

Model X Material Best Practice

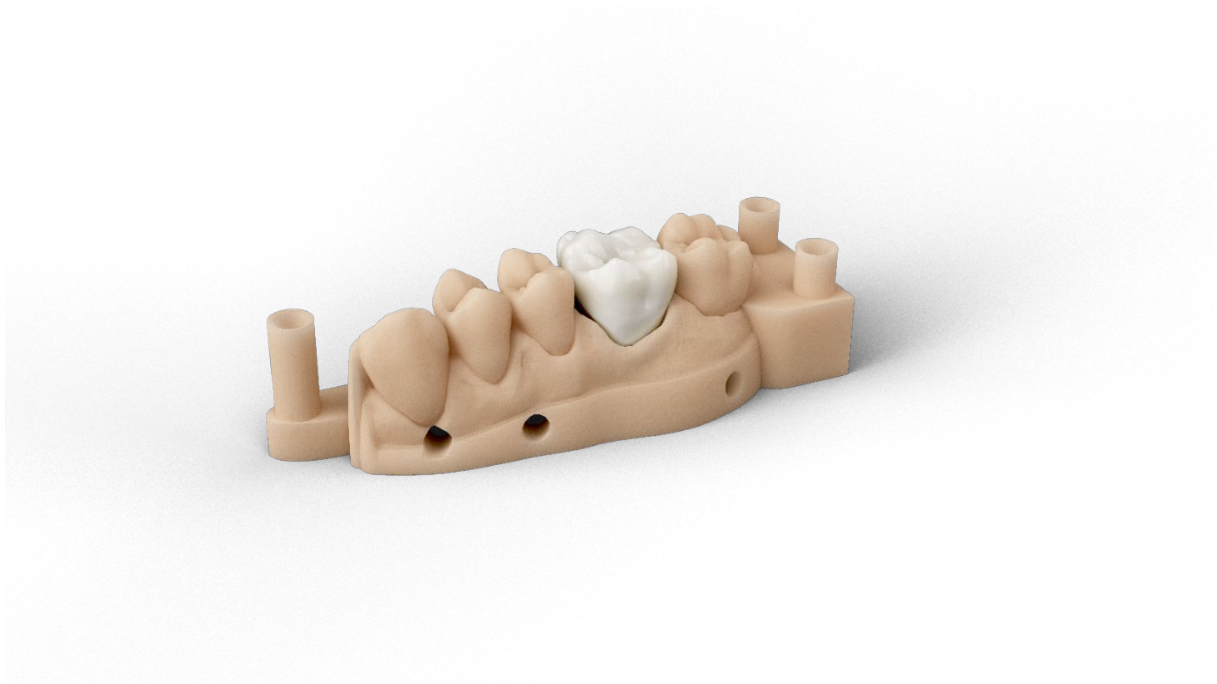


Table of Contents

- Document Information3**
- Legal Notice3
- History of Changes4
- How to Use This Guide4
- About Model X.....5**
- Identification.....5
- Applicable Printers5
- Getting Started6**
- Primary Supplies6
- Capture Patient Data6
- Design Models for Model X6
- Software7**
- Orient Models Envision One RP Software7
- Support Models Envision One RP Software7
- Print Preparation8**
- Mix Material8
- Fill Material Tray.....8
- Print with Model X Material8
- Post-Processing.....9**
- Materials Safety9
- Clean Printed Models9
- Dry Models 10
- Post Cure Printed Models 10
- Manufacturer 11**

Document Information

Legal Notice

This document contains information that is confidential and proprietary to Desktop Metal, Inc. and/or its affiliates, including without limitation EnvisionTEC US LLC and ExOne Operating, LLC (each a “DM Company,” and together the “DM Companies”). This information is provided only to authorized representatives or customers of the DM Companies, and solely for the purpose of facilitating the use of DM Companies’ products and services. This document and its contents shall not be used or distributed for any other purposes or communicated, disclosed or copied except as agreed by a DM Company in writing.

