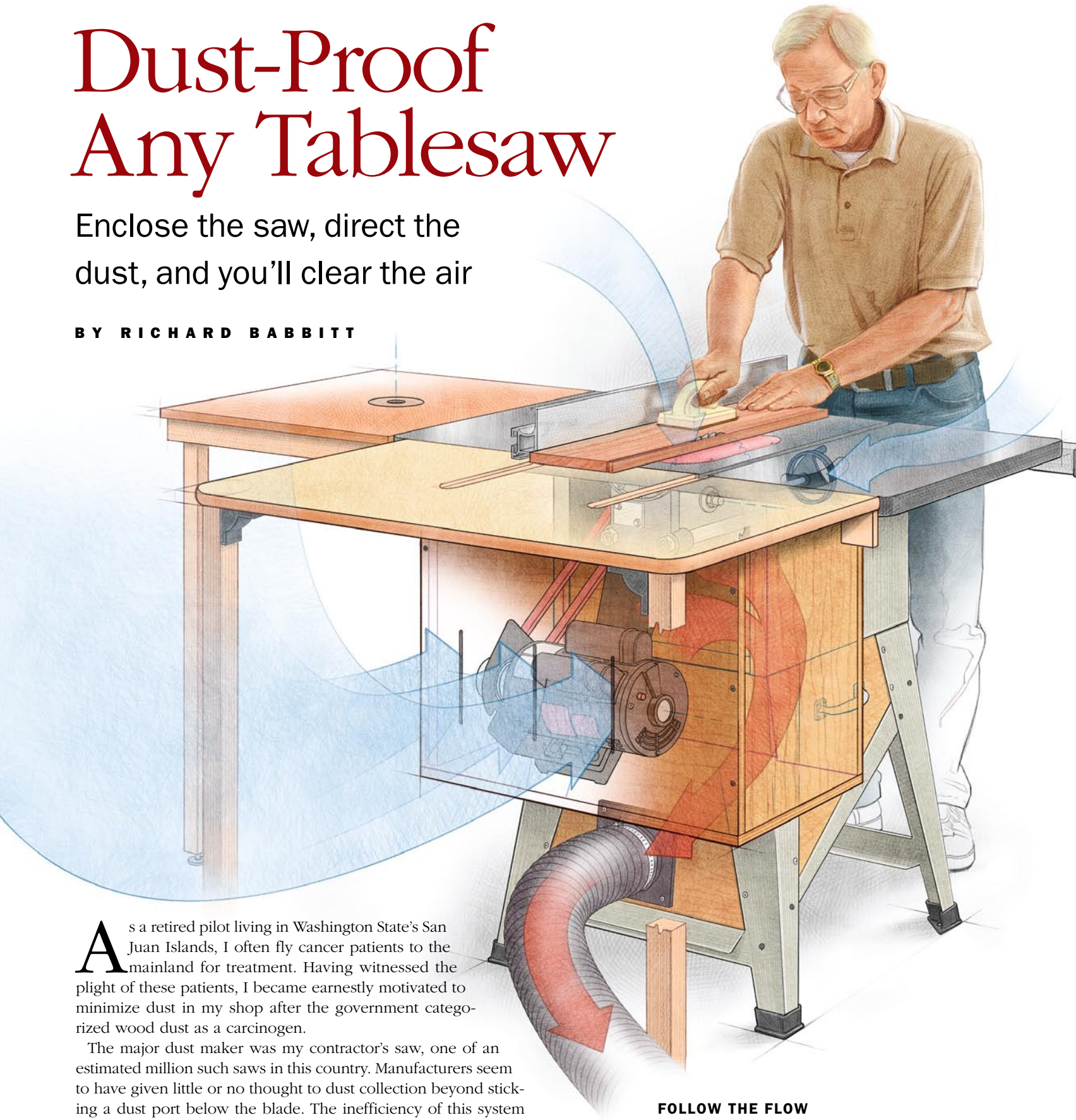
Dust-Proof Any Tablesaw

Enclose the saw, direct the dust, and you'll clear the air

BY RICHARD BABBITT



As a retired pilot living in Washington State's San Juan Islands, I often fly cancer patients to the mainland for treatment. Having witnessed the plight of these patients, I became earnestly motivated to minimize dust in my shop after the government categorized wood dust as a carcinogen.

