free and repositionable, but you only get one shot at using a conventional wax gasket. At this point, the easiest fix would probably be to replace the old supply line with a flexible braided supply line long enough to easily reach the inlet of the toilet tank.

Q: What's the difference between enamels, latex-base and oil-base paints?

A: According to the experts at Sherwin-Williams, enamel is a broad classification for finishing materials that dry to a smooth finish. In the past this term referred only to oil-base coatings, but some new latex products are also referred to as enamels, which makes the word somewhat ambiguous as a paint term. Oil-base products are typically composed of pigments dissolved in a mineral spirit such as paint thinner. Latex-base products are an emulsion suspended in water. From a practical standpoint, the biggest difference is that oil-base paint requires mineral spirits for cleanup, have a longer dry time, have a stronger odor, but dry to a harder finish. Latex products typically will dry faster and are easier to clean up, requiring only water. Oil-base paints are used primarily where a harder finish is required. However, today's improved latex products allow the substitution of latex in nearly all scenarios that had traditionally called for an oil-base paint. (Source: www.sherwin-williams.com)

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A: The PEX material can be used outdoors if it is buried or otherwise protected. PEX piping can deteriorate in the presence of ultraviolet rays, so it should not be used outdoors if it will be exposed to sunlight. That old standby, copper piping, not only resists corrosion but is also unaffected by ultraviolet rays, which is one advantage copper has over PEX. Copper would be better suited for any outdoor lines that will be exposed to the sun. You should also install a back flow prevention device to make sure no water from the pond can be siphoned back into your drinking system.

Q: How do I fix a sagging refrigerator door?

A: A sagging door isn't just an eyesore. If the gasket doesn't seal properly, the refrigerator will work harder to keep a cold temperature, wasting energy, costing extra money and stressing the appliance. This can also lead to frost buildup in the freezer. The door can be adjusted by removing the hinge cap and loosening the hinge screws. Align the door with the top of the refrigerator and then re-tighten. If the unit has both an upper and lower door, adjust the lower door first using the middle hinge, and then adjust the top hinge afterward to realign the upper door. **EHT**



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New Jigs and Accessories



By Matt Weber

Jigs and tool accessories provide a handy way to get more efficiency, more versatility or more accuracy from your powered equipment. Attach an auger to your drill/driver to plant a garden. Use an angle gauge to transfer a tricky crown molding angle to your miter saw. With the right accessories your tools can do more jobs, and do them better. Here's a handful of power-tool helpers that are currently on the market.

POWER PLANTER AUGER

Whether you're planting annuals, shrubs, bulbs, or are mixing paint or small batches of concrete, the Power Planter Auger will speed up your job dramatically compared to using a garden shovel or trowel. The #207 Power Planter Auger

features a 3/8-in. non-slip hex drive that fits any 3/8-in. or larger corded or cordless drill. It's perfect for planting 4- and 6-pack annuals in containers or flower beds, as well as planting grass plugs. The 2-in. diameter by 7-in. long auger is constructed with a heavy-duty 5/8-in. steel shaft and durable 10-gauge flighting. The #207 Power Planters are hand-welded, hand-dipped in high quality gloss black enamel paint, and ship in a hangable box for pergboard storage. Power Planters are Made in the USA and come with an unconditional warranty on materials and workmanship, excluding normal wear and tear. Visit www.powerplanter.com.

GENERAL'S E-Z PRO CROWN KING

It's always a challenge to make accurate cuts in crown molding to create seamless joints at inside or outside corners. The new E-Z Pro Crown King (880) from General Tools & Instruments makes it a snap to cut crown molding accurately, eliminating trial and error and saving time and money. Unlike other crown molding jigs on the market, the Crown King



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requires no assembly and is designed for the ultimate ease of use. It enables professional and DIY woodworkers to produce inside and outside corners with the three most common crown molding spring angles (38, 45 and 52 degrees). In combination with a miter saw, the Crown King can create precisely joining angles every time. Simply measure the corner angle, divide it by half, set your miter saw to



that angle, cut and fit. No complicated compound miter angle calculations are necessary. Visit www.generaltools.com.

SKELETON JIG SAW BLADES

Spyder introduces the Skeleton Jig Saw Blades. These blades feature a number of unique design elements that produce a cleaner, straighter and cooler cut in hardwoods, softwoods, synthetics, plastics and engineered wood products. The rectangular channel section cut-outs dissipate frictional heat throughout the length of the blade so it stays cooler, resulting in less deflection and straighter cuts than a traditional jig saw blade. What makes the Skeleton Jig Saw Blade a cut above the



competition is its rip-cut, gill-shaped teeth for highly clean and precise cuts. This design allows the blade to remove material on both the up and down strokes, and since the teeth maintain constant contact with the wood, the edges of the blade barely touch the sides of the cutting channel. Manufactured in Germany, the Skeleton Jig Saw Blades come in 10 TPI (Teeth Per Inch) and 12 TPI in both T-Shank and U-Shank configurations. Woodworking, multi-surface and combo packs are available. Visit www.spyderproducts.com.

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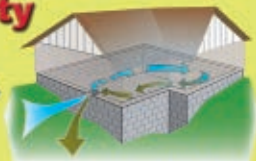
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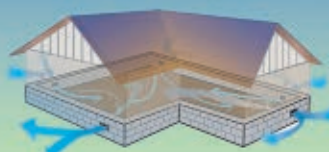


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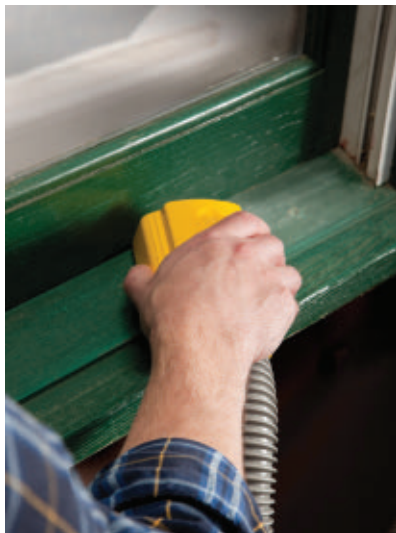
- Standard kit includes 12 oak wood stair treads, a landing, a complete handrail, and all necessary hardware and connectors.
- Diameters available include a 5 ft. 3 in. model and a 4 ft. 3 in. model.
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- Powder coat finished painted in either Hi-Gloss Black or Hi-Gloss White.
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- Stair treads and landing are made of solid Oak wood with a natural stain and a polyurethane protective coating.
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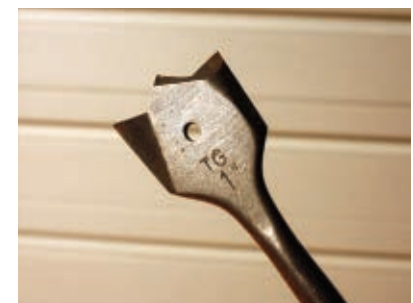
corners and even cylindrical surfaces, too. The inserted solid metal guide offers the six common drill diameters: 1/8, 3/16, 1/4, 5/16, 3/8 and 1/2 inch. The metal guide is held at a tight



tolerance and allows you to drill a hole 90 degrees to any surface, centered on a round item or even directly into the corner of your project. Centerlines ensure accurate alignment when drilling into various surfaces. The non-slip padding holds the DrillBlock in place when drilling. The ergonomic design of DrillBlock fits into the hands easily for comfortable usage. Visit www.milescraft.com.

