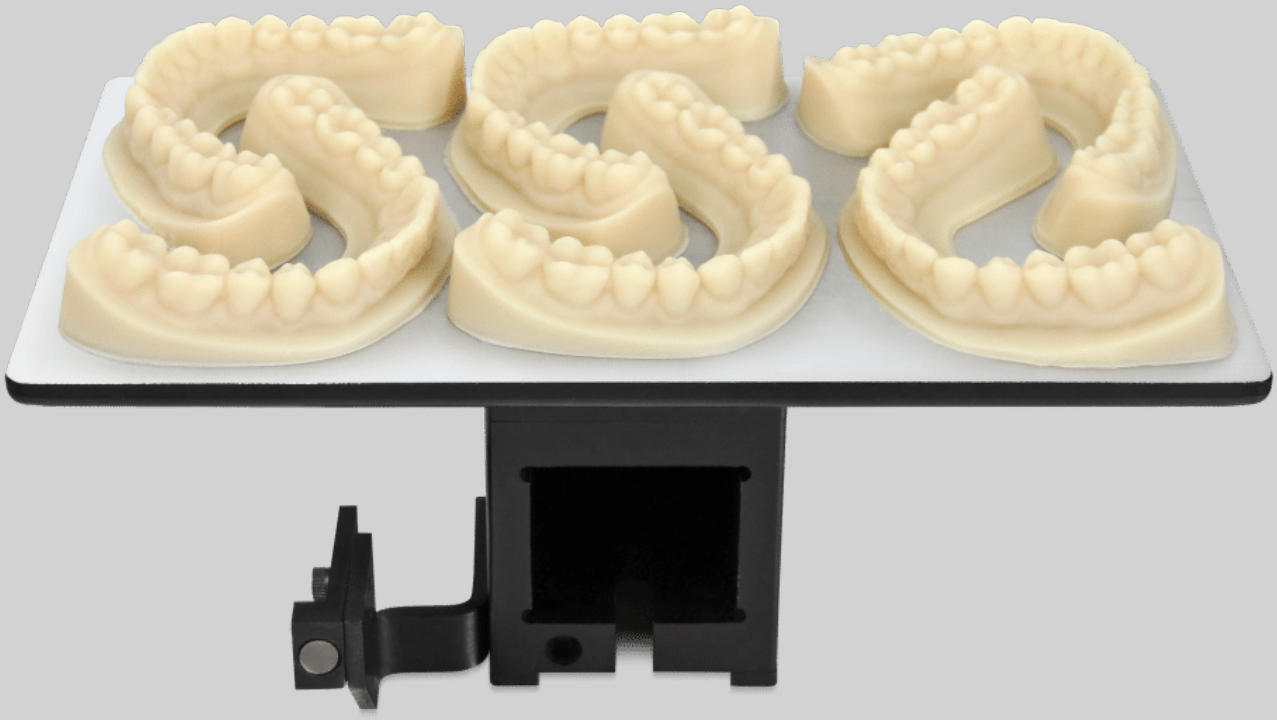
Model Z

February 2024

Material Best Practice Guide for Einstein™, Einstein™ Pro XL, Envision One™, & D4K™



Desktop Health

Contents

Legal Notice

About This Guide 3

About Model Z

Applicable Printers 4

Getting Started

Primary Supplies 5

Design Parts Model Z 6

Software

Orient Models Live Build DLP 7

Autopilot 8

Print Preparation

Mix Material 9

Fill Material Tray 9

Print with Model Z Material 9

Post-Processing

Materials Safety 10

Clean Models 10

Dry Models 10

Post Cure Printed Models 11

History of Changes 13

Legal Notice

About This Guide

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

Model Z Material Best Practice Guide: 81-00273_Rev04_EN Model Z Material Best Practice Guide, February 2024.

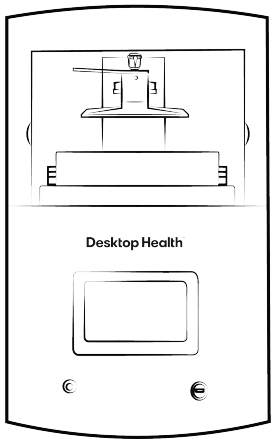
About Model Z

Model Z is as effective as it is fast. This low viscosity model material is ideal for thermoforming models, diagnostic models and orthodontic appliance models requiring a smooth surface resolution, easy clean-up and a superior fit and finish.