The information contained herein is provided for reference only and subject to change without notice. This document provides general information about the products described herein and is not a substitute for the Instructions For Use and Safety Data Sheets for said products. The DM Companies shall not be liable for omissions or for technical or editorial errors contained herein or for any damages whatsoever arising in connection with the furnishing or use of this document. This information is not intended to be used to determine the suitability or reliability of the user’s specific applications or environments; these determinations are the sole responsibility of the user, and the DM Companies disclaim all liability associated therewith. Without limiting the foregoing, the user is solely responsible for the use and operation of the products and services, including the disposal of waste products in connection therewith.

This document does not supplement, replace or otherwise modify the terms and conditions that govern the purchase and sale or use of DM Companies’ products or services.

Furthermore, nothing herein shall constitute a warranty; the only warranties for DM Companies’ products and services are those set forth in the express warranty statement in the terms and conditions of sale for said products and services.

Desktop Metal, the DM Logo, Bound Metal Deposition, BMD, Live Parts, Studio System, Shop System, Fabricate, Fiber, Production System, Desktop Health, Desktop University, Flexcera, Einstein and ETEC are trademarks of Desktop Metal, Inc. EnvisionTEC, Envision One, cDLM, Vida, Perfactory, D4K, Hyperprint and Xtreme 8K are trademarks of EnvisionTec GmbH and its affiliates. ExOne, the ExOne Logo, Innovent, Innovent+, InnoventX, X25Pro, X160Pro, X1, S-Max, S-Print, CleanFuse, NanoFuse, and HydroFuse are trademarks of ExOne Operating, LLC or its affiliates. All other trademarks used herein are the property of their respective owners. © 2022 Desktop Metal, Inc. All rights reserved.

Model X Material Best Practice Guide: MODELX-MBP-00026-Rev02-EN, December 2022

History of Changes

Date	Changes	Version
February-2022	Document creation	1.0
February-2022	<ul style="list-style-type: none"> • Updated Primary Supplies • Updated Clean Printed Models 	1.1
November-2022	<ul style="list-style-type: none"> • Added Document Information • Added Legal Notice • Added History of Changes • Added How to Use This Guide • Added Materials Safety • Added Manufacturer • Updated document style • Updated Applicable Printers • Updated Primary Supplies • Updated Mix Material • Updated Fill Material Tray • Updated Print with Model X Material 	2.0

How to Use This Guide

This document serves as a comprehensive guide to prepare parts, post-process, and finish using Model X.

About Model X

Identification

Model X with its 50-micron build layer allows for exceptionally detailed crowns, bridges with removable dies, implant cases and diagnostic and orthodontic models.

Applicable Printers

This material is tested and approved for the following printers:

- Einstein™
- Einstein™ Pro XL
- Envision One cDLM
- D4K Pro

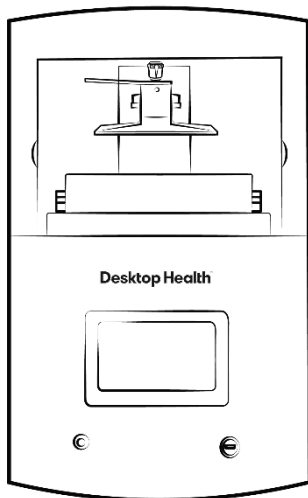


Fig. 1 Einstein Front View

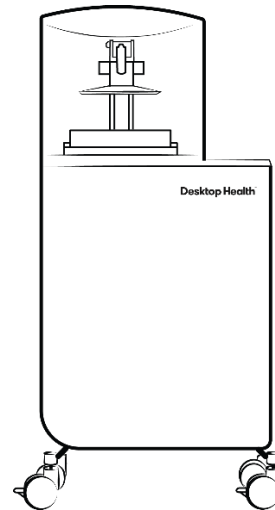


Fig. 2 Einstein Pro XL Front View

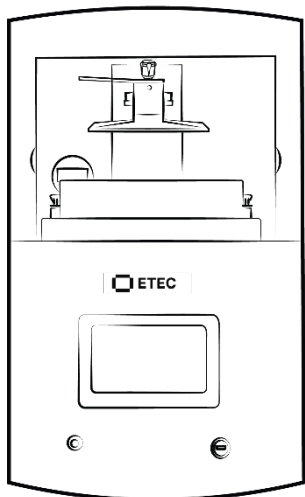


Fig. 3 Envision One cDLM Front View

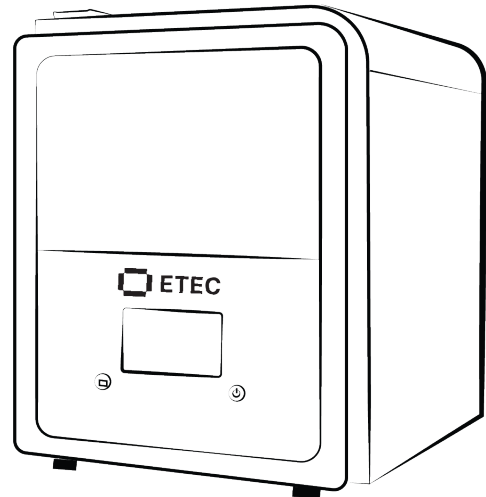


Fig. 4 D4K Pro Front View

Getting Started

Primary Supplies

The following supplies are required to print Model X material:

- 99% isopropyl alcohol (IPA).
- Air compressor.
- Cone-shaped paint filter, *Starter Kit item*.
- Curing unit: Otoflash, *SAP Part # ACC-30-1000*, PCA 4000 *SAP Part # ACC-06-1000*, or PCA 2000 *SAP Part # ACC-32-1000*
- Dual Motion Bottle Roller, *SAP Part # ACC-26-1000 (110V) and ACC-26-1000 (220V)*.
- Nitrile gloves.
- Paint scraper, *Starter Kit item*.
- Paper towels.
- Plastic funnel.
- Rubber spatula or material mixing cards, *Starter Kit item*.
- Spray bottle with 99% IPA.
- Snips, precision blade, or similar tool.
- Storage container for material, sealable and opaque.
- Washing unit: PWA 2000, *SAP # ACC-22-2000*.

Capture Patient Data

A digital impression can be accomplished with a handheld intraoral scanner and CBCT scan, or with a traditional impression and a desktop box scanner.

Envision One RP Software is compatible with the universal .STL file format and is thus compatible with almost all dental CAD and model design software as well as digital design services. Models may be designed in-house or outsourced to a design partner.

Design Models for Model X

Hollow dental models printed in Model X must have a minimum wall thickness of 3 mm.

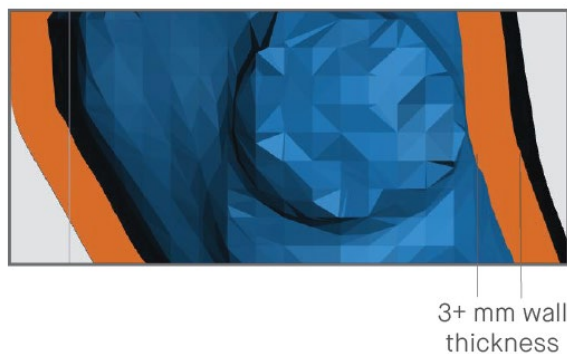


Fig. 5 Hollow Model Wall Thickness

It is recommended to add channels or drainage holes to hollow models. This allows uncured material to drain from the hollow feature during the printing process.

Software

Orient Models Envision One RP Software

Orient models in Envision One RP Software with the flat base side down, parallel with the build platform.

- **Spacing:** place models a minimum of 1.5 mm apart.
- **Level at build platform:** place unsupported models 0 mm from the build platform. Place supported models 4 mm from the build platform.
- **Resolution:** 50 μ m Z resolution.