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- You should always make sure that a qualified engineer has designed your footing forms and that they have been tested by an accredited organization.
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- Select a footing form made of environmentally friendly, sturdy materials.
- Ensure you are placing the footing form on solid ground. The more solid the ground the less likely movement will occur.
- Install your footings 4-6 inches below the frost line to avoid potential movement. If you are in an area without frost, then the form should be back filled 2 feet to hold it in place when it is being filled with concrete.
- Should rebar be required pour concrete into the system first. Insert three or four number 4 or 5 rebar rods into the tube. To determine the length of rebar, measure the distance from the top of the tube to the air holes located on the Bigfoot Systems® Footing Form before you place the system in the excavation and backfill.
- Purchase the amount of concrete started on the form label. You will use all of it.
- Use a Bigfoot Systems® Footing Form as a funnel to pour concrete into the system by placing an inverted Bigfoot on top of the construction tube.
- For a marine application, such as constructing a wharf, pour the concrete into the footing and tube on shore and have an excavator set them in place in the water. The other option will entail using a diver and pumper truck.
- Footing forms should always be used when installing footings as they provide added stability, strength and safety to your new construction.
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found on similar bits, which allows these spade bits to drill a curved hole. Great for plumbing and electrical installations, simply start the drilling as usual and you can angle a hand drill as you bore,

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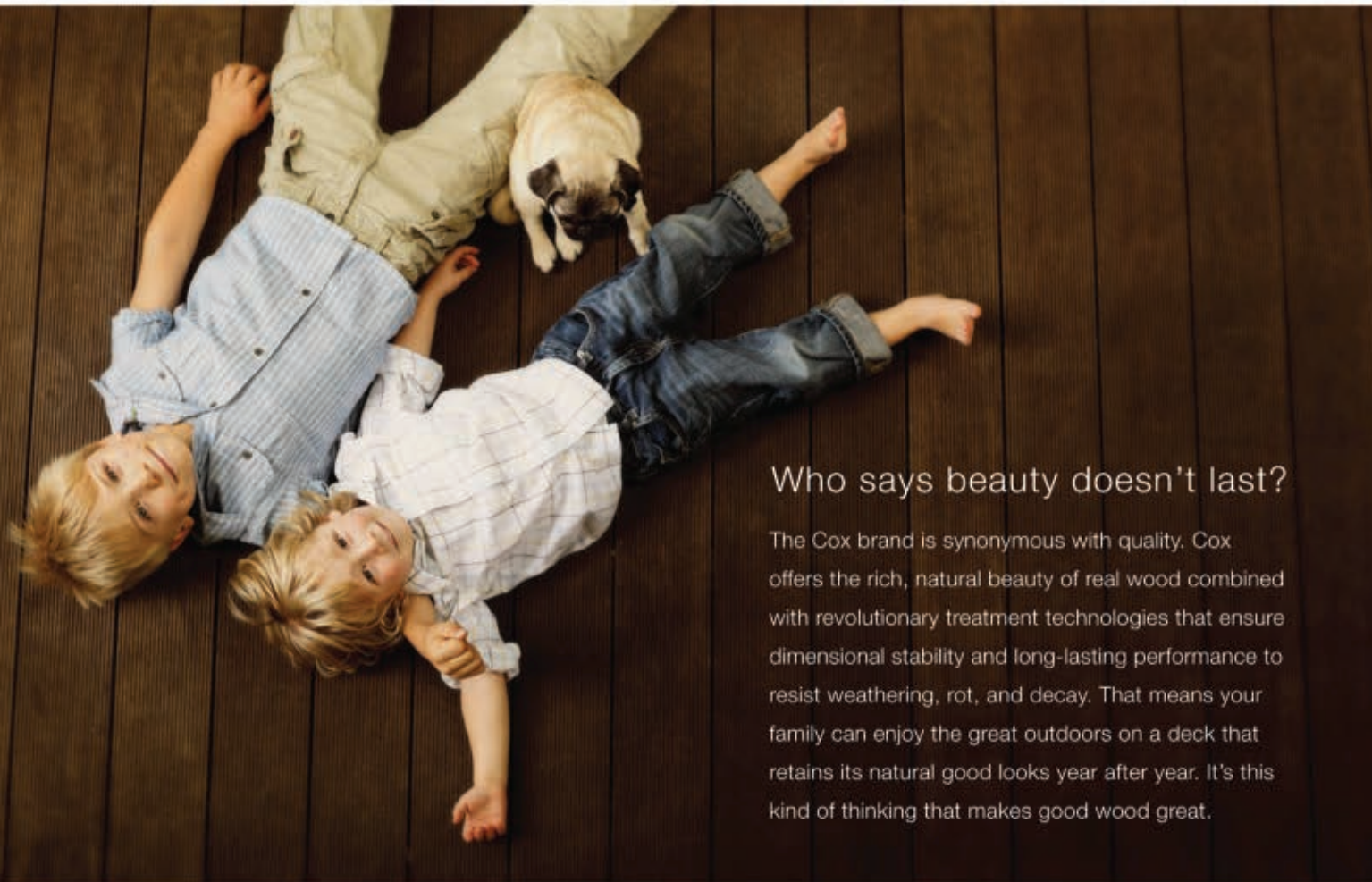
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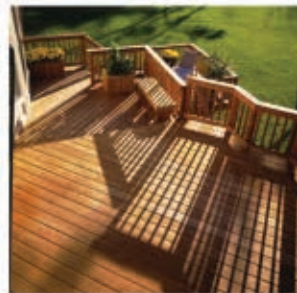


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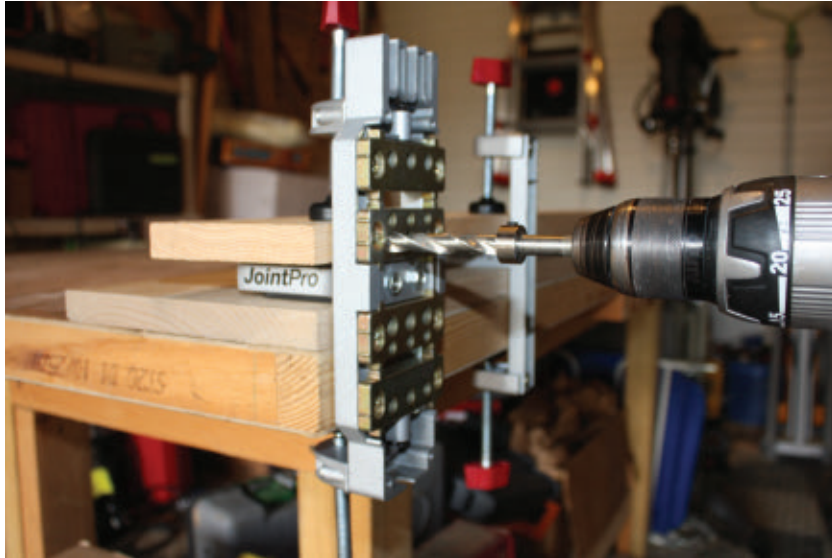
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Install a Clay Paver Patio



Installing a clay paver patio is great DIY summertime project that enhances the look of the home's outdoor environment.

By Walt Steele

The warm weather is here, and it's time to get outside. A good summertime project for DIY'ers is to build a patio of genuine clay pavers. To get started, figure out how you plan to use the space.

Gather everything that you will regularly want on your patio—the grill, the children's toys, patio furniture—and place everything where you will want it to go. Use a garden hose or spray paint on the grass to outline the size of the patio.

Visualize beforehand how you want the patio to look. Think about what the overall shape will be and what pattern you'll use. A curved

patio, for example, is less formal than a rectangular or square one. In terms of patterns, a basket weave pattern is ideal because full pavers can be used throughout in a square or rectangular shaped installation. Using a running bond or 90-degree herringbone in rectangular areas will only require half-cuts, while a 45-degree herringbone requires cuts around the entire perimeter. That would mean renting a wet saw for at least a day, which would add an additional expense to your project.

And before you start digging, always make sure the underground utilities have been located and marked.

Conventional installations require pavers, crusher run gravel and sand, edge restraints, a compacting machine or hand-held tamper and a broom.

As a general rule, conventional pavers require about 4 inches of compacted crushed stone as a base for pedestrian use; or deeper, to up to 8 inches for more harsh climates where ice heaving is a problem. For vehicular uses, a base of between 8 and 12 inches is recommended. Another good rule of thumb is to find out the generally accepted practices in your area and use them.

Dig down deep enough to include the depth of the crusher run gravel, one inch of sand on top of that, and the paver itself. When you're done, the paver should be flush with the top of the ground. Dig six inches out beyond the area you will pave. Slope the soil about 1/4 inch per foot to allow for proper drainage away from the home. Next, tamp the soil down with the tamper or plate compactor.

