

"In the Beekeeper's Work Shop"

Making Hive Top Ventilation Shims

©by Stephen E. Tilmann

Hive Top Ventilation Shims

When preparing your bee hives for the winter, it is very important to provide for ventilation at the top of the hive. Throughout the winter, the bees are expelling a lot of water through respiration which rises to the top of the hive. Unless there is a means for this moisture to escape it will condense on the inner cover and "rain" back down on the winter cluster. This is a near sure fire way to kill your bees.

There are a number of ways to deal with wintertime moisture in the hive; each with its pluses and minuses. Some beekeepers drill a 3/4 or 1-inch hole in front near the top of the uppermost hive body. This works fine, except you need to make sure that the top hive body is the one with the hole. Also, it is feasible that rain and snow can blow into the hole since it generally will not be protected by the telescoping top cover.

Other beekeepers cut a notch on the lower rim of the inner cover. This approach also works and the notch will be protected from the elements by the telescoping top cover.

I like to use Imirie© shims. These gadgets are 3/4-inch rims that have a notch cut into the front edge. An Imirie© shim can be located anywhere on the hive stack throughout the season, but having one just under the inner cover is a good way to get rid of the wintertime moisture.

Yet a fourth method is to use wedged-shaped hive top ventilation shims, which is the subject of these plans. The hive



top shims are placed on the two sides the topmost hive body and below the inner cover (see Figure 1 and photo above). The shims are tapered, with the front end being about 3/4-inch high.

Advantages of Ventilation Shims

These wedged-shaped hive top ventilation shims have several things going for them. First, they are simple and inexpensive to build. All you need are 3/4-inch boards that are about 20 inches long and several inches wide; you probably have some scrap pieces that will do the job.

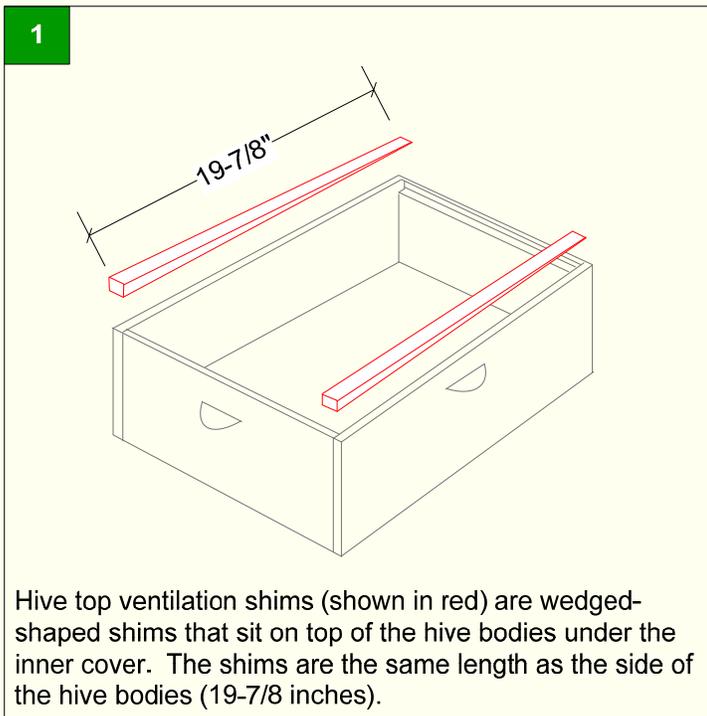
Second, the front of the inner cover will be raised about 3/4-inch above the hive body (because of the wedge shape) and will create a gap across the front of the hive that provides lots and lots of ventilation space. And this gap will be under the telescoping top cover so it will be protected.

Third, the taper of the shims will cause the inner cover to be slanted toward the back of the hive. This slant will have the tendency to cause any condensing moisture (and there will be some) to run toward the back of the hive and then down along the back side of the hive bodies. The cluster will be protected from the winter "rain" which can result from flat lying covers.