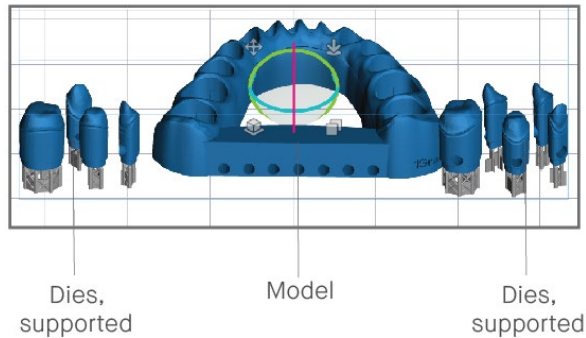


Fig. 6 Models in Envision One RP Software

Support Models Envision One RP Software

Some approved applications require supports:

- **Minimum support base:** 1.0 mm
- **Minimum contact tip:** 0.45 mm
- **Minimum support beam height:** 4.0 mm

Print Preparation

Mix Material

Model X material must be mixed in the material bottle prior to use:

1. Place the sealed material bottle on the Dual Motion Bottle Roller for a minimum of 60 minutes.
2. Wait for bubbles to subside before filling the material tray.
3. Mix material in the material tray before each print with the rubber spatula (Einstein, Envision One cDLM, D4K Pro) or a material mixing card (Einstein Pro XL). The material should be a uniform color.

Ensure there are no small, cured particles in the material. If found, then the material must be filtered. See the Knowledge Base:

- [Maintain Materials Einstein](#)
- [Maintain Materials Einstein Pro XL](#)
- [Maintain Materials Envision One cDLM](#)
- [Maintain Materials D4K Pro](#)

Fill Material Tray

Do not overfill the material tray. Overfilling can cause the material to overflow when the build platform moves down at the start of the print job.

To add more material to the printer, carefully pour material into the material tray between prints.



Important: Adding material while the print is paused, or during a print, will cause a small shift line in the model. See the Knowledge Base:

[Add Material to Material Tray in Einstein](#)

[Add Material to Material Tray in Einstein Pro XL](#)

[Add Material to Domeless Material Tray Envision One cDLM](#)

[Add Material to Material Tray D4K Pro](#)

Print with Model X Material

To start the print, follow instructions in the printer's Operations and Maintenance Guide.


To remove the models from the build platform after the print is complete, follow instructions in the printer's Operations and Maintenance Guide. See the Knowledge Base:

- [Einstein Operations and Maintenance Guide](#)
- [Einstein Pro XL Operations and Maintenance Guide](#)
- [Envision One cDLM Series Operations and Maintenance Guide](#)
- [D4K Operations and Maintenance Guide](#)

Post-Processing

Materials Safety

Safety data sheets (SDS) for materials used in the printing process are available either from [Desktop Health](#) or directly from suppliers. Read and understand the information provided in these documents prior to attempting to operate the printer or handle any media.

 <p>Warning</p>	<p>Fire hazard: Some materials used for washing may be flammable. Do not wash parts in proximity of any potential ignition source. Washing or drying equipment must be approved for use with flammable solvents. Read the SDS and contact your EHS Representative.</p>
---	---

Clean Printed Models

The PWA 2000 is the recommended parts washer. Always wear gloves when handling uncured material and alcohol.



Important: Do not expose Model X to alcohol for longer than 5 minutes.
Excess exposure to alcohol may cause discoloration and warping.

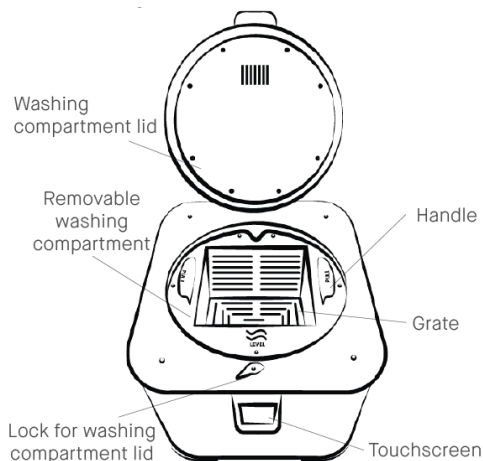


Fig. 7 PWA 2000 Front View

Getting started:

1. Open the washing compartment lid.
2. Lift the handle to raise the interior grate to the highest position.
3. Pour the 99% IPA into the washing compartment to just below the grate while it is in the lifted position.
4. Place the model on the grate and gently lower the handle to submerge the model in 99% IPA.
5. Close the washing compartment lid and lock in place.
6. Plug in the power cable to turn on the PWA-2000.

