

# envisionTEC

## Technical Guide

### Shopping List

In order to prepare for successful printing and post-processing with your new printer, you will need to obtain the proper tools. These items should be acquired prior to the delivery of your printer.

The Primary Supplies will be used with every print. The Non-Immediate Supplies will be required less often, but are recommended to have on hand.

**Applicable printers:** cDLM, Desktop, Perfactory, and 3SP series

#### Primary Supplies

- 99% Isopropyl alcohol
- Absorbent paper towels
- Air compressor
- Bottle rolling machine
- Cone-shaped paint filters
- Curing unit - PCA 2000 and Otofash recommended
- Digital calipers
- Ethernet cable: CAT 6
- Garbage can
- Makeup or quality paint brush
- Material warming oven (Envision One HT only)
- Metric Allen key set
- Nitrile gloves
- PWA 2000 (parts washer) or post-processing containers, 1 qt
- Storage containers for material (sealable and opaque)
- USB drive

#### Non-Immediate Supplies

- Extra material tray (all printers except 3SP)
- Hand drill with mixing attachment (3SP only)
- Magnification loupe
- Phillips screw driver
- Stylus
- UV protective goggles

#### Post-Processing

- Electric hand-tool
- Files and rasps
- Needle-nose pliers
- Sandpaper
- Snips

#### Dental Polishing

- Ceramic Dremel bits
- Material / PMMA polish
- Medium coarse pumice
- Ultrasonic cleaner

#### Primary Supplies

##### 99% Isopropyl alcohol

99% Isopropyl alcohol breaks down uncured material from printed models. Anything lower than 99% Isopropyl alcohol can cause model defects. This product can be purchased from a number of sources, such as Walgreen's, Grainger, or Amazon.com, or from medical and business supply stores.

**Do not use denatured alcohol. Do not use less than 99%.**

##### Absorbent paper towel

Paper towel is used to clean the printer, material tray, and any surfaces uncured material comes into contact with. Inter-folded paper towel, found in labs or offices, is not as effective as a standard roll of absorbent paper towel.

##### Air compressor / forced air system

Forced air is required for removing excess material from the model during post processing. Forced air also removes the 99% isopropyl alcohol from the surface of the models. Do not use canned air as it is ineffective. For those without a forced air system, compressors can be purchased and installed into the post-processing station.

**Do not use canned air as it is ineffective.**

##### Bottle roller machine

A bottle rolling machine keeps material warmed and helps to keep material mixed while not in use. A hot dog roller can be purchased for this purpose via Amazon.com, and Olde Midway is the recommended brand.

**Link to purchase - <https://bit.ly/Bottle-Roller>**

##### Cone-shaped paint filters

These filters are used to strain material. The filter removes particles that are generally too small to see but may affect print quality. They will be used while pouring material from the tray into the material storage containers for maintenance. Each filter is approved for one-time use only.

**Do not leave filters in the bottle of material for longer than 5 minutes.**

**Do not use coffee filters.**

##### Curing unit

3D printed models must be post-cured to achieve the final, end-use state. EnvisionTEC offers several curing units, including the PCA 2000 and the Otofash. Contact EnvisionTEC to ensure you have the correct curing unit for your printer and material combination.

**EnvisionTEC only supports EnvisionTEC curing units.**

##### Digital calipers

These are used during calibration. Calibration may be needed when a new material is purchased or for maintenance reasons. Digital calipers are used to check the accuracy of printed models against the computer's measurements. Mitutoyo is the recommended brand.

**Find calipers from major manufacturers only. Look for an accuracy of  $\pm 0.02$  mm.**

##### Ethernet cable: CAT 6

Ethernet cables connect the printer to the local Internet network. The cable inserts into the input behind the printer on one end. The other end plugs into the network or operating computer. The printer can be operated by other Windows computers on the network if the CAT 6 is plugged into a modem or into a network outlet. If it is directly connected to the operating computer, it can only be accessed by the connected printer.

**This product can be substituted with a CAT 5 cable if using the printer on a network.**

##### Garbage can

Dedicate a waste bin for cleanup. Having a can on hand speeds up throughput, increasing efficiency. This needs to be easily accessible and very near to the printer / workspace. If the garbage can is too difficult to access, material may spill. Lidded cans minimize residual smells. Lidless cans are easier to access. Cans with a foot pedal are preferred. If material drips onto the can, wipe it clean immediately. Dried material will stain and in most cases, cannot be removed.

