

## Adaptive Chef Knife

Version 1.0

February 24, 2024

Limited options are available for a chef with arthritis to continue cutting comfortably. Most commonly available knives with adaptive handles have neither quality blades nor handles strong enough for repetitive usage.

The Maker team was able to satisfy the requested design challenge by creating a knife with a permanent adaptive handle. The result is a strong, high-quality adaptive chef's knife that can easily be modified and reproduced for others with similar needs.

A handle was placed along the back of the knife blade to allow forearm leverage as opposed to using the wrist. A wider handle is added to the blade to accommodate those needing wider grips.

The body of the handle uses a tessellated PLA form to reduce the amount of resin necessary as well as to add structural stability to the handle.

The use of resin over a 3D-form creates a clean, non-porous surface that will last as long as the blade.



## Bill of Materials

**Device:** Knife Tang (without Handle)

**Link:** Amazon or other knife parts suppliers

**QTY:** 1

**Price Per Unit:** \$20.00

**Total Cost:** \$20.00

**Device:** Handle Form (3D Printed)

**Link:** [iatpmakers.org/product/adaptive-chef-knife/](http://iatpmakers.org/product/adaptive-chef-knife/)

**QTY:** 2

**Price Per Unit:** \$0.75

**Total Cost:** \$1.50

**Device:** Knife Mold (3D Printed)

**Link:** [iatpmakers.org/product/adaptive-chef-knife/](http://iatpmakers.org/product/adaptive-chef-knife/)

**QTY:** 1

**Price Per Unit:** \$5.00

**Total Cost:** \$5.00

**Device:** Vacuum Form Mold (3D Printed)

**Link:** [iatpmakers.org/product/adaptive-chef-knife/](http://iatpmakers.org/product/adaptive-chef-knife/)

**QTY:** 2

**Price Per Unit:** \$0.75

**Total Cost:** \$1.50

**Device:** EVA Inner Mold (Vacuum-Formed)

**Link:** [iatpmakers.org/product/adaptive-chef-knife/](http://iatpmakers.org/product/adaptive-chef-knife/)

**QTY:** 2

**Price Per Unit:** \$10.00

**Total Cost:** \$20.00

**Device:** 1/4 inch Weather Stripping

**Link:** Hardware Store or Online Retailer

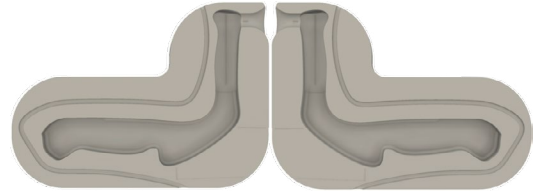
**QTY:** 1

**Price Per Unit:** \$0.20

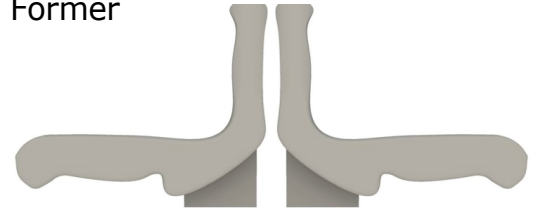
**Total Cost:** \$0.20

## Parts List

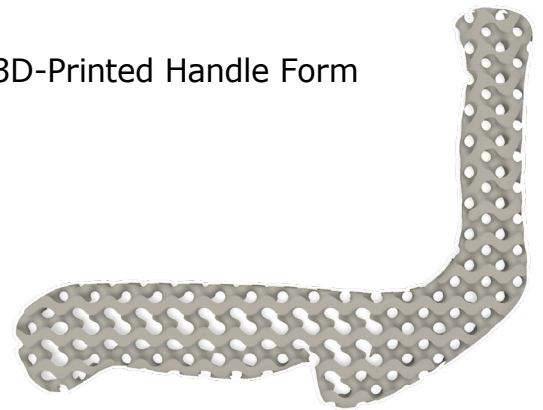
3D-Printed Knife Outer Mold



3D-Printed Handle Form for Pressure Former



3D-Printed Handle Form



Knife



1/4 inch Weather Stripping



## Tools

- 3 inch C-Clamps – x4
- 4 inch Vice (or similar to secure mold during pouring/curing)
- Plastic bin for catching resin
- Glue Gun
- 3D FDM Printer
- Vacuum/Pressure Former

## Assembly Instructions

### ***3D Printing Instructions***

- Download all parts from the IATP Maker Website.
- The Outer Mold can be printed in PLA and does not require high resolution or high strength.
- The Pressure Form Molds are printed on a dual extruder FDM printer using Varioshore infill with Nylon CF walls. It is advisable to increase the increase the wall layers (3-5) to help resist warping during the pressure-forming process.

### ***Vacuum/Pressure-Forming Instructions***

*Vacuum forming is the process of warming a piece of polymer until it's pliable then using a vacuum to mold the polymer around an object. Because the polymer is hot, when it makes contact with the model, the heat dissipates through the model. For this reason, we recommend using something stronger than PLA when printing the Pressure Form Molds.*

We used our [Mayku Multiplier \(mayku.me\)](https://mayku.me) pressure former with EVA to create a flexible, removable inner mold allowing the resin part to be easily removed once cured. Pressure forming is similar to vacuum forming, except it pushes the polymer against the object rather than using a vacuum to pull the polymer. The Multiplier exerts 60 psi / 4 ba of pressure, resulting in a highly detailed, accurate mold.

We chose this method over a silicon mold as it allowed us to quickly iterate during the design process with an easy to replicate template to work with.

## **Resin Casting Instructions**

### **Use a knife guard to prevent injury!**

- Place the weather stripping along the channel in either side of the outer mold.
- Fit the flexible EVA mold in the outer mold with the weather stripping.
- Insert the corresponding knife handle form into the EVA.
- Before placing the knife tang, run a bead of hot glue along the EVA where the handle will meet the blade. Place the knife tang against the assembled form and run a second bead of hot glue along the exposed blade side. The hot glue helps prevent leakage along the blade.
- Repeat assembly with the opposite side, but without the weather stripping.
- Fit both sides together carefully (align channels) and secure using the c-clamps, distributing the tightening process.
- Be sure knife guard is in place. Suspend assembled mold so the funnel is facing up. Place a disposal bin beneath mold to catch spillage.
- Slowly pour prepared resin into funnel until full. Wait until fully cured before disassembling mold.

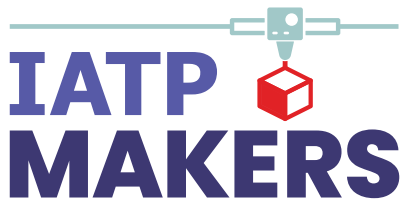


*\*Using a vacuum chamber will help remove the bubbles from the resin, creating a more translucent finish.*



## Finishing

- Carefully disassemble mold and remove knife. With guard still in place, use a Dremel or file to remove excess resin. Sand until smooth.
- Fill any air pockets with additional resin and allow to fully cure.
- Sand until smooth then coat with wax.



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