Fourth, these shims are quick to install. All you do is pop off the two top covers, place the shims on the top of the hive and then put everything back together. The whole operation can be done in under a minute.

Basic Construction

While cutting a wedged-shape shim may seem to be a simple operation, there is actually a bit more to it than meets



Hive top ventilation shims (shown in red) are wedged-shaped shims that sit on top of the hive bodies under the inner cover. The shims are the same length as the side of the hive bodies (19-7/8 inches).

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the eye. The key is to make a taper jig which will hold the boards at the proper angle as you run them through your table saw. A taper jig is the only safe way to make this type of cut.

Once you have made the taper jig, cutting the shims is simple. The first shim is cut using the taper jig adjusted so that the shim is 3/4-inch on the high side. The second shim is made by removing the taper jig and making the cut using only the fence of the table saw. These two operations are then re-

peated to make as many pairs of shims as you need.

The thin end of the shim needs to have a bit of thickness for strength; we suggest you go with 1/8-inch. Since it is hard to eyeball this distance when setting up the cut, we will describe a shop tip which you can use to accurately and repeatedly establish the desired thickness of the thin end of the shim.

Taper Jig Construction Details

There is considerable leeway available when making a taper jig, the most obvious being the length of each arm (see Figure 2). We suggest you go with 30-inches, which is plenty long for the hive top shims and will be long enough for other shop projects that may come your way.

Another decision to make concerns the two bolts used to clamp the spreader on the back side of the taper jig. The plans call for using two 1/4" by 1" bolts. A knobbed bolt will make it easier to adjust the taper jig, although a standard hex head bolt will work just as well.

Step 1. Cut the Taper Jig Side Arms

For the side arms of the jig, cut two 30" long pieces from 1x4 #2 pine. Then clamp the sides together, making sure the ends are flush, and attach a 2-inch box hinge on one end (Figure 2).

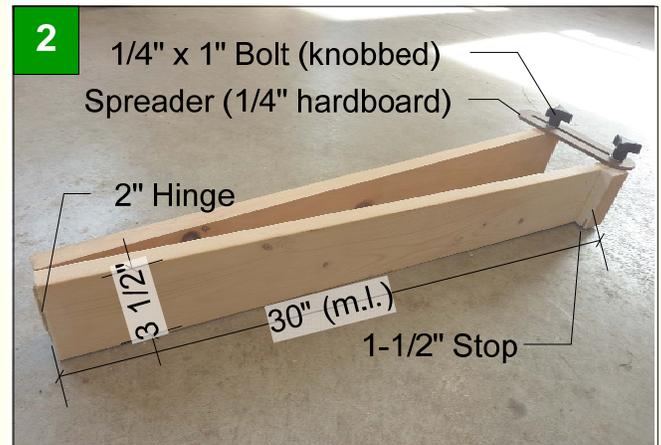
Step 2. Install the Stop

From a scrap piece of 1x4, cut a stop 1-1/2 inches wide. Glue and nail (use 1-1/4 inch brads) the stop to the front side arm 1-1/2 inches from the end opposite of the hinge. Make sure the stop is square to the side of the board (Figure 2).

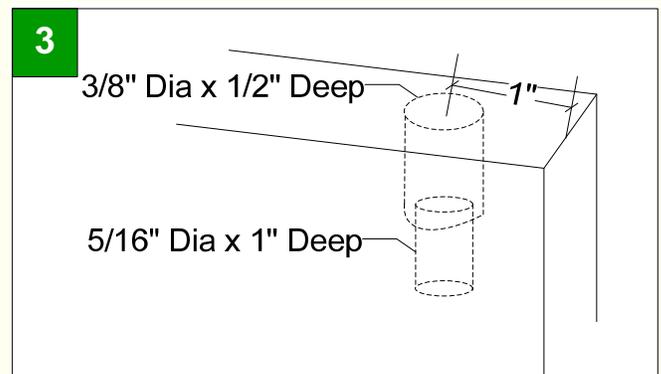
Step 3. Drill Pilot Holes for Bolts

On the top of each arm, opposite the hinge, we need a 5/16th inch hole one inch in from the end to accept the shank of the bolt (Figure 3). This hole needs to be about the length of the bolt shank (in our case, 1 inch). The thickness of the spreader will keep the bolt from bottoming out.