The major dust maker was my contractor's saw, one of an estimated million such saws in this country. Manufacturers seem to have given little or no thought to dust collection beyond sticking a dust port below the blade. The inefficiency of this system is obvious every time a piece of wood is cut and the operator becomes surrounded by a cloud of dust. To come up with a better solution, I put on my pilot's cap and began to think about airflow. By applying aerodynamics to my tablesaw, I was able to

FOLLOW THE FLOW

No matter which type of saw you have, the principle is the same: Close off most of the saw, allow rapid airflow in a few key areas, and you'll send the dust toward the hose and not into the shop.

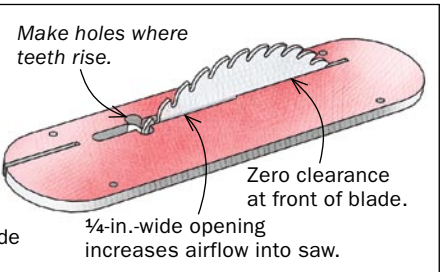
Photos: Mark Schofield; drawings: John Hartman

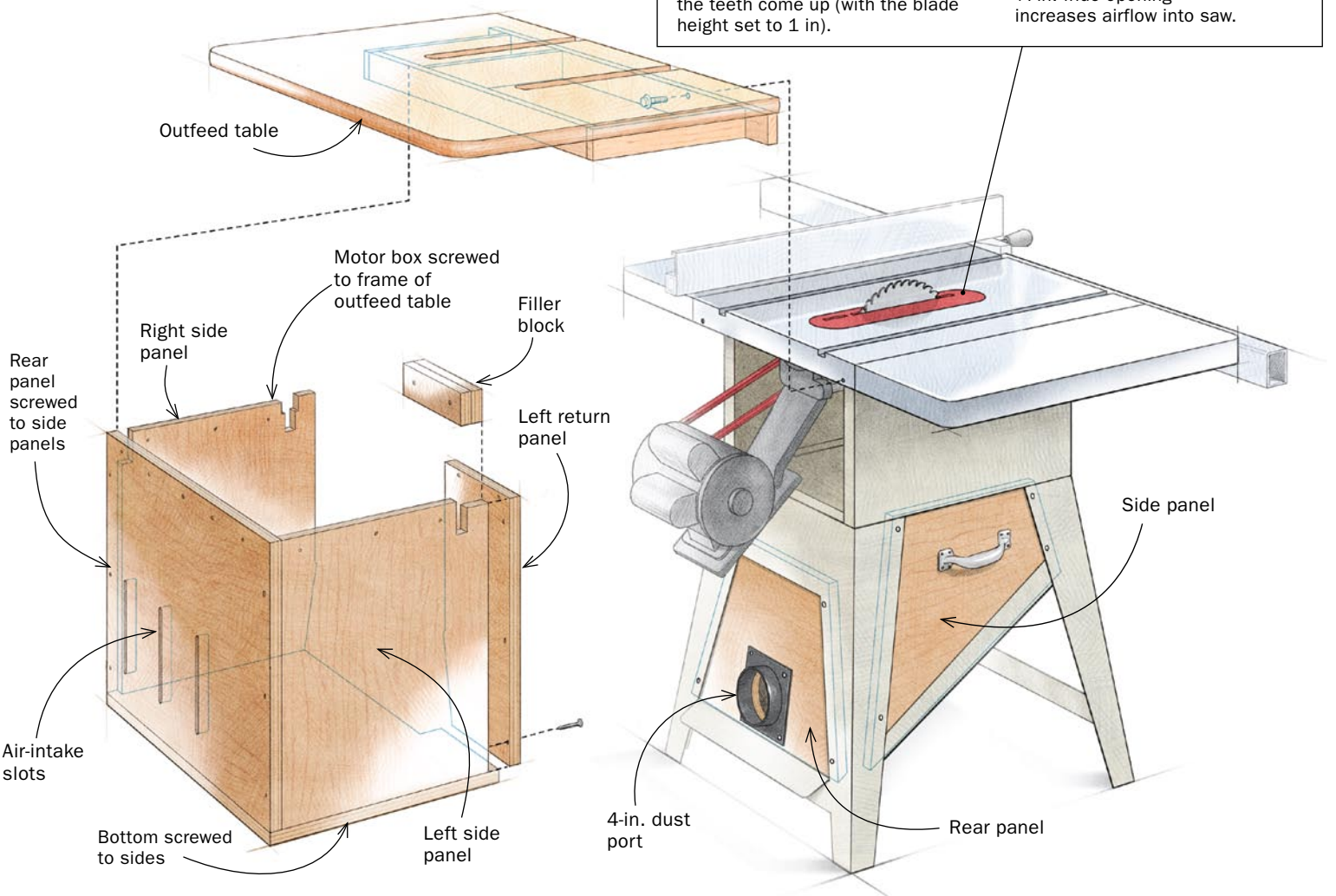
ENCLOSE A CONTRACTOR'S SAW

You need an outfeed table from which you can suspend a box to enclose the motor. The base of a typical contractor's saw already has a dust chute, so three small panels will close off the bottom; the rear one gets the dust port.

HOT-ROD THE INSERT PLATE

Widen the back of the slot in a zero-clearance insert plate to create suction where the dust usually shoots out. Increase the effect by adding a pair of holes at the point where the teeth come up (with the blade height set to 1 in).





vastly improve its dust collection, and keep the motor cooler in the process.

While I'll focus on the contractor's saw, the principles and techniques work on any saw. Two of *Fine Woodworking*'s editors will describe how they dust-proofed a hybrid saw and a cabinet saw.

Dust goes with the flow—if you direct it

