BetterComb™ Frame Assembly Instructions

Updated November 25, 2020

BetterComb is a completely drawn comb made of food-grade, virgin, synthetic wax, similar in composition to beeswax. When installed into wooden frames, it is ready for the bees to use right away. These instructions assume you know how to assemble frames; check Betterbee's website for instructions on basic frame assembly.

Installation Methods

The best way to install BetterComb is to embed into fully cross-wired frames with toothpick "pins" added to the top and bottom for additional support. The wire supports the weight of the comb and its contents, particularly in warmer climates, while the toothpick pins help center the comb. Simply pinning with toothpicks or skewers alone may be satisfactory for smaller frames, such as mediums, that are used in colder climates and will not be extracted. **For best performance, wired frames are recommended for all users.** Only pinning the combs ***does not*** work well in hot climates, or for use in honey supers or frames full of nectar. Wired frames can be extracted in tangential or radial extractors just as any other frames are extracted. Wiring supplies are available at Betterbee.

Caution: Embedding BetterComb involves risk of fire and burns. Read instructions thoroughly before starting. Do not allow children to perform these steps.

Tools and parts required for wiring and embedding (Betterbee item in parenthesis):

- Installation shim: 7-3/4" x 16-3/4" x ¼" piece of cardboard or wood (included in complete kit or available as part number BCOMBINSTALLBOARD)
- 27-gauge frame wire (BW) and eyelets (EYELETS)
- Wooden grooved-top frames with full crosswiring (see details to follow)
- Eyelet punch (EPUNCH)
- BetterComb comb pieces (BCOMB)
- BetterComb Embedding Device (BCOMBEMB) or similar homemade device
- 12V power supply such as a car battery or lawn mower battery
- Toothpicks or wooden skewers (recommended, but not required) and electric drill with bit to match toothpick/skewer size

Installing BetterComb into Wired Frames

We recommend watching a video of the embedding process before starting:
youtu.be/a-ElrV6SR4s

Step 1: Assemble Bare Frame

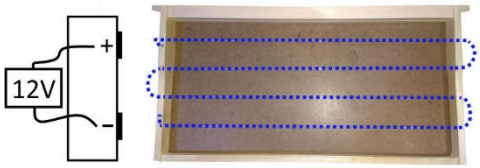
Assemble frames using preferred method of assembly (nails, staples, etc.). Wood glue is also recommended for extra strength.

Install eyelets in all side bar holes on the outside edge of the frame. Tap into place with a hammer and eyelet punch.

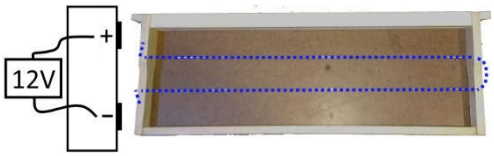
Prior to wiring, consider how the wire will be heated. The ends of the wires need to be positioned so they can be electrified by a 12V power source (see notes below on power supply). An illustration is shown to the right.

Partially install a nail in the edge of the side bar at both ends of the wire. Recommended locations are shown to the right.

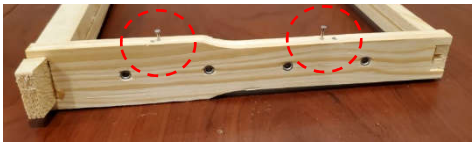
Deep Frame Wire Routing:



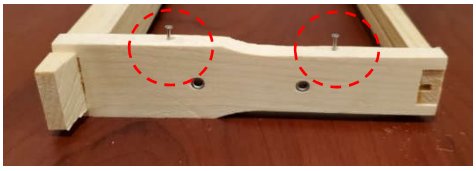
Medium or Shallow Frame Wire Routing:



Deep sidebar eyelets and anchor nails:



Medium sidebar eyelets and anchor nails:



Step 2: Wiring

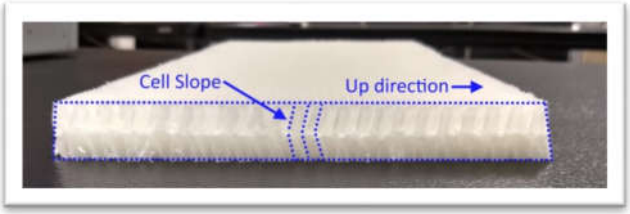
We recommend 27-gauge steel or stainless-steel frame wire. *Note: We do not recommend using 26-gauge or thicker wire because the wire may get too hot during embedding.*

1. Thread wire through all eyelets.
2. After passing through the last eyelet, wrap the end of the wire around the nail a few times. Pound in the nail the rest of the way to firmly anchor the wire.
3. Stretch the wire as tight as possible. *Here it is helpful to have a jig to hold the frame, or compress the frame.* While holding the wire tight, wrap the other end around the nail and pound the nail.
4. **Optional:** Use wire crimper to increase tension if wires are not taut. Run the crimper along each wire, being careful not to pull the wire sideways.