Put down the crusher run gravel and compact it well. Then, lay down two lengths of 1-in. PVC pipe, parallel to each other and several feet apart. Cover the pipes with concrete sand (course, jagged sand) and use a board across the top of the pipe to screed the sand level.

Remove the pipes and use a trowel to fill and smooth the voids. Lay the pavers in place, using string lines to ensure a straight pattern.

Next, install edge restraints,

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DO IT YOURSELF

which can be metal or plastic, or even a row of finished pavers stood on end and buried to finished height. Troweled concrete that's later backfilled can also be used as the edge restraint.

Tamp or compact the pavers into the sand bed using a piece of scrap plywood, a square of old carpet or a plastic pad on top of the pavers to avoid chipping. After that, sweep sand into the joints. In a week or two, you'll want to see if more sand is needed in the joints after it has settled.

EXISTING CONCRETE

To install pavers over an existing concrete patio or walkway, begin with thinner pavers that are 1-3/8 inches thick and made for this purpose.

Lay a "soldier course," which means laying a line of bricks perpendicular to the edge of the concrete to form the outside frame of your project. Use four

As a general rule, conventional pavers require about 4 inches of compacted crushed stone as a base for pedestrian use.



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dots of masonry adhesive on each brick, each about the size of a penny, which allows rainwater to pass underneath.

On the inside of the soldier course, cut pieces of roofing felt to put a single layer inside the frame covering the concrete. Don't overlap the felt edges. Then, lay a second layer of felt perpendicular to the first, over the top of the first layer. The felt keeps the pavers from rocking against the concrete when you walk on it.

Starting at one corner, begin laying the pavers in place, leaving a 1/8-inch gap between the pavers. Finish by sweeping sand between the joints until they are full.

PERMEABLE PAVERS

Permeable pavers are somewhat similar, except that special open-graded aggregates without fine particles are used instead of crusher run and sand. Additionally,

Cover the gravel bed with concrete sand (course, jagged sand) and use a board across the top of the pipe to screed the sand level.

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the permeable pavers themselves have larger nibs—spacers that keep the pavers apart—and allow water to seep in-between them.

Figuring the depth of the underlayment is also different. The

standard method is to dig down a minimum of 12 inches. Some installations, such as streets, will require a deeper excavation. Since the idea is to trap stormwater and then release it slowly into the

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After placing the paver stones over the sand bed in your preferred pattern, sweep sand over the installation to fill the joints between pavers.

ground underneath, the depth depends on how much water needs to be handled, and that's a question for an engineer.

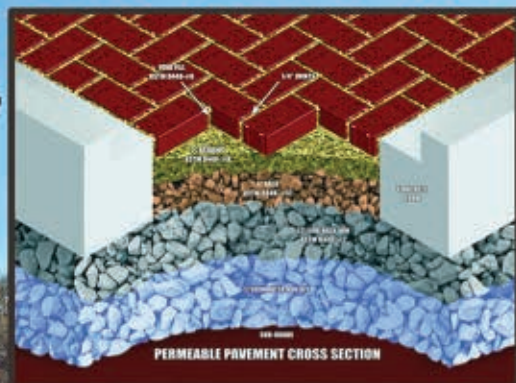
A #2 stone is used as a sub-base, followed by a finer grade of #57 stone. The bedding layer, just beneath the pavers, is made up of #8 or #89 aggregate, which is also swept into the joints. Every 4 inches of depth, the aggregate is rolled or compacted into place. Once the surface is prepared, the pavers are put into place. **EHT**

Editor's Note: Walt Steele, is a recognized expert on clay pavers. He is paver business manager for Pine Hall Brick Company. Steele can be reached at (800) 334-8689 and at waltsteele@pinehallbrick.com. For more information, visit www.PineHallBrick.com.

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THE PERFECT WORK- BENCH

Give your workshop a workout by building the perfect workbench.

By Rob Robillard

Okay, that was misleading. There is no such thing as a perfect workbench. I can say this because I've built and rebuilt my workbench at least five times in twenty years and I'm now considering a new design. I'm not alone in this quest for the perfect bench.

A workbench can be the most essential part of your workshop or garage, but know that there is no "holy grail" of workbenches. The fact is that all workbench designs end up as a compromise.

Essentially, a workbench is a platform to get stuff done. It can be a simple table with a machinist's vise bolted to its top or built to accommodate a number of different work-holding mechanisms.

BASIC FEATURES

A good bench should be heavy enough that it doesn't move while you're working, and stiff enough that it doesn't rack to pieces under the forces that will be placed upon it.

Most DIY'ers would agree a good bench needs these key features: For starters, the base must be sturdy—no wobbling allowed. It must have a large, flat work surface that's rugged enough to stand up to years of hard use. It must be a comfortable height, and the bench should suit the type of work you spend the most time doing. Tool or parts storage is nice, but not critical.

There are many methods to build a workbench. You'll find a number of plans for sale online, all with varying degrees of cost and

THE PERFECT WORK- BENCH



Workbenches are built for many different jobs, such as this classic woodworking table. Woodworking benches usually include vises and other hold-down accessories.



sophistication, but most of them are really just tables. The key is finding the one that works best for you.

Woodworking benches tend to include elaborate work-holding systems with items such as bench dogs, planing stops, hold-fasts, board jacks, and will usually have one or more woodworking vises integrated into its structure.

If you're like me, however, you'll build your own solid, versatile work-surface for assembling all types or projects, including home repair issues like repairing a wobbly stool or re-sharpening lawn-mower blades. It's nice to keep the cost down, too.

DESIGNING YOUR OWN WORKBENCH

If you're considering making your own, take a moment to examine

how you will use the workbench. Analyze your needs based on the type of things you do in your workshop, the types of tools you use and your workshop or garage's limitations.

I use a principle of simple observations in almost all aspects of my work, designing a workbench included. It's called the Pareto's Principle or the 80/20 Rule. I've used the 80/20 observation to determine how to build a workbench, size, height, accessories and other factors. The 80/20 refers to the "vital few and trivial many". The principle states that 20 percent of work is always responsible for 80 percent of the results. That means I need to focus my design on the 20 percent of my work that really matters. Don't just "work smart", work smart on the right things.

So how do I apply this to my work bench? It means building a bench that optimizes your specific tasks. For starters, figure out the specific tasks for which you will most often be using the bench.

To me, there are three basic workbench use applications: General work/construction; sanding, cutting and hand-plane applications; assembly and repairs.

Here are some important design considerations you should consider. Ask yourself the following questions:

- Is your bench going against a wall?
- Do you need 360 degree access to your bench?

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THE PERFECT WORK-BENCH



Here's an example of a custom-built assembly table (no top yet).

- Will you be placing heavy objects on the bench?
- If yes, should you install casters for mobility and storage?
- Will casters affect your working applications, such as hand-planing?
- Will you be mounting a vise, saws or other bench-top tools permanently?
- Do you need shelf or drawer storage?
- Do you have space to stretch out long boards?
- Have you considered electrical and lighting considerations?

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Once you answer these questions you'll have a good idea of what type of a bench you need, with the least amount of compromises. The goal is to design a bench that meets your needs for the majority of situations.

CORRECT WORKBENCH HEIGHT

Customize the size of your workbench to your body height. Most workbenches range from 28 to 36 inches deep, 48 to 96 inches wide and 28 to 38 inches tall.

TIP: If you're unsure about your preferred bench height, build your workbench legs without a horizontal cross brace at the floor. This way if the bench is too high you can later trim it down in height.

The amount of space you have available will likely dictate its



This photo shows the assembly table being used as an outfeed bench for a table saw, while providing ample tool storage.



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THE PERFECT WORK-BENCH



When incorporating a bench into your garage or workshop, don't forget to provide power for lighting and electrical outlets.

depth and width. Size your bench so you can move material and equipment past it freely, and so it's not a constant obstacle in your workspace.

WORKBENCH HEIGHT RULE OF THUMB:

General work: For basic joinery and construction, set the top of the bench to your belt line

Sanding, cutting, hand-plane work: Set the top of your bench 6

inches below the belt for better leverage

Assembly and repairs: Set the table top 6 inches above the belt.