The average contractor's saw, with its open design, is equivalent to sticking the dust hose in the middle of the room. Some dust-laden air will be drawn in, but the majority will be too far from the hose and will float off into the shop. You need to increase the velocity by restricting and directing the amount of air entering the base of the saw. My plan uses three pieces of plywood to enclose the lower part of the saw, and five more to build a small box around the rear-hanging motor. This enables me to direct the airflow to the dust port.

This system requires a dust collector rated at a minimum of 1,100 cubic feet per minute (cfm). Most 1½-hp mobile dust collectors fit the bill, but if yours doesn't have a 1- or 2-micron filter, you should invest in one. The smallest particles are the most dangerous.

Begin by enclosing the motor—The motor enclosure is suspended from an outfeed table. The bracing under my Rockler table is placed almost perfectly for this installation, but if you have another outfeed table, you can either adapt the bracing or attach a shopmade frame to the underside of the table.

The first step is to calculate the size of the box required to enclose the motor at both the 0° and 45° blade settings. On most contractor's saws, the motor is mounted on a hinged plate and hangs down behind the saw, supported by the drive belt. To make the enclosure box as compact as possible, you'll need to pull the motor up slightly by shortening the belt. The easiest way to do this is to buy 4 ft. of link belt (www.in-lineindustries.com). Be sure to unplug your saw before working on it.

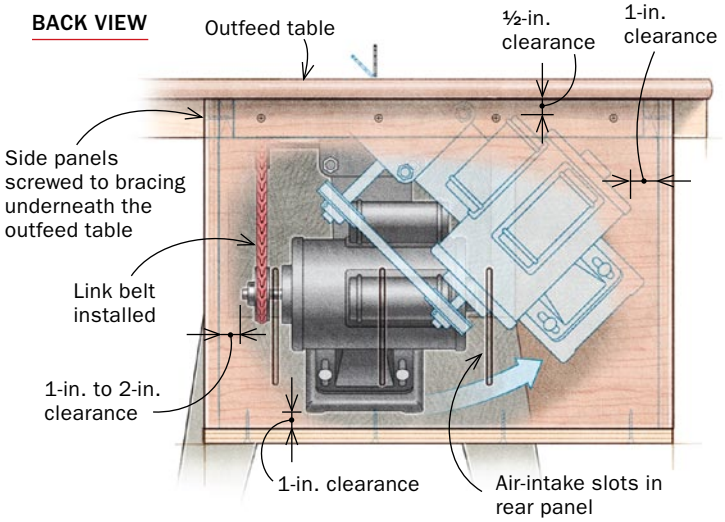
Because the motor will be completely sealed in, you can remove any belt guard. Now tilt the blade to the 45° position and adjust the belt length to give ½ in. of clearance from the motor's capacitor to the underside of the outfeed table. This in turn will