In addition, we need to counter bore the top of each hole 3/8ths inch to a depth of 1/2-inch to allow for the threaded insert. These dimensions may vary depending on the threaded insert threaded insert you use.



The taper jig is made from 1x4 pine about 30" long. Consult the text for details on making this jig.



Drill a 3/8" counter bore 1/2 inch deep and 1 inch from the end of each side arm for the threaded insert. Then drill a 5/16" pilot hole for the shank of the bolt for a total depth of about 1".

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Step 3. Drill Pilot Holes for Bolts (cont'd)

We like to use forstner bits for this job because the hole will have a flat bottom. And you should drill the counter bore (the 3/8" diameter hole) first and then the 5/16" diameter hole for the bolt shank.

Tip

To keep the side arm from splitting while drilling the pilot holes, tightly clamp a couple pieces of scrap 1x4s to each side of the board. A sharp bit also helps to prevent splitting.

Step 4. Install Threaded Inserts

Install a 1/4-inch x 20 threaded insert into each hole you made in Step 3. Be sure the insert is installed square to the hole; it is easy to get the thing crooked.

A simple way to install threaded inserts is to use a 1/4-inch bolt with two nuts tightened part way up the shank to act as a stop. Screw the threaded insert onto the exposed shank and then use the bolt to screw the insert into the pilot hole (see Figure 4a).

You can use a socket wrench to turn the bolt, but we like to use a drill press for this step (see Figure 4b). A drill press will ensure that the insert is threaded square to the hole. Cut the head off of the bolt if using a drill press and hand turn the chuck when screwing the insert in.

Step 5. Make the Spreader

The spreader is made from 1/4-inch hardboard cut to a 2-inch by 8-inch size (Figure 5). Use a jig saw to round each end.

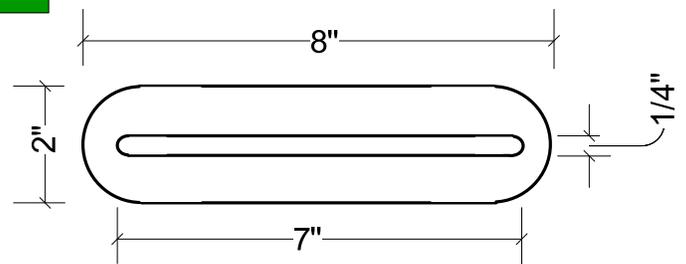
We need a 1/4-inch channel down the middle of the spreader. Drill a 1/4-inch hole along the center line 1/2-inch from each end. Draw two guide lines; one tangent to the top of the holes and the other tangent to the bottom of the holes. Use a jig saw to cut along the inside of these guide lines and creating the channel. Clean up any rough edges with fine sand paper.

Step 5. Assemble the Taper Jig

The taper jig can now be assembled (see Figure 2). Use a 1/4-inch washer under each knobbed bolt. By loosening the bolts, you can adjust the angle of the two arms to obtain the degree of taper needed for the job at hand.



5



The spreader is made from a 2" by 8" piece of 1/4" hardboard. The rounded ends are 2" in diameter. Along the centerline, cut a 1/4" channel that starts and ends 1/2" from each end.

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Making the Hive Top Shim Details

Once the taper jig is complete, we can now cut the shims. First, the jig has to be adjusted for the correct taper (angle). Once that is done, we can cut the first shim from a piece of 1x board 19-7/8 inches long (which is the length of the side of a standard hive body). We recommend that you start with a 1x8 board, as this will yield several sets of shims without getting too narrow of stock.