Assembly of large items: Set the table top 12 inches or more below the belt.

BUILD IT STRONG

The secret to the strength of any workbench is selecting the right materials and building a sturdy base and top. A simple,

cost-effective workbench can be built with 2x or 4x stock, and the top, shelf, and end panels can be sanded plywood or plank stock. I choose these materials for their sturdiness, low cost, and ready availability.

When assembling the bench, keep fasteners and joinery simple. Use glue, and pre-drilled lags or structural screws. Build your bench like a house with continual point load and a strong foundation.

Resting the tabletop on the legs is stronger than attaching the legs from the side using only fasteners. Again, this all depends on how much weight you plan to put on the table. Are you building cedar birdhouses or rebuilding a Chevy V-8 engine?

TIP: For wall-mounted workbenches, install the bench on a ledger board or blocking mounted into existing wall studs. Align the tabletop so the ends of the plywood are even with the outer edges of the studs. Most studs are laid out and installed 16 inches on center, and this works well with plywood sheet stock measurements. Additional studs or supports can be added if needed.

GARAGE DOOR CHECKUP

For many DIY'ers the home's garage doubles as the home workshop, and proper maintenance is important. Corrosion and metal fatigue will eventually cause the components of a garage door to fail, but you can extend its life with a little annual upkeep. Lubrication prevents corrosion and allows the moving components of the door to move more quietly and smoothly with less wear from friction. Lubricate the the chain drive (or screw drive) with white lithium grease, available at any home center. You can coat overhead torsion springs or extension springs with standard WD-40.

Check the door rollers every year for wear and tear. Nylon rollers tend to crack apart, and the worn bearings of steel rollers can cause the wheels to deflect. Replace as needed by removing the roller bracket (but do not remove the bottom bracket).

If the door doesn't close far enough or returns once it hits the floor, you probably need to adjust the travel setting of the door opener. Check with your manufacturer to determine the adjustment procedure. Some door openers have set screws you can adjust with a screwdriver, while other units have knobs or trip levers for adjustment.



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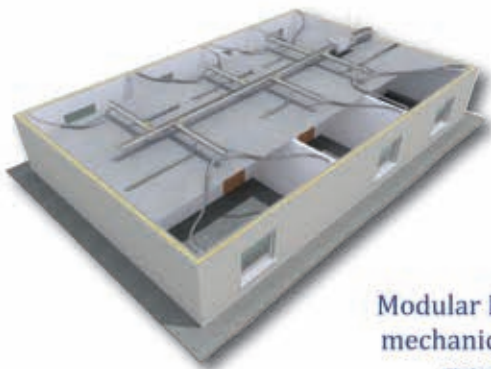
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THE PERFECT WORKBENCH

STORAGE

Consider incorporating storage options into the bench or its surroundings. The more shelves, drawers and tool holders one has, the better. All the nooks and crannies add up to lots of storage space, which makes it easy to organize and locate needed tools, supplies, fasteners, etc.

I'm a big fan of cabinet doors and shelves to hide my tools and keep them dust-free, but doors and drawers do add cost and complexity to the building process.



POWER AND LIGHTING CONSIDERATIONS

Plan for electrical power and lighting. If you're fortunate enough to be wiring your own shop, dedicate 20-amp circuits along the walls, including one or two for your workbench.

Proper lighting in your workshop is as important as any tool in your toolbox. Whether it's to see what you're doing, to illuminate mill marks on wood surfaces or for photographing of your work, having adequate and proper lighting

is important. Make sure you have ample lighting positioned to reduce shadows that may compromise productivity or safety.

Most of the light in the workshop should come from overhead lighting. The overhead fixtures should be spread out to provide consistent overall lighting throughout the entire shop without major dark spots.

Fluorescent lighting is the least expensive way to light a workshop. These fixtures can be installed with screws, and are no more difficult than installing a regular light fixture. The lights are bright, use very little electricity and are easily replaced.

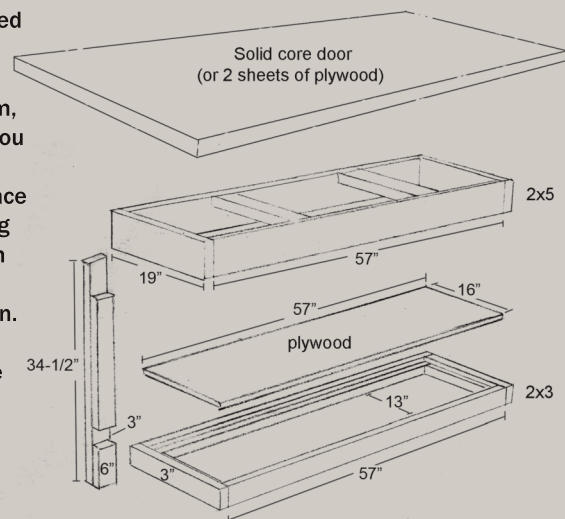
Spot lighting can also enhance the workspace. In addition to the overhead lighting, it may be advantageous to place recessed flood or spot lights directly over some of your tools and workbenches.

Many tools now come with on-tool lighting. My drill press is one of them. You can purchase aftermarket lighting with heavy-duty

Adding storage options to your bench or its surroundings will help organize the workspace.

BEEFY SHOP-MADE WORKBENCH

This workbench, which we use in the EHT workshop, is constructed from 2x6s, 2x4s and 2x2s. I first ripped the rounded edges off the lumber, so each 2-by-4 measured 3 inches, and each 2-by-6 measured 5 inches. I then assembled it according to the diagram, sizing the height for a 6-ft. tall person to work comfortably, but you can adjust the height of your bench accordingly. I used 2-1/2-in. No. 8 wood screws when fastening through 2x lumber into the face of another 2x board. I used 3-in. screws, however, when fastening through 2x lumber and into the end of a board. Make the bottom shelf by cutting your sheet material of choice to fit flush into the lower frame over the 2x2 edge supports, and fasten with 1-5/8-in. wood screws. The sturdy top is nothing more than a solid-core door available at any home store, centered on the table frame and screwed to the brackets from beneath. — *Matt Weber, EHT editor-in-chief*





Shelves don't have to be fancy. Simple wooden platforms can store items off the floor and easily visible.

magnets or just install a simple clamp light to such tools. These task lights are a great supplement to your overhead lighting but should not be a replacement for poor shop lighting.

If you have cabinets over a workbench then under-cabinet lighting is a perfect solution for task-lighting the bench.

Finally, as good as your bench is, you can make it even more versatile by adding a bolt-on woodworking or mechanic's vise.

HOW TO BUILD A ROUGH SAWN WORKBENCH

The workbench shown here was made of materials left over from

a previous project. Most of the workbench parts came from rough sawn 2x10-16-ft. staging plank material. The planks sell for \$34.00 each, were used and not returnable, so they became the "perfect" material to allocate to this workbench.

This bench measures 25-by-87-by-48-in. high, and is made from a combination of the rough-sawn planks and some 4x4 stock for the legs. The planks make up the top and shelf, and the supports are ripped down plank sections.

1. Determine footprint of your workbench, which means determining the Width x Length x Height.

2. Check the floor level in the area where the front legs will sit. Are they level or will the legs be different heights? Make a note and put aside for later.

3. Cut the bench-top planks to length and rip them for even spacing. The benchtop planks were ripped so three boards fit evenly



This rustic wooden bench was built from rough-sawn 2x10 planking and 4x4 stock.

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THE PERFECT WORK-BENCH



The strongest benches are always supported by the table legs from beneath the top. The top of the rustic bench is supported by 2x3 boards every 16".

up against the horizontal beam of our post-and-beam building. The bottom shelf ended up deeper because it extends to the outer wall.

4. Rough-cut the shelf planks and put aside. Rough-cutting means leaving them 3 to 4 inches longer than you need.

5. Cut the 4x4 legs and put aside, the legs will sit directly under the bench-top planks. If the legs won't be sitting on a level surface, keep them longer than the height of the finished bench to trim later. Determine how far your bench-top will overhang your frame supports. You may want to consider vise clearances.