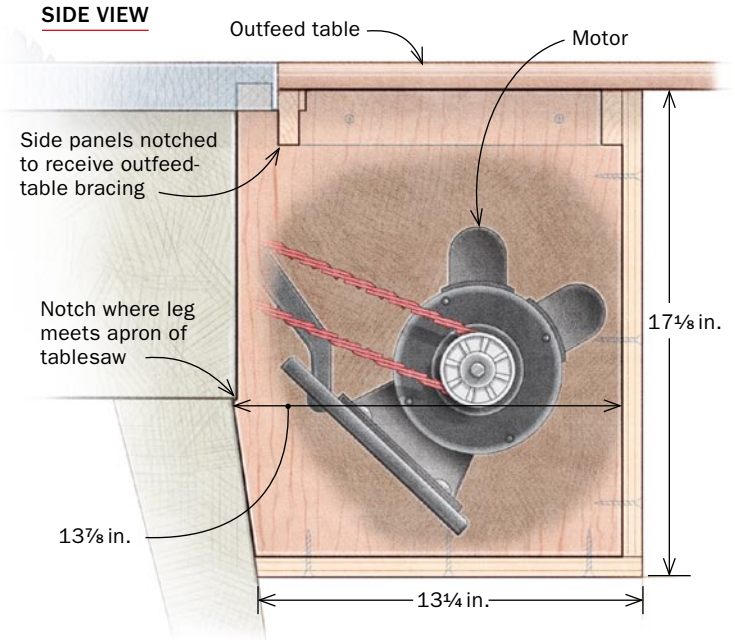
Measure the opening. *After installing a link belt to adjust the height of the motor, use a tape measure and level to find the height of the motor-enclosure box you need.*

Attach the motor-box sides. *The sides can be screwed to the bracing that supports your outfeed table. Cut the right-hand side of the box to fit the back of the tablesaw and notch the top to go around the bracing.*

AS SMALL AS POSSIBLE

To minimize the size of the box, the motor should be ½ in. from the outfeed table when the blade is tilted to 45°. The motor box dimensions refer to Babbitt's Delta contractor's saw. Your saw may need a different-size box.





Add the return. *On this right-tilt saw, the left-hand side of the motor box extends past the base of the saw to give the motor room to swing out when the blade is angled. To seal the box, a short return panel is attached.*

determine how far the motor hangs down at the 0° setting. To get the vertical dimensions of the box, reset the blade tilt to 0°, set a tape measure on the floor, run the tape up past the motor to the underside of the outfeed table, and lock it. Hold a level against the lowest part of the motor mount and across the tape, note the dimension, and add 1 in. for clearance. This will be the vertical dimension of the left, right, and rear panels (all references to right and left are from the operator's position). Hold the level vertically an inch away from the back of the motor and mark the underside of the outfeed table.

Begin with the right side panel—I have a right-tilt saw. For a left-tilt one, reverse the descriptions for the left and right side panels. The right panel must seal against the rear apron of the saw's base, plus a portion of the 7° splayed leg. I held a piece of cardboard tightly against the saw's side and scribed it. We know the height of the panel; for the width, measure from the top of the saw's base to the line you made on the underside of the outfeed table.

Depending on the design, your saw may have an indent where the vertical part of the saw meets the splayed leg. This is the widest part of the right panel. Cut the panel to height and width, then use the template to cut the profile to fit the tablesaw. Cut slots in

Look for gaps. *Use weather-stripping or duct tape to close off any gaps between the motor box and the tablesaw.*

Close the box. *Screw on the back. Slots in the back panel allow air to enter at high speed, cooling the motor and picking up the dust.*

the top edge to accommodate bracing under the outfeed table. Use drywall screws to attach the panel to the bracing.

Making the left side panels—When the blade is angled at 45°, the motor extends beyond the left side of the saw. To allow for this, the main left-side panel doesn't contact the back of the saw. It is the same height as the right panel but ½ in. wider and doesn't have to allow for the indent or the splayed leg. Locate the left panel an inch away from the tilted motor and attach it in the same way.