When finished, you should have a wired frame with tight wires, and two separate anchor nails. The short section of wire between the eyelets and the anchor nails is the contact surface that you will electrify the frame with. Make note of its position. On deep frames, you will need to electrify these ends but not touch other sections of the wire.

Extra holes: We recommend drilling three (3) evenly spaced holes in the center of the top and bottom bar for support toothpicks. Choose a drill bit slightly larger in diameter than a toothpick; for typical round toothpicks we find a #44 drill or 3/32” drill will work. These will be used for “pinning” the combs to help maintain center position.

Step 3: Prepare for Embedding



Narrow Side Up
Wider Side Down

Determine the orientation of the comb. Look at the cells. Each cell slopes in one direction, just as in natural comb. The cells need to be sloped “uphill” when installed in the frame, so be sure to orient the cell slope toward the top bar. One side of the comb is slightly narrower to aid in installation. Face the **wider** side down. Reference the illustration to the right (looking down the end of a comb).

Set the comb on the installation shim, making note of which side is the top. Place the wired frame on top of the comb so that the wires rest on the comb, and double check that the cell orientation is correct with respect to the top of the frame.

Place frame over the comb, as seen in the photo on the right. Be sure to place your hands where they will not touch any wire.

Step 4: Embed Wires

We recommend performing this step with the BetterComb Embedding Device (item code BCOMBEMB) or a similar homemade equivalent. In short, it is a block of wood with two electrical contacts that are aligned with the ends of the wires. See betterbee.com for details and to download detailed instructions.

Caution: Risk of burns and fire. The wires reach very high temperatures, capable of burning skin and igniting fires. Do not allow children to perform this step. Do not leave embedding tools electrified, and always be certain all parts/pieces are cooled and safe before putting away or leaving unattended.

Apply 12V power to the ends of the wires. The wires will heat up immediately. Press gently on the frame (keeping fingers away from the hot wires) until all wires melt into the center wax core of the comb. Quickly remove the power source by sliding the frame away from the electrical contacts, and allow the wires to cool for two to three seconds. The total time connected to power should be about 5 to 8 seconds. If the wires do not melt into the wax immediately, there is likely a connectivity or power issue, such as a failed fuse or dead battery.

Press frames into the embedder as seen in the photo on the right.

Step 5: Insert Toothpicks for Support

This step is optional, but helps hold the comb centered top and bottom, especially during the first few days of use. While holding the comb centered, insert a toothpick into holes in the top and bottom bar. Press the toothpick in until it penetrates the comb 1 to 1.5”, and then creak off the rest. Repeat this process for the three holes on the top and bottom bar.

Step 6: Label Frames

If you are building your own frames, be sure to label them as BetterComb frames so they can be easily identified later. Over time, it is difficult to distinguish from other frames. The wax color will change, and as brood cycles through, the appearance changes. We recommend labeling the top bar in large black letters so there is no doubt which frames contain BetterComb.