6. Rip the remaining plank stock into 2x3 boards for the support framing of the top and shelf.

7. Cross-cut four 2x3 long supports for the benchtop and shelf. Then, cut enough short supports to install them every 16 inches on center for strength and rigidity. (On this table the long supports are 72 in. and the short supports are 22-1/2 in.)

8. Determine shelf height.

9. Assemble the bench-top support and shelf support frames with using 3-in. galvanized decking or other structural screws.

10. Draw a level line on the wall and mount both frames into the wall

TRIPLE-DECKER STORAGE

For some easy and economical utility shelves, these three plywood shelves are supported by ladder brackets. Each bracket is constructed of two 2x2 legs bridged by three 2-ft. long 2x2 cross-braces. The cross-braces of the brackets are 2 feet apart, but you can customize the height of the shelves. I assembled the brackets using triangular gussets fastened with a combination of Gorilla Glue and wood screws to anchor each intersection of the cross-braces. Use a square to make sure you're assembling the brackets at 90 degrees. And measure between each corresponding cross-brace on each leg to ensure the braces are evenly spaced so the shelves sit flat. You can strengthen the shelves' stability by driving 3-in. screws through the 2x2 brackets and mounting them to wall studs, then adding the plywood. Or, for freestanding shelves, screw 1/4-in. luaun backing onto the legs at the rear to add structural rigidity.



studs with two 3-inch screws every 12 inches. Use temporary scrap wood supports if needed.

11. Clamp the legs to the level frame again and mark for notches. If the legs aren't level, this is the time to cut them. Notch the two outer 4x4 posts to accept the 2x3 support frames. Use a miter saw and handsaw to accomplish this.

12. Dry-fit the 4x4 posts to the outer edge of the support frame. Check for level and plumb, adjusting as needed.

13. Drill 5/8-in. pilot holes through the 4x4 posts and frames. Insert 1/2-in. carriage bolts with washers through the 4x4s and frame supports on the two outer legs. Tighten and check for level as you do this.

14. Measure the shelf support and determine how much overhang, if any, you want to see on your shelf.

16. Cut shelf planks and install with 3-in. screws into each 2x3 support. Use a hand saw or jigsaw to notch the shelf planks around the 4x4 legs. (Install these before the top planks for easier access.)

17. Install the top planks next, in the same manner.

18. Position the bench in your workspace and use it for all your projects.



It is critical that a workbench sits level, which means the legs may need to be cut at different heights if the floor isn't level.



Note that the legs are notched to carry the weight of the support frames of the shelf and top.

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surface preparation is key to a long-lasting finish, so take your time and follow the manufacturer's instructions carefully, such as allowing appropriate dry time between product applications. Once you have your floor completely clean and etched, you can apply a concrete bonding primer. Primer is recommended in order to get maximum adhesion from your paint. Epoxy paint is easy to apply with a brush (for cutting-in along walls) and a roller. Most one-part epoxies recommend two coats to get the best looking and longest lasting floor. For additional protection, you may decide to seal your epoxy floor with a clear sealer. Add a non-slip additive when applying sealer to provide a slip-resistant finish to your top-coat. Seal-Krete has a full line of products for your garage floor. Visit www.seal-krete.com.

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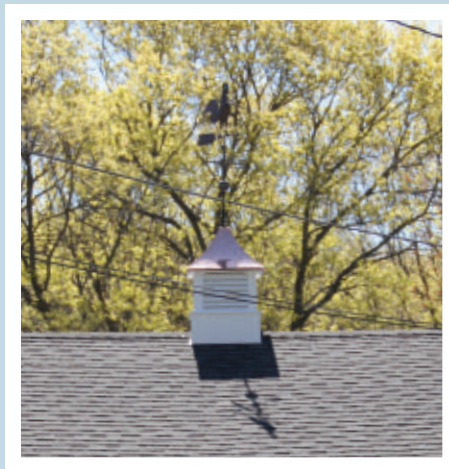
INSTALLING A CUPOLA

Top Off Your Roof

I love the look of cupolas, and this article will show you how to install a decorative cupola on your roof. I first had the opportunity to rebuild an 80- to 100-year old cupola in historic Concord, Massachusetts, and have since repaired several other cupolas of varying styles.

WHAT IS A CUPOLA?

A cupola can be a decorative or functional architectural structure mounted on top of a home or barn and usually centered along the roof ridge line. In my neck of the woods all barns worthy of their salt have a functional cupola. When functional, a cupola is used to ventilate a building or roof area. They are often made from wood, copper or composite materials. They can come as a single piece or, if larger, two or three pieces.



Cupolas of various styles were integrated into English domestic architecture during the late 17th century and became part of the U.S. architectural design during the post-Revolutionary Federalist era. Many new homes use decorative cupolas as architectural details to enhance the exterior design.

A decorative cupola differs from a functional cupola in that the roofing material and roof sheathing does not need to be cut away to create a vent hole. These types of cupolas should be installed with step flashing to prevent leaks.

The decorative cupola in this installation was built by a company called Walpole Woodworkers.

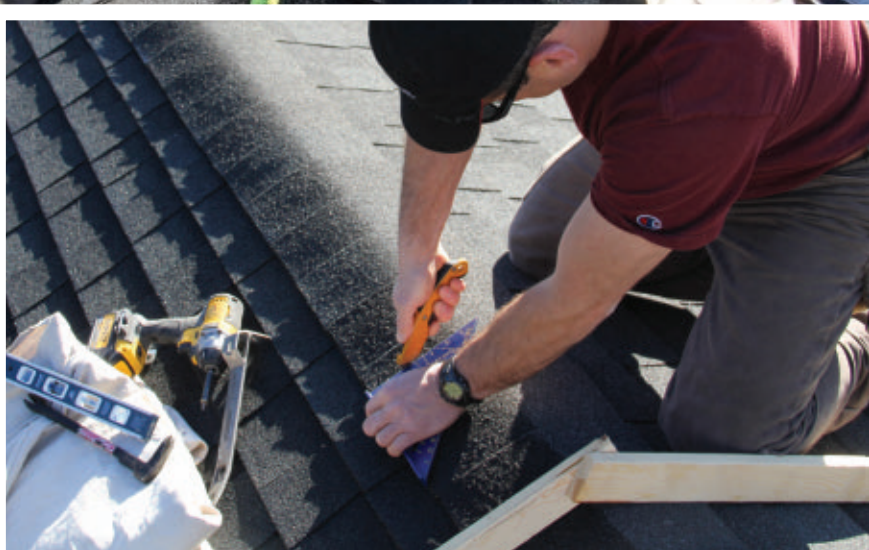
Cupolas generally have three major components: the base; the louver vents or windows; and the finial or weather vane.

By Rob Robillard



First step is to determine the cupola location. If the roof is longer than your tape measure, pull two tape measures from opposite ends and determine where the centers of the two tapes meet.

Remove only the roof ridge shingles where the cupola will be located.



HOW TO INSTALL A DECORATIVE CUPOLA

First step is to determine the cupola location. Measure and mark the center of where the cupola will be installed. If the roof is longer than your tape measure, pull two tape measures from opposite ends and determine where the centers of the two opposing tapes meet.

Measure left and right along the ridge line to determine the outer sides of the cupola.

Remove only the roof ridge shingles. I cut the center shingle out and then used a nail puller (cat's

paw) or a flat bar to remove the roofing nails and ridge cap shingles. The goal is to remove them in one piece so you can use them later for patching, if needed.

Cut and remove only the ridge shingles and/or ridge vent up to the outer edge of where the cupola will sit.

You may need to use the utility knife to trim the shingles back. Use care not to expose the roof sheathing. If you do you will need to patch this spot with rubber flashing tape or flashing and shingles to prevent water intrusion.

DETERMINE THE ROOF PITCH

On the ground, insert one screw into the ends of two 24-in. pieces of wood to make a hinge tool to copy the roof pitch. Bring this angle finder up to the roof and lay it over the area where you removed the ridge shingles.

Press the angle finder tightly to the shingles and then insert a second screw to hold it tight, locking the angle in place.