The gap between the front of the left panel and the left side of the saw is enclosed by a short return panel. This panel's top edge will butt up against the underside of the left table extension. Scribe a piece of cardboard to measure the side splay of the saw's left rear leg and use this to bandsaw the return panel to the correct shape. Now screw the return panel to the left side panel.

The bottom of the motor enclosure will be attached later, but cut it to size now. Add ¾ in. to the length for a shelf to receive the rear panel. Cut a hole in the front edge for the power cord.

Create the dust-collection area in the saw's base

The base enclosure on my saw consists of two side panels and a rear panel that houses the dust port. Place a piece of cardboard

SEAL THE REST OF THE SAW

Close off the base. *Screw panels to the existing framework. Attach a 4-in.-dia. dust port to the rear panel.*

Allow for access. *The base side panels have handles attached. This makes them easier to install and to remove for saw access.*

Seal the underside of the table. *Large gaps between the saw's base and table are best filled with a foam sealant.*

Add a simple adjuster. *A shop-made magnetic panel covers the curved slot for the height-adjustment crank. Adjust the opening to achieve optimum airflow.*

How to dust-proof a hybrid saw

After reading Richard Babbitt's article, I was curious whether I could achieve the same results on my DeWalt hybrid saw. I knew the base was open to the floor, but a closer inspection showed huge gaps between the base and the tabletop, and even the legs and side panels did not have a good seal. Not surprisingly, dust collection was never very efficient. Working with Babbitt, I came up with a design that adopted the principle of directing the air.

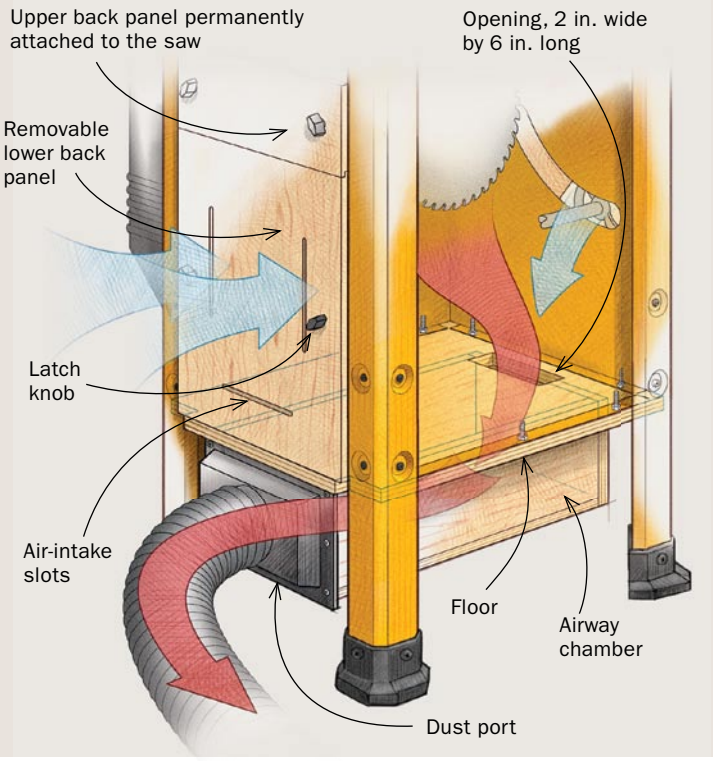
The first task was to remove the plastic combination blade-shroud and dust chute. Not having an easy way to create an angled dust chute, I installed a plywood floor in the base with a 2-in. by 6-in. opening at the front. From this floor I hung the airway dust chamber with the dust port at the rear. Not wanting to drill holes in the legs, I secured the back panel to the legs with latches that allow for easy access to the inside of the saw. The large gaps between the base and the table were filled with expanding foam sealant; weatherstripping filled the gaps between the sheet-metal legs and the side panels, and small pieces of magnetic sheet (refrigerator magnets) covered holes around crank handles, etc.

The improvement in dust collection has been dramatic. During several weeks of use that included cutting medium-density fiberboard and plywood, almost no dust escaped the saw. Inside, the motor and the mechanics remained remarkably clean.

—Mark Schofield is the managing editor.