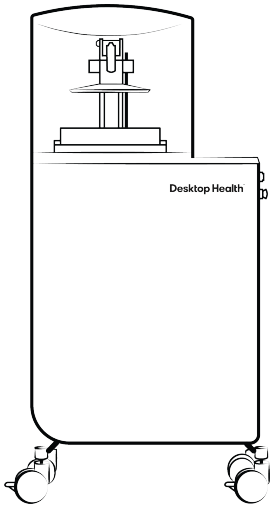
Applicable Printers

This material is tested and approved for the following printers:

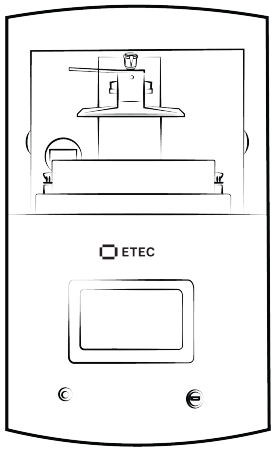
- Einstein™
- Einstein™ Pro XL
- Envision One™
- D4K™



Einstein Front View



Einstein Pro XL Front View



Envision One Front View

D4K Front View

Getting Started

Primary Supplies

The following supplies are recommended for producing parts in Model Z:

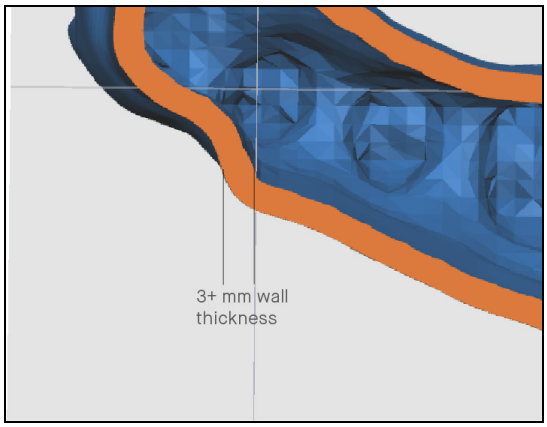
- Personal Protective Equipment (PPE).
- Paper towels.
- Material mixing:
  - All printers: Dual Motion Bottle Roller, Product Code ACC-26-1000 (110V) and ACC-26-1000 (220V).
  - Einstein, Envision One, and D4K: Rubber spatula.
  - Einstein Pro XL: Material mixing cards.
- Material filtering: Cone-shaped paint filter, plastic funnel, and spare material storage bottle.
- Part removal: Paint scraper.
- Washing unit:
  - PWA 2000: Product Code ACC-22-2000.
- Washing agent: 99% isopropyl alcohol (IPA).
- Spray bottle with 99% IPA.
- Air compressor.
- Curing unit options:
  - Otoflash: Product Code ACC-30-1000.
  - PCA 4000: Product Code ACC-06-1000.
  - PCA 2000: Product Code ACC-32-1000.
  - Third party curing unit: CUREbox Plus UV Post-Cure Chamber from Wicked Engineering.
  - Third party curing unit: UVitron Intelliray 400.
- Part finishing: Snips, precision blade, or similar tool.

Note: See Einstein Site Prep Guide, Einstein Pro XL Site Prep Guide, Envision One Site Prep Guide, and D4K Site Prep Guide for more information.

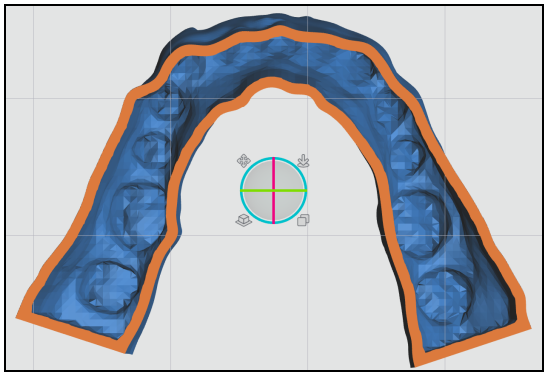
Design Parts Model Z

Live Build DLP 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.

Hollow dental models printed in Model Z must have a minimum wall thickness of 3.0 mm.



Micro View: Hollow Model Wall Thickness



Macro View: Hollow Model Wall Thickness

Important: In Live Build DLP software, an orange highlight indicates that the surface is contacting the build platform. This orange highlight must be visible all the way around.

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.

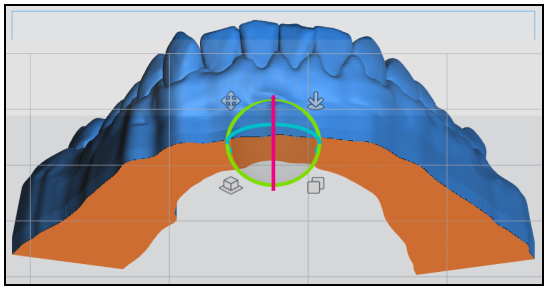
Software

Orient Models Live Build DLP

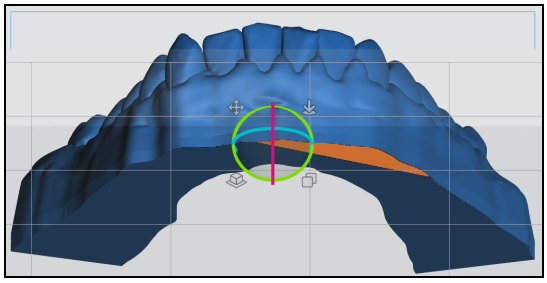
Orient models in Live Build DLP software with the flat base side down, parallel with the build platform.