Once this is complete, use a level to mark a plumb line from the center of the ridge onto your



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INSTALLING A CUPOLA



Use two pieces of wood to make a hinged angle finder. Use the angle finder on the roof ridge to determine the pitch.

The cupola is made from composite material and arrived as a single piece.



angle finder. This plumb line will be your top reference line when tracing the cupola. Bring your angle finder off the roof to the cupola to be installed.

MARK THE CUPOLA BASE

Determine which sides will be the front and back of your cupola.

Measure and draw a center-line on the two opposing base walls on your cupola. These are the two sides that will straddle the roof ridge.

Using your angle finder, line up your plumb line on the center line and ensure that the bottom legs of your angle finder line up at the lower corners of the cupola. Doing this will ensure an accurate and symmetrical cutout.



Determine how the cupola will be oriented on the roof so you cut the correct sides to match the pitch.



Mark the centerline on the cupola and align the angle finder.



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Scribe the roof pitch onto the cupola. Cut the angle with a jigsaw.



Bring the cupola to the roof and test the fit.



Shown is the cut base. If you have a steep roof, greater than 9-12 pitch, you may need to install an extended base. Cut the opposite side of the base to match.



Use the ridge shingles that you removed, if in good condition, to make any necessary patches or to cover any roofing you removed.

Mark both sides of the cupola the same way and use a saw to cut out the angle along your marked lines.

If you have a steep roof, greater than 9-12 pitch, you may need to install an extended base.

MOUNTING BOARDS

Mount four sections of 2x4 blocks on the roof to fit flush inside the edges of your cupola. Pre-drill your holes in the block and apply silicone to the bottom of each block prior to attaching it to your roofing.

Mount all four blocks to the roof sheathing and drive the top fasteners into the ridge board.



Pre-drill holes in the 2x4 mounting blocks and apply silicone to the bottom of the prior to attaching them to your roofing.

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INSTALLING A **CUPOLA**

POSITION THE CUPOLA ON THE ROOF

Once you are satisfied with the fit on the roof, attach the cupola with two to three stainless steel screws driven into each mounting block. Plug or patch the screw holes. On PVC cupolas, I use the Cortex screw and plug system.

Apply silicone only to the seams that straddle the ridge and are

fastened to the mounting blocks. This will keep angled rainfall from getting under your cupola and affecting the 2x4 wood.

Leave the lower pitches' roof edges open to drain any wind driven snow or moisture that may make its way under the louvers.

Use the ridge shingles that you removed, if in good condition, to make any additional patches or to cover any roofing you removed. **EHT**



Mount four sections of 2x4 blocks to fit flush inside the edges of your cupola. Drive the top fasteners into the ridge board.



When mounting the cupola, apply silicone only to the seams that straddle the ridge and are fastened to the mounting blocks.



Attach the cupola with two to three stainless steel screws driven into each block.



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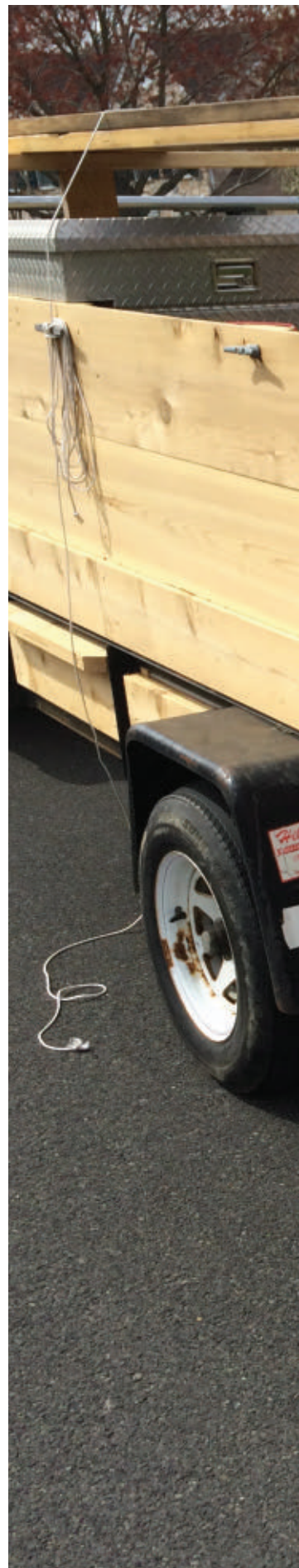
TRICK OUT YOUR TRAILER

By Mark Clement

I'm a trailer guy. Yes, a dump truck would rock for heavy haul-outs, and a big box truck would be great for storing tools and serving as a mobile workshop. But, depending on the day, the work we do may range from residential bathroom improvements to our Food Network bakery make-overs. We may also tackle a weekend DIY project like hauling mulch and a mower to a friend's house. This variety of jobs requires the flexibility a trailer offers.

We can also leave a trailer at the jobsite and just drive the truck by itself, which isn't possible with the aforementioned vehicles. Part FedEx, part dumpster, all workhorse, our trailer sees no end to its work ... or play, for that matter. A utility trailer is a king vacation machine, too. Forget about jamming everything you own into the SUV. Put the bikes, beach blankets and Beanie Babies in the trailer and ride in style.

If all you have is the common 16-in. tall angle-iron trailer body, you're limited to how much you can get in and out of a simple utility trailer. That is, unless you add to it.







A basic "no walls" utility trailer is the platform. Sure, it can carry some stuff, but will get left in the dust by a trailer tricked out to roll with all your building equipment.

TOOLS AND MATERIALS

Obviously, you'll need a trailer. Mine is a 5-by-10-ft. two-wheel utility trailer. Nothing fancy, yet.

The upgrade shown in this article requires 2x material for the posts and materials racks, 1/2-by-3-in. galvanized through bolts, 3-in. deck screws, and 1x or 2x material for the walls. You'll also need a drill and bits to drill out steel and a saw to cut stuff.

THE BUILD

First, cut the posts or staves. My trailer walls are about 40-1/2 inches tall. It's a great height for

everything I carry. I fill in the trailer framer around the wheel wells, then stack four 2x8s for the walls. I've made the staves from 2x4 in the past, but I beefed them up in this build to 2x6 pressure treated pine because I knew I'd be lashing loads to the top of them. (More on that later.) Also, install the vertical staves 'wild' and cut them to final length later.

You'll need to drill bolt holes through the trailer frame to mount the staves. Here's a tip for drilling steel that makes the job easier. First, locate the hole. Next drill a pilot hole with a small (1/8-inch),

very sharp bit that is designed to drill steel. Once the pilot hole is drilled, follow up with the right diameter bit, in this case 5/8-in. to accommodate a 1/2-in. bolt.

Use a drill to drill the holes, not an impact driver. Steel likes to be drilled more slowly than wood, so an impact driver might not perform well. Some people drip oil on the bit to keep it lubricated and cutting well.

Once the holes are drilled, square up the staves to the trailer body, then hold them fast with a couple of bar clamps. Drill through the steel and through the wood. Pop in the through-bolts and hand-tighten the nuts before socking them tight with a socket set or impact wrench.

I center all but the end and corner staves on the trailer's steel posts to make fastening the planking to the staves easier later on. It also gives the through-bolts the maximum meat to hold onto for heavy loads.

Next, install the planking. To make life easier I span the trailer's wheel well with blocking on the inside of the trailer, installing the boards flush with the staves. To make the butt-joint connections between the boards set edge-to-edge, I make what I call "no-jig pocket holes". I drill angled pilot holes large enough and deep enough to countersink the screws. This makes driving toe-screws much easier than any other method I've tried. For the oddball angles by the wheel well, I used



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the Starrett ProSite Protractor—love that thing—to lay out the angles.

Next, I start at the back and work my way around, piecing in

all the small pieces and ripped blocking to create a solid wall on the trailer frame. It gives me peace of mind hauling, well, everything.

