

# MAKING BEEWAX FOUNDATION



**VOLCANO ISLAND HONEY COMPANY**

In Partnership with Michael Krones, Hawaiian Queen Company

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## **Introduction**

Beekeepers give bees a wax foundation upon which to build comb to store honey. There is currently no organic wax foundation commercially available in the United States. Most beeswax foundation is contaminated due to the use of toxic chemicals used by beekeepers in the hives to treat disease. The chemicals remain in the wax, which is processed into foundation. Organic standards will soon require apiaries to use organic foundation. While organic standards allow plastic foundation dipped in organic beeswax, many beekeepers including Volcano Island Honey Company and Hawaiian Queen Company, feel strongly that plastic should not be used in bee hives.

Making beeswax foundation in a small-scale farm setting is a lost art, there are not many people who know how to do it as the process has been industrialized in developed countries. The fact that it is not possible to purchase organic foundation makes this project a necessity for apiaries who do not want to use plastic foundations. By learning how to make wax foundation and demonstrating it to others, we are trying to become more self-sufficient and find a small scale creative solution to a serious problem.

We found that making beeswax foundation on a small scale is indeed more art than science. Each farm will have to adjust the process to account for the small variations that occur in the wax, the temperature of the wax or room on any given day, and the equipment available.

We have not yet achieved the perfect sheet of embossed foundation, although we are moving ever closer. What follows is our experience with what works best to date. This is an ongoing learning process, just like beekeeping!

Enjoy!

Richard Spiegel

Volcano Island Honey Company

Michael Krones

Hawaiian Queen Company

## **Equipment & Supplies**

### **Melting & Dipping**

- Blocks of clean wax
- Two water-jacketed wax melters with temperature gauge. One melter is for dipping and one for replenishing.
- Liquid temperature gauge
- Pot with handle for transferring wax between melters (or a wax transfer system).
- Small sump (tub or barrel)- filled with water for cooling dipped wax covered boards.
- Dipping Boards: 8-10 pieces of marine plywood cut to 18" x 11 1/2" x 1/4". Mark the boards with dipping lines for western and deep foundation size. Mark the dipping lines slightly larger than what you need and trim to size later.
- Container (small garbage can) filled with water and sea salt for soaking Dipping Boards.
- Table

### **Embossing**

- Embossing machine (cell size 5.1mm)
- Dipped sheets of wax
- Frozen ice packs
- Cold water
- Organic dish soap (unscented or mild smell)
- Paint brush / firm tooth brush
- Water sump to soak wax sheets

### **Trimming**

- Cutting Board
- Wood template cut to the final size of the foundation
- Sharp blade or pizza cutter
- Towels

### **Resources**

Water Jacketed Wax Melter:

Wax Melters: [www.waxmelters.com](http://www.waxmelters.com), 888-929-6358

Embossing Mill: Hawley Honey Co., Raymond Cooper 620-365-5956  
[madelinecooper@sbcglobal.net](mailto:madelinecooper@sbcglobal.net)

## Step 1: Melting Wax with Wax Melters

- You can melt wax overnight, if you want to start early the next day.
- Turn wax melters on the night before to 200 degrees.
- Load both melters with blocks of clean wax and/or any clean wax scraps.
- Wax will slowly melt overnight. Check and add more blocks of wax as they begin to melt. You want to have both melters full.
- Once the wax is melted, turn the temperature down to the dipping temperature of 165-170 degrees and maintain that temperature throughout the process.



**Water Jacketed Wax Melter**

## Melting Wax without a water jacketed wax melter

- Place a steel tank inside a drum with water.
- Use a propane burner to heat the water to melt the wax. This method melts wax in half the time of an electric wax melter, but has to be watched carefully (do not leave overnight).
- The depth of the wax in the steel tank depends upon the height of the wooden dipping boards.



**Clean Blocks of Wax**



**Steel tank in a drum with water heated by a propane burner.**

## Step 2: Creating Smooth Wax Sheets

You will first make smooth wax sheets which will then be embossed. There are two ways to make smooth wax sheets: Dipping (the method we use) and Pouring. We have found that achieving an even thickness throughout the sheet has been challenging with both methods. We are still seeking to get the perfect embossed sheet of foundation!

### Pouring

If you pour melted wax into flat molds you will need to run the sheets through flat rollers that flatten and even out the wax sheet before it is embossed. The embossing mill has both flat and embossed rollers that you can switch out.

### Dipping

When we dip the boards, the wax ends up thicker on the long bottom because the wax naturally flows towards the bottom of the board.

You can even out the dipped sheets afterwards by adjusting the embosser. Adjusting the embosser is tricky and it is necessary to get to know, and have a relationship with, the embossing machine. We have discussed dipping sheets top to bottom, instead of side to side.

