



# RAMOS 1892 CHOCOLATES

I got started with 3D printing in 2013. I've used my 3D printers for tools, repairs, and knick-knacks. I felt it was about time to apply 3D printing to my favorite food: chocolate.

Yes, there are now specialized 3D printers for chocolate, but this didn't seem like the best approach. Chocolate 3D printers are primarily for decorative applications, such as creating desserts and cake decorations. I felt that producing molds for chocolate bars would be a better approach.

So I was enthusiastic when I heard about the Mayku Formbox (<https://shop3duniverse.com/products/mayku-formbox>), a device that uses vacuum forming to produce food-safe molds from 3D printed models. My objective was to design a high quality custom chocolate bar with attractive packaging.

The Saturday evening (July 30) Talent Show, to be conducted at the Ramos Family Reunion, provided a good excuse to get started. I decided to produce custom chocolate bars shaped like Bob and Lauri's 1892 farm house, the site of the reunion. Thanks to Julienne, who offered constructive criticism as I perfected my design, while helping me to keep this project a secret prior to the Talent Show.

I worked from some photographs to create a design in Adobe Illustrator. I had to make some guesses about the original appearance of the house, since I did not want to include some of the more recent additions. The challenge was to include sufficient detail to ensure that the design would be recognizable, but to avoid excessive detail that would be lost when casting a chocolate bar from a mold.

I created some software that allowed me to import the Adobe Illustrator artwork into OpenSCAD, the 3D parametric modeling software (<https://herbweiner.com/gsOpenSCAD.pdf>) that I used to create the 3D model. OpenSCAD made it easy to change the depth and taper (draft angle) of the mold, the depth of the windows, the thickness of the lines, etc. (In order to remove the chocolates from the mold, a slight taper is required – that is, the dimensions of the top must be slightly smaller than the dimensions of the base.)

The 3D model is about 2.25 inches x 2.75 inches. The Cast Sheets used to create molds using the FormBox have a working area of about 8 inches square, so I was able to position four molds on each Cast Sheet.

I chose Callebaut Belgian Dark Chocolate Semisweet 54.5% Callets, (<https://www.amazon.com/dp/B008RBC1JM>). This is a highly rated chocolate (<https://foodsguy.com/best-chocolate-melting>), suitable for melting, with more than 50% cocoa butter, but smoother and less bitter than many dark chocolates.

My first surprise when melting chocolate is that the chocolate must be tempered (pre-crystallized) in order to solidify properly (<https://www.callebaut.com/en-US/chocolate-video/technique/tempering/how-to>). Tempering chocolate helps chocolate

harden, gives it a glossy finish and a crisp snap. Callebaut recommends melting their chocolate at 45°C, then stirring in unmelted callets (chocolate morsels formulated for melting rather than baking) to cool the melted chocolate to 31°C prior to pouring it into the mold.

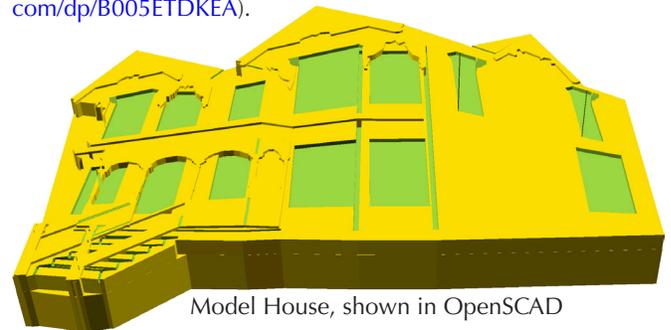
I prefer to work with small batches. I heat about 10 oz chocolate at 45°C until melted and smooth. I then turn down the temperature to 31°C and slowly mix in about 2 oz chocolate until it is all or mostly melted, and the temperature on my infrared thermometer reads 31°C. Once the chocolate reaches the proper temperature, I use a Gourmac Mini White Melamine Spoon (<https://www.amazon.com/dp/B01N2UGMSC>) to divide the chocolate into eight molds (about 1.5 oz chocolate each). Tap the bottom of the molds on a hard surface to level the chocolate and remove any bubbles.

In order to precisely control the temperature of the melted chocolate, I invested in the Waring Commercial WCM3 Chocolate Melter (<https://www.amazon.com/dp/B07P5VS9R6>), and an infrared digital thermometer (<https://www.amazon.com/dp/B00DMI62HM>).

The chocolates show evidence of being hand made: there are slight difference in the thickness of each chocolate, and minor imperfections such as small bubbles. These should be referred to the complaint department.

The type on the label is set using ITC New Baskerville, using small caps and old style figures. The label was printed using a Brother PT-P950NW Label Printer (<https://www.amazon.com/dp/B011NVSS42>) on Brother 24 mm TZE-251 Tape (<https://www.amazon.com/dp/B004I2GG5Y>).

The chocolate bars were sealed in 4x6 Inch Vacuum Sealer Bags (<https://www.amazon.com/dp/B07JVGJD1M>) using a Vacuum Master VP215 Chamber Vacuum Sealer (<https://www.amazon.com/dp/B005ETDKEA>).



Model House, shown in OpenSCAD

The products and software listed in this document are not necessarily the best or only way to create and package custom chocolate bars. Feel free to experiment and develop an even better solution.