I used 2x pressure-treated pine for the planking on this trailer upgrade, and it is virtually bomb-proof. But 2x is heavy making the trailer hard to move around by hand. If I had a tractor or ATV, that wouldn't be a big deal, but I don't. Another option would be to use 1x12 #2 pine. I formerly had a trailer built with 1x12 and not only was it much lighter, it lasted for

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Cut the staves to support the wall. A 2x4 will work, but I beefed them up to 2x6 because I knew I'd be lashing loads to the top. Also, if you move a lot of debris or mulch then beveling the edges of the stave makes the trailer easier to clean out.



When drilling metal, drill a small pilot hole with a very sharp bit

nearly a decade of professional use. Bottom line: your call.

To get the first course of planking started on my trailer where there are interruptions from the



The pilot hole makes drilling the full-diameter hole much easier.



Clamp the stave square to the trailer frame and drill the hole for the through-bolt.



Square the staves to the trailer and insert the through-bolts. Use cut washers on both sides and tighten with a socket or impact driver. Tighten until the washer crunches into the wood fiber. If you're using new treated wood with high moisture content, check the connections again in a week and re-tighten as necessary.

wheel wells and corners, I used a couple of bar clamps to hold the pieces where I wanted them before bombing in the screws.

To make the look interesting, I like to alternate the corners. I

think it makes the corner stronger but I also really like the box-joint, custom look.

Every now and again a 3-in. deck screw tip makes it through the laminated 2-bys (which is 3

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TRICK OUT YOUR TRAILER



I span the trailer's wheel well with blocking on the inside of the trailer, installing the boards flush with the staves.

inches thick). It's hardly a hazard unless you're just crushing the heads into the wood and the points are really showing, but I blunt them with a hammer whack anyway. I've been cut, scraped and scratched by everything else. What would make these screw tips any different?

MATERIAL HANDLERS

While the hero function of most trailers, including mine, is to hold stuff inside the walls, there's no reason you can't rack 'em up to carry the long stuff like ladders, lumber or molding.



Add blocking as needed to create a wall around the trailer's angle iron projections.



For mapping out the weird wheel well angles I used one of my fave tools: the Starrett ProSite Protractor.



Get the first course of planking started. To hold the pieces tight if you're working alone, a few bar clamps can be your best friend. Lock 'em and sock 'em.

To get a really cool, powerhouse look, I alternated the corners to create a kind of box joint.



Once you've planked up the sides, cut all the staves to length except the front and back, which will be vertical supports for the materials racks.

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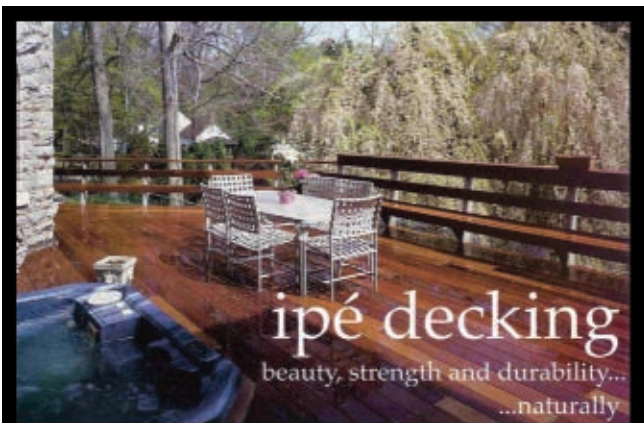
The material rack on my trailer is fixed to the staves (which I didn't cut flush with the trailer walls) but kept at 53-inches above the trailer deck so it would clear the trailer's tailgate. It's a T-bracket of 2x8 that bridges the staves.

The end of the rack is also a T, but I fabricated a pocket for it to sit in so the



Blunt any screw tips that make it through the laminated 2-bys.

Make and install the materials handlers, aka 'racks'.



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EXTRA FEATURES

As much use as I get out of this trailer trick-out, I added some details (and would like to add more) that max it out even further.

TOOL HOLDER. I added a triangular front piece on the trailer tongue to hold shovels and other long-handled tools. The triangular shape makes this wall of the trailer a little more aerodynamic for easier towing.

CLEATS. I added six cleats like you'd find on a dock or ski boat as anchor points for quickly cinching and un-cinching loads using rope. From tarps to lumber, these are essential (and cheap) additions for me. I use bowline knots and trucker's hitches to secure the material.

TRUCK BOX. I also added a few blocks inside the trailer walls to set my old truck box on. When I roll to a job-site, I can store any number of tools in there. For vacation, it's awesome for anything from beach toys to beer and ice or grocery store stuff you want to bring.



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TRICK OUT YOUR TRAILER



Marine cleats are the world's best tie-down anchor. I have 3 on each side of the trailer with 3/8" nylon braided line as my tie-down material. To make the rear cross-piece removable, I fashioned a slotted pocket out of scrap 2x6 that holds the leg of the T-shaped rack.



T is removable. The reason for this is that a horizontal rack gets in the way when hauling tools, mulch, or plaster debris. In other words, if I made it a fixed-feature I'd literally have to duck under it every time I walked into the trailer with a sheet of drywall.

So whether I'm hauling for work or hauling out of town for vacation (who am I kidding—vacation?), my stuff is safe and secure for the long haul. **EHT**

Editor's Note: Mark Clement is co-host of the MyFixitUpLife show, General Contractor on Food Network's Save My Bakery and spokesman for Wood Naturally.

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Join the Fan Club

How to Install a Ceiling Fan



By Matt Weber

A ceiling fan can be a stylish and effective way to enhance airflow throughout a room. Unlike swapping one light fixture for another light fixture, however, a ceiling fan requires special mounting accommodations to support its weight and movement.

A ceiling fan requires a metal ETL-listed mounting box, and if there is not one already in place, then one must be installed before hanging the fan. The fan's outlet box must be secured directly to the building framing with the appropriate fasteners to provide sufficient reinforcement to support

the moving weight of the fan (at least 50 lbs.).

Never mount a fan using a plastic outlet box. The fan could feasibly tear out of the plastic mounting and fall onto whoever or whatever happens to be beneath it.

In this article I show the steps to install the Kichler Décor Innes II ceiling fan. Although assembly will vary among different models of fans, the mounting procedure is basically the same for all ceiling-mounted units.

INSTALLATION

Begin by shutting off power to the ceiling fixture at the electrical

On this project we installed the Innes II decorative ceiling fan from Kichler.



After removing the old light fixture, I discovered the old plastic ceiling box was not suitable to mount the new fan.



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service panel. After removing the old light fixture and disconnecting the wires, I had to deal with an old plastic ceiling box that was not rated for the fan.

To dislodge the plastic box, cut away any caulk or paint around the rim, try to remove the screws or nails and pry it out. This didn't work in my case, and I had to

venture into the attic to pry some nails out of a ceiling joist to remove the old box.

The good news about the ceiling joist is that it provided a solid framing member on which to secure the new ETL-listed fan box. You'll find the appropriate metal boxes prominently listed as "fan-rated" on the packaging at your local home center. The one I used came with a 90-degree bracket

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It's a good idea to label your wires for reconnection, because once you remove all the wire nuts, you may have a tangle of wires like this to sort through.



Inside the attic I found the old outlet box buried beneath loose insulation attached to the side of a ceiling joist.



The plastic box was nailed to the framing, so I had to pry it loose.

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The new metal ceiling fan box came with a right-angle bracket for mounting from the side.

for screwing into the side of the joist.

If the box is not situated beneath or adjacent to a ceiling joist, then you'll need to make other accommodations to mount it securely. If you have access to the ceiling joists, you can install



In my situation, I attached the fan box to the side of the joist using heavy-duty R4 screws from GRK fasteners.