The first shim will be a rip cut using the taper jig. The second shim will be a normal rip cut on the table saw without using the taper jig (since the remaining stock will already have the correct taper after the first shim is cut). It will then be a simple matter of making more shims; first with the taper jig and then without the taper jig.

Step 1. Set the Taper Jig Angle

The shim is 19-7/8 inches long and the wide end is 3/4 inch (Figure 6). Therefore, the taper jig has to be set for a 3/4-inch gap that is 19-7/8 inches away from the hinged end.

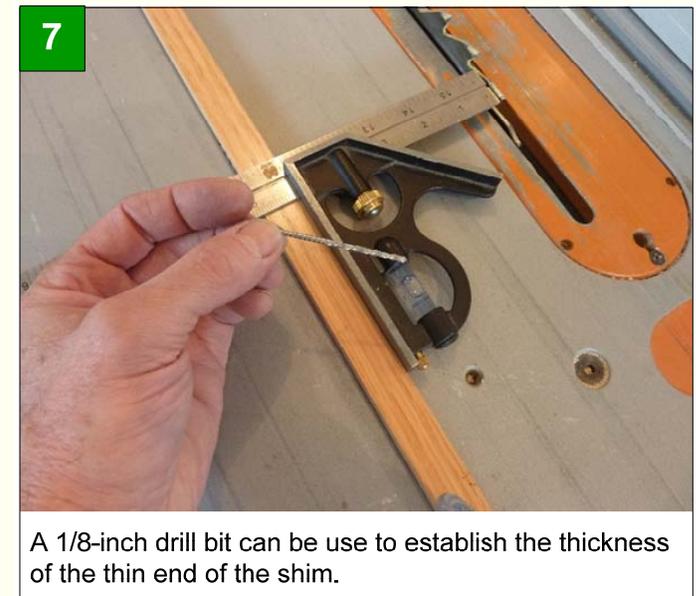
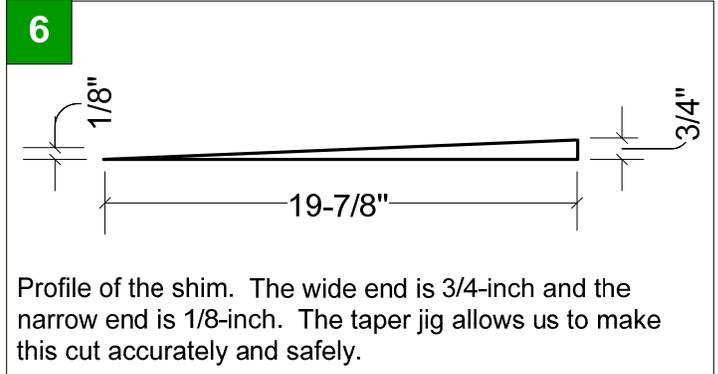
The simplest way to set this angle is to strike a reference mark on top of the jig's side arms 19-7/8 inches from the hinge end. The shim will be 1/8-inch at the thin end (the beginning of the cut) and ending at 3/4-inch. Therefore the total rise is 5/8ths inch. So at the reference mark, separate the arms of the shim so that there is a 5/8ths inch gap. Hold the arms in place by tightening the bolts on the spreader.

Step 2. Setting the Thickness of the Thin End

The thin end of the shim is 1/8-inch thick. This thickness is set by moving the fence, both when the jig is in place (for the first shim) and without the jig (for the second shim). Establishing this thickness by eyeball is hard to do. Here is a shop tip to get it right.

You will need a combo square and a tight fitting wood strip in the table saw's left hand miter gauge track (Figure 7). First, put a 1/8-inch drill bit against the reference strip. Then place the square against the bit and adjust the combo square's ruler so that it is just touching the saw blade's kerf. Tighten the combo square and remove the drill bit. The end of the combo square will now be 1/8-inch from the outside of the blade.