CONSTRUCT AN AIRWAY DUST CHAMBER

Like Babbitt's contractor's saw, this design draws in clean air through the back slots and the tilt-control slot. But, instead of an angled dust chute, a floor opens into a lower dust chamber linked to the dust port.



Air goes in, dust comes out. *Despite the semi-open base, this hybrid saw was successfully dust-proofed using the same principles employed on a contractor's saw. High-speed air enters slots in the rear panel, washes over the motor, picks up dust from the blade, and exits at the bottom via a 4-in.-dia. hose.*

over the rear opening in the saw's base and mark the opening on it. Add 1½ in. to the sides and transfer this outline to the plywood. The first cut should be on the bottom edge with the blade tilted to match the angle of the dust chute. After cutting the sides of the panel on the bandsaw, on center, draw a 4½-in.-dia. circle with its bottom 1¼ in. from the lower edge of the panel. Cut this out with a jigsaw. Now drill two clearance holes evenly spaced into each leg, staying ¾ in. from the inside edge. Screw the panel to the legs and seal the bottom of the interior with self-stick weatherstripping. Now that you are finished working on the back of the saw, you can install the bottom panel of the motor box.

Make the lower side panels in the same way, using a cardboard template. Stick weatherstripping on the top edge of the panels.

TIP

Use fridge magnets

Plastic magnetic sheet, often used for free advertisements, can be easily cut to close small gaps, like the one around the blade-angle crank.

Even cabinet saws can be improved dramatically

I was skeptical that dust collection on my old General 350 cabinet saw could be improved, for two reasons. First, it was already mostly enclosed. Second, I had already built a box to close off the one gaping hole in the cabinet—the square cutout that allows the motor to pivot when the blade is angled. But after seeing photos of my saw, Babbitt suggested a number of modifications.

The best upgrade was to cut three slots in the plywood box, located to send a stream of air across the motor, cooling it and helping to keep the gears and trunnions dust-free.

Then, starting at the bottom of the saw, I replaced a permanent pile of dust with a three-part plywood floor to funnel chips toward the port. The next task was to direct some air across this channel to push the dust to the port. A piece of plywood and a metal louver did the trick (below right). I then sealed other gaps with expanding foam and weatherstripping, used magnetic sheet to cover screw holes and gaps around handles, and fitted an adjustable cover to the tilt-control slot.

After several months of use, there is no buildup of dust around the base of the saw, I get almost no dust coming off the back of the blade, and when I remove the insert to look inside, the motor and trunnions are very clean.

—Asa Christiana is the editor.

Add intake. *Christiana had a plywood box covering the motor opening. So he just routed three slots, positioned to wash cool air over the motor.*

Install a floor. *To channel dust toward the dust port, install a floor in the base, with two plywood side panels angled downward.*

Front and back panels control the airflow

We've now closed off all the conflicting air inlets except for the back panel and the large tilt-crank slot. This is where we start to direct the airflow. Cut the back panel to fit the opening in the rear enclosure. Note where the motor is positioned with the blade vertical, and align the high-velocity air-intake slots so that the air flows over and around the motor.

There are a couple of ways to seal the tilt-crank slot: If you live near a sign company, see if you can acquire a piece of magnetic sign board large enough to cover the slot. Alternatively, cut a scrap of ½-in.-thick plywood 1 in. wider than the opening. Drill two holes diagonally opposite each other and epoxy in two magnets.

Open and close this panel to find the most efficient airflow. Too small an opening may starve the dust collector of air and reduce the flow; too large an opening may reduce air velocity entering the rear of the saw. I generally keep mine open 1½ in. to 2 in., and a little wider when running a dado blade. After several hours of use, check for sawdust buildup inside the saw by removing the back panel or the insert plate. Some dust sloped on the sides away from the main airflow is normal. You aren't attempting to get all the dust out of the saw, just to get the vast majority into the dust collector, not your nasal passages. □

Woodworker Richard Babbitt attempts to keep the air clear in his shop on San Juan Island, Wash.

Let air sweep the floor. *A thin plywood panel blocks all of the louver slots in the access door, except the lowest. Because that slot is still several inches above the new floor, install a sheet-metal louver to direct incoming air down to the floor. Attach the panel with construction adhesive.*