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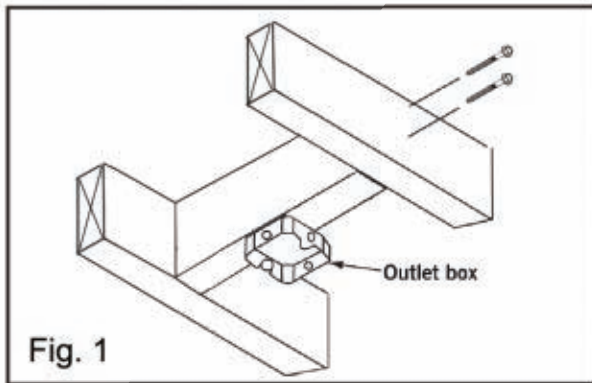


Fig. 1

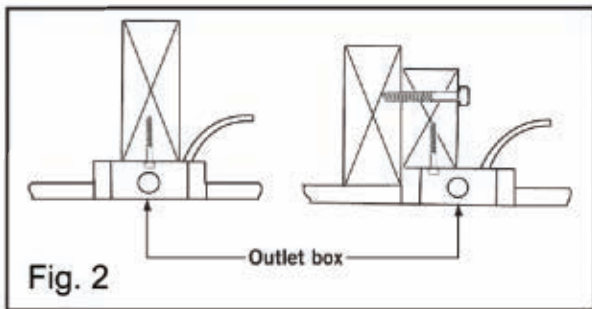


Fig. 2

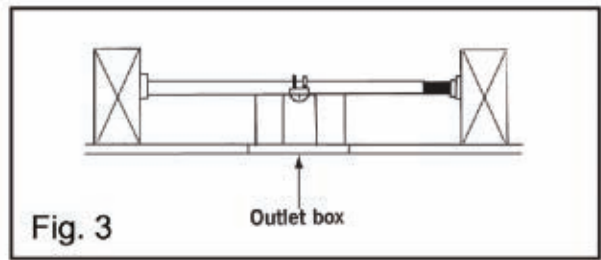


Fig. 3

To hang your fan where there is an existing fixture but no ceiling joist, you can install 2x blocking between ceiling joists or alongside a ceiling joist, and then mount the fan box to the blocking. Or, you may need to install a joist hanger bar as shown in Fig. 3.

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PROJECT NEXT

2x blocking between the joists and then screw the fan box into the blocking.

If the fixture is situated between two joists and you can't access the joists from above, then you can install a metal brace called a "ceiling fan brace" or "joist hanger bar". Available at most home centers, the brace can be inserted through the hole in the ceiling. Once positioned between the joists, the brace expands to contact the framing on each side. The fan box mounts onto the brace. Make sure the brace is centered in the hole and at the proper elevation so the fan box will be flush with the ceiling, then use a wrench or pliers to tighten the brace until secure. **EHT**



Route the wires through the punch-out holes in the fan box.



To hide some ceiling damage around the fixture box, I installed a decorative ceiling medallion with a couple of trim-head screws driven into the ceiling joist. The medallion is an accessory trim piece available at most home centers that sell fans.



Models vary, so it's important to refer to your fan manufacturer's instructions for assembling your specific fan. Typically, assembly begins with a mounting bracket that fastens into the metal box.



Because I forgot to label the wires, we had to use a multi-meter to test the cables to determine how to hook them back up correctly. Save yourself some hassle and learn from my mistake.



The next step is to install the motor body. Fan manufacturers usually provide a safety wire or mounting bracket that can hold the motor body in position while you work.




Connect the electrical wires to the fan body according to the instructions included with your fan.



The fan blades are attached one at a time.



If your fan includes a light fixture, it's usually the last component to be installed.



In addition to its sleek, contemporary design, the Kichler Innes II fan includes a remote control with a dimmer feature for the light, three fan speeds and a motor that operates silently.



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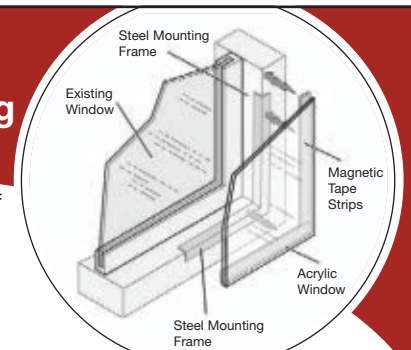
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BOSCH GLM 100 C LASER MEASURE WITH BLUETOOTH TECHNOLOGY

Using Bluetooth Wireless Technology, the new Bosch GLM 100 C Laser Measure instantly transfers measurements to smart phones and tablets with a free mobile application. Featuring an extended measuring distance (330 ft.), best-in-class memory storage and angle measurement in two axes, this laser-based range finder allows users to make accurate measurements that are instantly transferred to their smart devices. With the help of the app, professionals can easily store and manage measurements without relying on pen and paper, making it fast and easy to calculate material needs and estimate labor costs on-site.



Measurements also can be superimposed on jobsite photos, allowing users to quickly create and share detailed quotes containing pictures and comments. Boasting first-in-its-class remote control functionality, professionals can control the GLM 100 C from smart phones or tablets to make steady measurements along long range, short range targetless measurements, or in hard-to-reach spots. The GLM 100 C is accurate up to 1/16 inch. Visit www.boschtools.com.

ET SOLAR 300W POLYCRYSTALLINE SOLAR PANELS

Backwoods Solar offers great prices for off-grid and grid-tied projects. For years the company has been working closely with manufacturers to secure cosmetically blemished modules, and the mission is to find companies that continue to offer a warranty on the product, which protects the end user. By purchasing "B" grade modules, customers save money and still get a quality product. The slight cosmetic imperfections will not affect their performance. ET Solar guarantees excellent performance of the modules, even under limited light environments. The full 25-year power warranty is in effect on these modules, however, the 10-year "workmanship warranty" is waived (meaning that ET Solar will not replace the modules for cosmetic reasons). The ET Solar P672 series 300-watt panels provide excellent output with German manufacturing techniques using high-quality materials. Visit backwoodssolar.com.



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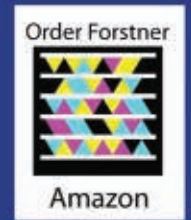
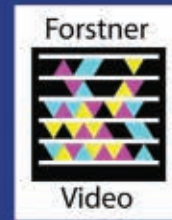


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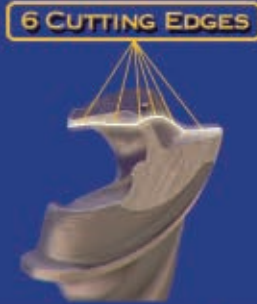
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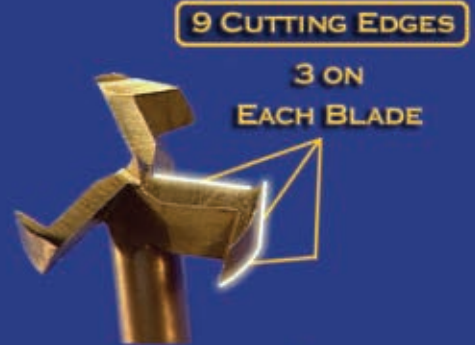
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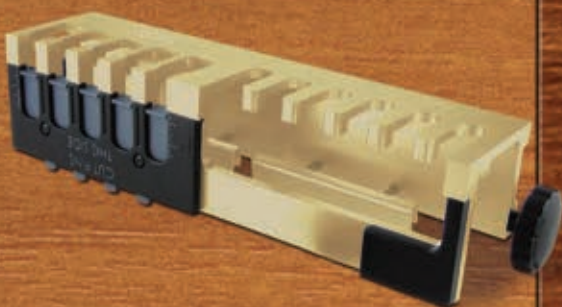
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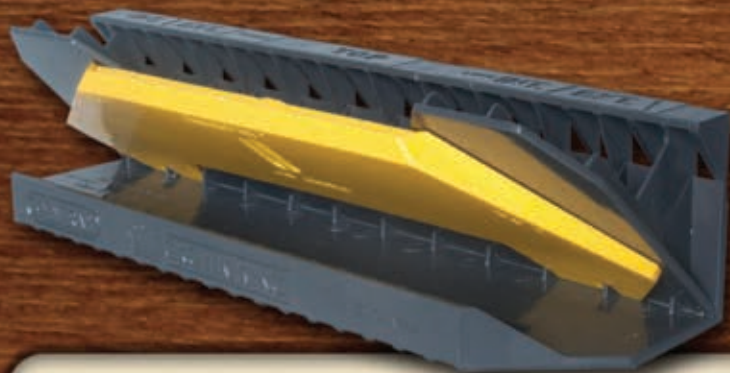
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