### **Dipping to Make Smooth Wax Sheets:**

- The marine plywood dipping boards have to be soaked in salt water for at least 24 hours prior to use, the boards should also be stored in salt water to prevent dry rot. The boards have to be wet so that the wax comes off after dipping.
- Remove Dipping Board from the water and allow the water to drip off. Holding the board lengthwise over the melted wax- dip the board evenly up to your measured size line.
- Dip the Dipping Board slowly in and out of the wax 2 – 3 times (depending upon how thick you want your foundation), allowing the wax to stop dripping between dips.
- Scrape the edges of the Dipping Board on the edge of the wax melter to create a break in the wax so that it can peel off the board.
- Place the waxed Dipping Board into the sump of cool water.
- The cool water will make the wax sheet easy to remove from the Dipping Board.
- Remove the wax sheets from the water and place on table. The sheets can be stacked up in piles until they are ready to be embossed.



Holding the board lengthwise over the melted wax- dip the board evenly up to your measured size line.



Dip the board slowly in and out of the wax 2 – 3 times (depending upon how thick you want your foundation), allowing the wax to stop dripping between dips.



Scrape the edges of the board on the edge of the wax melter to create a break in the wax so that it can peel off the board.



Place the waxed board into the sump of cool water. The cool water will make the wax sheet easy to remove from the board.

## Tips for Dipping Wax Sheets:

- Maintain a good wax dipping depth by transferring melted wax from the second wax melter to refill the wax melter used for dipping.
- Check the temperature of wax throughout the process. You want to maintain the wax at 165-170 degrees.
- Make sure the sump of *cool* water stays cool so the wax sheets come off easily.
- The Dipping Boards must be stored in water with sea salt added to it. Apx. ¼ cup of sea salt to 3 gallons of water.
- For long storage of wax sheets, make sure that they are dry and restack them. Store in a cool or room temperature room.



The cool water makes the wax sheet easy to remove from the Dipping Board. Keep the water cool!



Remove wax sheets from the water and place on table. The sheets can be stacked up in piles until they are ready to be embossed.



Keep Dipping Boards in a small garbage can filled with water when you are in-between dipping them.

### Step3: Embossing Wax Sheets

Place ice pack into water reservoir, fill with cold water and a squirt of dish soap. Fill reservoir under rollers with cold water and soap. Brush some of the cold soap water on the embossing rollers. Turn on machine and let the rollers get wet and cold. *Do not wear loose clothing that can get pulled into gears and rollers. Keep fingers clear of rollers*

- Adjust water reservoir to drip while you are rolling.
- Adjust embossing machine to roll a straight even imprint. Wax sheet should come off the roller straight, not one side and then the other.
- Wax sheets are placed in warm water sump (80-85 degrees).
- Feed one sheet at a time through the embosser- watching to make sure the sheet comes off, and does not stick to



Embossing Mill– the mill can be ordered with different size embossing rollers and flat rollers as well.



Wax sheets are placed in warm water sump (80-85 degrees) so they will not be brittle when running through the embossing machine.



Wax sheet should come off the roller straight, not one side and then the other.

## **Tips for Embossing Wax Sheets:**

**The temperature of the room, wax sheets and embossing rollers are critical to making embossing successful.**

- Embossing on the dipping day only worked well if the room was not too warm, otherwise it was hard to get the rollers cool enough to release the wax sheets. In this case you would not need to put sheets into warm water as they would be warm enough to go straight into the embossing machine.
- If you are doing the embossing later, then you will need to soak the wax sheets in warm water. If you do not warm the sheets, they will be too brittle to run through the embossing machine.
- Room temperature of about 70-75 degrees is best.  
If the sheets are sticking to the rollers, brush the rollers with soapy water.

**Cool to cold rollers are the trick to successful rolling.**

- Spend time with your embossing machine and get to know the adjustments. Depending upon how you dip (sideways or lengthwise and thickness of wax) will determine what adjustments will need to be made to get the perfect embossed sheet.
- Dipping wax sheets (as we do) creates a thick and thin side to the sheet and the machine will need to be adjusted to even out the sheet when it is embossed.

**It is important to get the sheet embossed deeply with the honeycomb cell pattern.**

- We have noticed the bees not drawing out the cell if it is not embossed deeply enough. They will build their own comb on top of the sheet, if the cells are not deep enough.

#### Step 4: Cutting Embossed Sheets

- If the embossed sheets are wet, towel dry before you cut them.
- Place embossed sheet of wax on the cutting board. Arrange template on top of sheet to get the best, straightest cut. (The honeycomb pattern should be running square to the cut edges.)
- Run cutting tool around template.
- Stack with wax paper between the sheets for long storage.