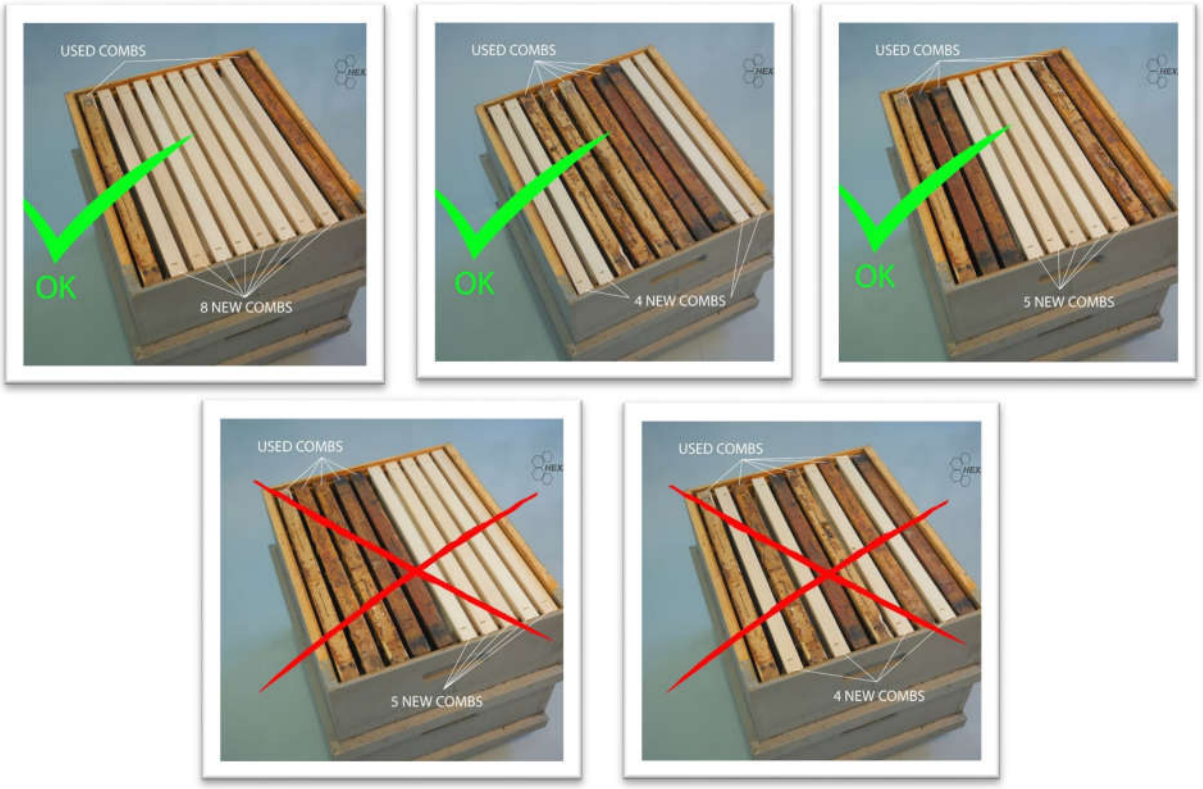
Storage:
Before installation, store frames upright in a cool area. Do not leave in a closed vehicle or other hot space (over 100 degrees) for prolonged periods as the combs may warp, or melt at higher temperatures. Store uninstalled combs in their shipping box in a cool area.

Notes on power supply for embedding:
A DC or AC power supply can be used. Generally, 12V provides the appropriate amount of heat to embed the wires into the combs; a variable power supply is even better in case increased or decreased voltage is desired. The amount of power or amperage required depends on the length and diameter of the wire used. We have found that between 6 and 12 amps are required at 12 volts when using 27-gauge steel wire. A car battery works well to provide this much amperage. Certain battery chargers or other power supplies may also work if they are rated to provide this much current. A typical small power supply such as a 12V "power brick" used to power electronics will not work as these usually provide less than 1 amp of current. A bench power supply or large car battery charger may work. Modern electronic battery chargers will often not work, as they detect a short circuit when connected to the frame wire.

BetterComb Recommendations for Use

- Carefully place the assembled frames into a hive body for storage until you are ready to use your BetterComb frames in a hive.
- If any cells were damaged during the installation process, the bees will take care of the repairs once the frame is installed in the hive.
- Bees love to put nectar in BetterComb! However, we only recommend extracting honey from wired frames. Frames that are assembled without full wiring cannot withstand extraction.
- Are you using the frames in a hot climate, or installing them during hot weather (>85 F)? Do not store the frames outdoors in hive bodies until bees are installed. An empty hive will get very hot, and can cause the combs to warp. Bees keep the hive cooler, and also attach the BetterComb to the frame to make it more secure.
- Label your frames! If you are building your own frames, be sure to label them as BetterComb frames to help you keep track of them. After time, it is difficult to distinguish from other frames. The wax color will change, and as brood cycles through, the appearance changes. We recommend labeling the top bar is large black letters so there is no doubt which frames contain BetterComb.
- Disposal: At the end of a BetterComb frame’s useful life, it cannot be melted down for beeswax as a natural frame would be. The wax must be disposed of in the trash so that it is not confused for beeswax.

- Ideally, use all BetterComb frames. If you are using more than half older drawn comb, we suggest placing the BetterComb evenly on either side of the older drawn comb. If using more than half BetterComb, then place BetterComb in the center using older drawn frames equally spaced on the outside. If using BetterComb with undrawn foundation (wax, plastic, etc,), we suggest placing at least five BetterComb frames in the center and the foundations on the outside. Do not checkerboard the frames. See photos below for reference:



Many have asked; why not “checkerboard” the frames? The reason is that bees, when given the choice, will opt to use natural honey comb. The natural comb is what they expect and are accustomed to, and will choose that over a synthetic or plastic comb. When a natural and BetterComb frame are side by side, they prefer the natural. But if several BetterComb are in a row, they will not have the comparison and will use the BetterComb.

BetterComb is produced for Betterbee by Hexacells in Hungary.