Clean models:

1. Using the touchscreen, select the **High** washing program. Set the timer to 00:03:00, or 3 minutes. Press **Start**.
→ *The PWA 2000 will immediately begin the set washing cycle.*
2. Remove the model as soon as the program is complete.
3. Spray the models with the spray bottle filled with 99% IPA.
4. Use compressed air to remove all IPA from the surface of the model as soon as possible.

Dry Models

Models must be completely dry before post curing –

1. Place the models on a clean paper towel lined surface.
2. Air dry in ambient room temperature/humidity for 10 min.

Post Cure Printed Models

Cure the models using the following method:

Otoflash: 2 cycles for 500 flashes, flip models between cycles.

See [Hardware Operations Otoflash](#) for instructions setting a curing cycle.

PCA 4000: 1 Minute - 20° C - 100% Power.

See [Programs and Features PCA 4000](#) for instructions setting a curing cycle.

PCA 2000: 2 x 2 Minutes - 20° C - 100% Power.

See [Programs and Features PCA 2000](#) for instructions setting a curing cycle.

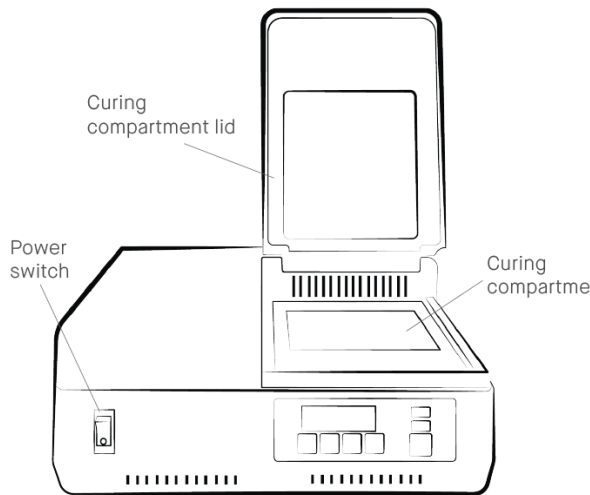


Fig. 8 Otoflash Front View

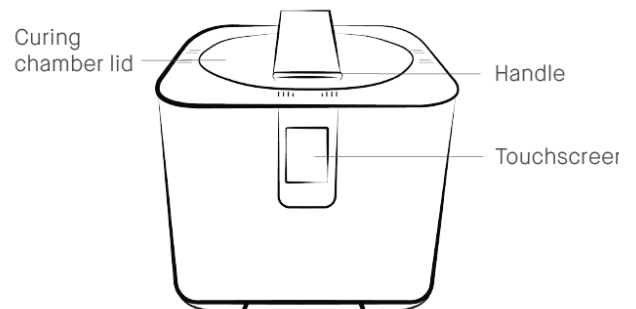


Fig. 9 PCA 4000 Front View

Place models into the curing unit with as much space between models as possible. Models should never touch one another while curing. Let models cool completely before handling them or starting the next cycle. Flip models between cycles for an even cure.



Important: Desktop Health does not support third-party curing units.

Manufacturer

Desktop Metal, Inc.
63 3rd Avenue
Burlington, MA 01803
www.desktopmetal.com

Desktop Health
c/o Desktop Metal, Inc.
63 3rd Avenue
Burlington, MA 01803
www.health.desktopmetal.com

EnvisionTEC US LLC (ETEC)
15162 Commerce Dr. S
Dearborn, MI 48120
www.etc.desktopmetal.com

EnvisionTec GmbH
Brusseler Str. 51
45968 Gladbeck
Germany

ExOne Operating, LLC
127 Industry Boulevard
North Huntingdon, PA 15642
www.exone.com

ExOne GmbH
Daimlerstrasse 22
86368 Gersthofen
Germany

ExOne KK
161-5 Haneo
Odawara-shi, Kanagawa
Japan 256-0804