##### Makeup or quality paint brush

Brushes are used to clean model surfaces during post processing. Do not use a toothbrush as they are too rigid and can dig into printed models.

##### Material warming oven (Envision One HT only)

The Envision One cDLM HT utilizes an infrared heating system for the material tray and a heated build platform. It is able to print with high temperature materials that are solid at room temperature. This material must be kept in a warming oven between prints. The **Courant Toaster Oven Toastower** is the recommended warming oven, and can be purchased from Amazon.com.

**Link to purchase - <https://bit.ly/E1HTOven>**

**Metric Allen key set**

A metric Allen key set may be required to perform calibrations as directed by an EnvisionTEC certified technician.

**Nitrile gloves**

Always wear gloves when working with the printer or prior to touching anything that may come into contact with uncured material.

**See the Safety Data Sheet for proper handling guidelines.**

**PWA 2000 or post-processing containers, 1 qt**

The PWA 2000 (parts washer) is available for purchase and allows for a simple post processing workflow. *Please refer to the PWA 2000 user manual for more information.* If the PWA 2000 is not purchased, a minimum of two plastic containers can be used for post-processing models. 1 qt or larger plastic food grade containers work well. Containers need to be sealable and large enough to submerge printed models. They can be wiped clean with a paper towel and re-used when emptied. Containers generally remain filled with 99% Isopropyl alcohol and are only emptied occasionally when the mixture becomes too muddy.

**Storage containers for material**

These containers will store material that needs to be removed from the printer's material tray. To avoid contamination, never pour used material back into the original bottle. These containers must be completely clean. They need to be opaque with a strong seal to keep material fresh. Containers must not let any light through. Please see the Resin Handling Technical Guide for more information about the material storage containers.

**USB drive**

USB drives work as a back-up for transferring print information from the operating computer to the printer. Between 8 and 32 GB size is recommended.

## Non-Immediate Supply Details

**Extra material tray (All printers except 3SP)**

Each type of EnvisionTEC printer comes with a specific type of material tray. All material trays are consumables that will need to be replaced over time. Some printer's have material trays that last longer than others. It is recommended to always have an extra material tray on hand in case it is needed. Contact EnvisionTEC or an authorized distributor to order an extra material tray.

**Hand drill with mixing attachment (3SP only)**

For 3SP printers, material is stored in buckets and an electric hand drill with a mixing attachment can be used to carefully mix the material in the bucket.

**Magnification loupe**

Loupes are used to look at the fine details of printed models. They are similar to a magnifying glass.

**Phillips screw driver**

This tool is used to open the printer's front and back covers. The cover should only be opened when instructed by an authorized technician.

**Stylus**

A stylus is a great option for offices or labs that want to keep the touch screen clean and smudge free.

**UV protective goggles**

UV protective safety goggles are used during printer calibration. They are not needed for day-to-day operation.

## Dental Supplies

These supplies are specially needed for dental applications. The ultrasonic may be suggested to other industries as needed, based on their unique material, printer, and application. These supplies can be purchased from dental suppliers.

**Ceramic Dremel bits**

Ceramic bits don't overheat while working with printed models. This type of electric hand-tool attachment is recommended for use during the support removal process.

**Material / PMMA polish**

Standard dental equipment used to post-process models for a glossy surface finish.

**Medium-coarse pumice**

Standard dental equipment used to post-process models for a smooth surface finish.

**Ultrasonic cleaner**

Ultrasonic cleaners are strongly recommended for post processing any bio-compatible materials. Fill the ultrasonic cleaner with water. Fill a cup halfway with 99% isopropyl alcohol and place a model in the cup. Place the cup in the ultrasonic. Cleaning time is material dependent. Most uncured material should be removed from the model before using the ultrasonic. Never put castable materials in the ultrasonic - the vibrations may cause casting porosity.

## Post-Processing Supplies

**Electric hand-tool**

Hand tools give more control during the support removal process. They also speed up the post-processing workflow. A simple Dremel will do the trick.

**Files and Rasps**

Files and rasps in various shapes and sizes can be used during the support removal process, and are especially useful for large models.

**Needle-nose pliers**

Needle-nose pliers are helpful for holding small features and getting into small spaces for support removal.

**Sandpaper**

Sandpaper grit 220 and finer can be used for manually smoothing supported surfaces.

**Snips**

Snips are suggested for cutting supports off models. An X-Acto knife can also be used, with caution. It is not recommended to pull supports off as this can leave indents in the supported surface.