- **Spacing:** place models a minimum of 2.5 mm apart.
- **Level at build platform:** place unsupported models 0 mm from the build platform.
- **Resolution:** 100 µm Z resolution.

Ensure that the bottom surface of the model is oriented flat-to-plate and is making full contact with the build platform. An orange highlight indicates that the surface is contacting the build platform. This orange highlight must be visible all the way around.



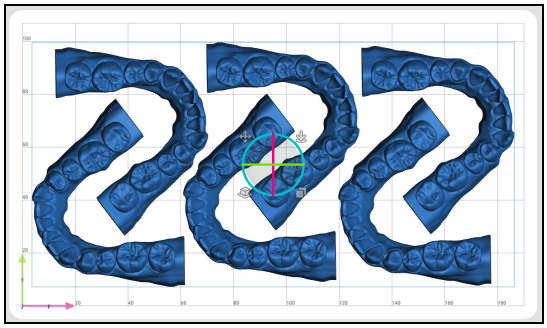
Model correctly oriented flat-to-plate in Live Build DLP



Model incorrectly oriented in Live Build DLP

Autopilot

Autopilot > **Models** in Live Build DLP can be used to quickly orient all selected orthodontic models.



Autopilot > Models

- **Models:** Aligns the largest flat surface with the build platform, spaces the models across the build platform, and transfers the job automatically to the printer.

Print Preparation

Mix Material

Model Z 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 30 minutes OR manually shake the sealed material bottle for 1 minute.
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, D4K) 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:

- Maintain Materials Einstein
- Maintain Materials Einstein Pro XL
- Maintain Materials Envision One
- Maintain Materials D4K

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.

Print with Model Z Material

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

- Einstein Operations and Maintenance Guide
- Einstein Pro XL Operations and Maintenance Guide
- Envision One 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.

WARNING

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.

Clean Models

The PWA 2000 is the recommended parts washer. Always wear gloves when handling uncured material and alcohol. See Hardware Operations PWA 2000 for setup instructions.

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

1. Using the touchscreen, select the **High** washing program. Set the timer to 00:03:00, or three 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 surface lined with paper towel.
2. Leaves the models to dry for 5 minutes.

Post Cure Printed Models

Post cure parts using one of the following curing options:

- Otoflash G171. See Hardware Operations Otoflash.
- PCA 4000. See Programs and Features PCA 4000.
- PCA 2000. See Programs and Features PCA 2000.
- CUREbox Plus. See CUREbox Plus UV Post-Cure Chamber from Wicked Engineering.
- IntelliRay 400. See UVitron Intelliray 400.

Cure models with the Otoflash:

1. Place the models in the curing unit with as much space between the models as possible. Models should never touch one another while curing.
2. Cure the models in the Otoflash for 500 flashes.
3. When the cycle ends, let the models cool completely before handling.
4. Repeat **Steps 2-3**. Flip the models between cycles for an even cure.

Cure models with the PCA 4000:

1. Place the models in the curing unit with as much space between the models as possible. Models should never touch one another while curing.
2. Cure the models in the PCA 4000 for 1 minute at 20° C and 100% power.
3. When the cycle ends, let the models cool completely before handling.

Cure models with the PCA 2000:

1. Place the models in the curing unit with as much space between the models as possible. Models should never touch one another while curing.
2. Cure the models in the PCA 2000 for 2 minutes at 20° C and 100% power.
3. When the cycle ends, let the models cool completely before handling.
4. Repeat **Steps 2-3**. Flip the models between cycles for an even cure.

Cure models with the CUREbox Plus:

1. Place the models in the curing unit with as much space between the models as possible. Models should never touch one another while curing.
2. Cure the models in the CUREbox Plus for 5 minutes at 30° C.
3. When the cycle ends, let the models cool completely before handling.
4. Repeat **Steps 2-3**. Flip the models between cycles for an even cure.

Cure models with the UVitron Intelliray 400:

1. Place the models in the curing unit with as much space between the models as possible. Models should never touch one another while curing.
2. Cure the models in the UVitron Intelliray for 15 seconds at 80% power.
3. When the cycle ends, let the models cool completely before handling.
4. Repeat **Steps 2-3**. Flip the models between cycles for an even cure.

History of Changes

Date	Changes	Revision
February- 2022	Document creation	1.0
February- 2022	■ Updated Getting Started ■ Updated Post-Processing	1.1
December- 2022	■ Added Document Information ■ Added Legal Notice ■ Added History of Changes ■ Added About This Guide ■ Added Materials Safety ■ Added Back Page ■ Updated document style ■ Updated Getting Started ■ Updated Print Preparation	2.0
February 2024	■ Updated Getting Started ■ Updated Software ■ Updated Print Preparation ■ Updated Post-Processing	4.0

Desktop Health

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
health.desktopmetal.com

EnvisionTec US LLC (ETEC)
15041 Commerce Dr. S, Suite 401
Dearborn, MI 48120
etec.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