Place the 1x stock that you are using for the shims in the jig and adjust the fence so that the outside of the board is tight up against the end of the combo square. Set the fence at this distance (Figure 8).



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Step 3. Cut the First Shim

With the taper jig’s angle properly set (Step 1) and the table saw’s fence properly set (Step 2), we can cut the first shim. The jig is placed against the saw’s fence and the stock we are using to cut the shims is placed up against the jig’s stop. Notice that the board is at an angle to the plane of the blade (Figure 9). The thin end of the shim will be cut first with the cut tapering back to the thick end of the shim. To make the cut, slide the board and jig together along the saw’s fence.

Step 4. Cut the Second Shim

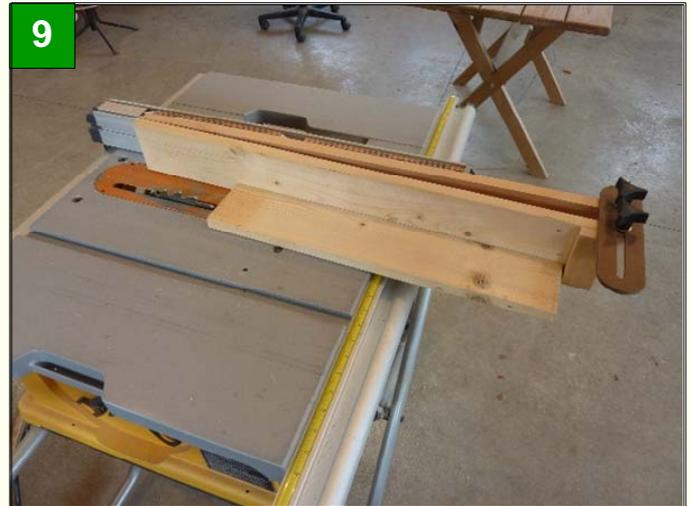
After the first shim is cut, notice that the stock board now has a tapered side. To make the second shim, all we have to do is flip the stock board end for end keeping the tapered side away from the fence, remove the taper jig and adjust the fence for the proper spacing (Step 2). The second shim is a simple rip cut (Figure 10).

Step 5. Cut Additional Shims As Needed

After the second shim is cut, the stock board again has sides that are parallel. So we can simply repeat Steps 3 and 4 (above) to cut more shims, each time moving the table saw’s fence (Step 2) to get the correct spacing for the stock.



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The first shim is cut using the taper jig.



The second shim is cut without the taper jig.

Resources

“In the Beekeeper’s Workshop” series. Published on-line at www.michiganbees.org/beekeeping/in-the-beekeeper-s-workshop. For other beekeeper’s workshop project plans, search for “workshop”.

Video on a making hive top ventilation shims available at...
<http://www.youtube.com/user/beekeepersworkshop>

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List of Materials: Taper Jig

WOOD

			Reference Figure
A	Taper jig side rails (2)	30" - 1x4 #2 Pine	2
B	Taper jig stop (1)	1-1/2" - 1x4	2
C	Taper jig spreader (1)	2" x 8" - 1/4" Hardboard	5

HARDWARE

2" hinge with screws (1)
1/4-inch x 20 threaded inserts (2)
1/4-inch x 1-1/2" knobbed bolt or hex cap bolt (2)
1/4-inch washer (2)
1-1/4-inch drywall screws
Franklin's Exterior Titebond® glue

List of Materials: Hive Top Ventilation Shims

WOOD

			Reference Figure
A	3/4 inch #2 pine for shims (width not important)	19-7/8" - 1x4, 1x6 or 1x8	2

HARDWARE

(None)

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Photo Gallery...



Photo Captions:

1. Two hive top ventilation shims ready to go.
2. Taper jig is required to cut wedge-shaped shims.
3. Combination square used to position board. Drill bit is used to establish taper thickness.
4. Using combo square to position board prior to cutting.
5. Detail of spreader on taper jig showing knobbed bolts. Note stop on right side of jig.