TrueDent® and TrueDent-D™ Materials

J5 DentaJet® Printers

Best Practice

This document describes guidelines for achieving optimum quality and biocompatibility with TrueDent® and TrueDent-D™ materials and ensuring that the dental appliances printed with TrueDent and TrueDent-D are suitable for the intended use:

- Overview
- Printing and Post Processing Guidelines

Overview

The following resins were developed for 3D printing on the Stratasys® J5 DentaJet® platform for the following applications:

- TrueDent is a Class II FDA-cleared resin family—full and partial dentures, temporary crowns, and bridges.
- TrueDent-D is a Class I CE-approved resin family—full and partial dentures, denture bases, and teeth.

Printing with these resins enables batch production of highly aesthetic, monolithic, multicolored parts on a single mixed-part on a high-capacity tray (Figure 1).

Figure 1: TrueDent dentures

TrueDent and TrueDent-D each include 5 model materials and 1 support material as listed in Table 1:

Table 1: TrueDent and TrueDent-D materials

TrueDent Materials	TrueDent-D Materials
TrueDent® Clear	TrueDent-D™ Clear
TrueDent® White	TrueDent-D™ White
TrueDent® Cyan	TrueDent-D™ Cyan
TrueDent® Magenta	TrueDent-D™ Magenta
TrueDent® Yellow	TrueDent-D™ Yellow
TrueDent® Support	TrueDent-D™ Support

Important:

TrueDent materials cannot be mixed with TrueDent-D materials (and vice versa), or with other material families.

Printing and Post Processing Guidelines

- Supported Printers, Materials, and Software
- Preparing the Printer
- Preparing for Printing
- Post-Print Processes
- Polishing and Relining

Supported Printers, Materials, and Software

- TrueDent and TrueDent-D materials can be used on Stratasys J5 DentaJet 3D printers.
- 3Shape Dental System software versions are described in Table 2. After deciding which *3Shape Dental System* version to use, download the corresponding *.dme* properties file (that starts with the version) from the Stratasys Support Center.

  For example, **2022** 3Shape Dental System version, download the **2022** 3Shape Properties File for TrueDent Materials file.

Table 2: 3Shape Dental System Version Support

3Shape Version	Exported File Format	Color Assignments
2021	*.stl* format	Colors need to be assigned in GrabCAD Print™ before printing.
2022 (and later)	*.stl* and *.3mf* formats	Colors that are selected in the 3Shape Dental System order form are automatically loaded to GrabCAD Print. • Assign the colors in 3Shape Dental System and save the color definition as a *.3mf* file. After downloading the corresponding *.dme* properties file, you can access the Stratasys shades library in 3Shape Dental System. • The shades selected in the order form are saved in the exported *.3mf* file and are automatically imported with the model when loading the *.3mf* file to GrabCAD Print.

- To protect patient privacy, before importing CAD files into GrabCAD Print, verify that the files do not contain sensitive and confidential patient health information.
- Make sure that you prepare the following post-processing materials and equipment:
  - Cleaning System: Objet WaterJet or approved alternative
  - Caustic soda (sodium hydroxide, CAS 1310-73-2)
  - Curing Chamber: TrueDent™ Cure or approved alternative
  - Glycerol (CAS 56-81-5, purity > 99.5%)
  - Transparent glass container:
    - Borosilicate glass (for example, Pyrex, Borosil, Schott DURAN)
    - Max dimensions for the TrueDent Cure curing chamber:
      21 x 22 x 10 cm (8.3 x 8.7 x 3.9 in), wall thickness 2.5 mm (0.098 in)
    - Max dimensions for the Stratasys ProLight™ UV Curing Box:
      39.5 cm (15.6 in) diameter and 32 cm tall (12.6 in), wall thickness 2.5 mm (0.098 in)
  - Tweezers

Design Process and Parameters

Designing in 3Shape Dental System

Initial Setup

1. Import the Stratasys *.dme* properties file into 3Shape Dental System Control Panel. For information about the *.dme* properties files, see Supported Printers, Materials, and Software.
2. Open 3Shape Dental System Control Panel.
3. Go to *Tools* > *Import/Export* and select Import materials.
4. Locate and select the .dme properties file that you imported in step 1 and then import the *.dme* file.
5. Save and close 3Shape Dental System Control Panel.

Design Workflow

1. To start a new case design, set *Anatomy* and *Gingiva* parameters in the Order form (Figure 2).
2. In *Anatomy*:
   a. Select *Artificial Tooth* and click the ✚ button (Figure 3).
   b. Set the parameter fields that appear as follows (Figure 4):
   - *Material*: Stratasys TrueDent
   - *Color*: your preferred teeth shade.
   - *Type*: Stratasys TrueDent Teeth
   - Manufacturing process:
     - For **Stratasys TrueDent .stl**, assign the teeth shade in GrabCAD Print (available in the **2021** 3Shape Dental System version)
     - For **Stratasys TrueDent .3mf**, the shades are automatically assigned based on your selection in the order form (available in the **2022** 3Shape Dental System version)
3. In Gingiva:
   a. Select *Dentures Gingiva* dentures and click the ✚ button (Figure 5).
   b. Set the parameter fields that appear as follows (Figure 6):
   - *Material*: Stratasys TrueDent
   - *Color*: your preferred gingiva shade.
   - *Type*: Stratasys TrueDent Base
   - Manufacturing process:
     - For **Stratasys TrueDent .stl**, you assign the gingiva shade in GrabCAD Print (available in the **2021** 3Shape Dental System version).
     - For **Stratasys TrueDent .3mf**, the shades are automatically assigned based on your selection in the order form (available in the **2022** 3Shape Dental System version).
4. In *Bridge*, there is no selection.
   There is no need to bridge the teeth. TrueDent dentures are monolithic.

Figure 2: Order form with *Anatomy* and *Gingiva* settings

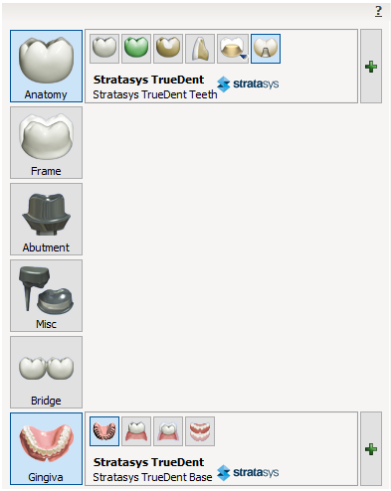


Figure 3: Anatomy options

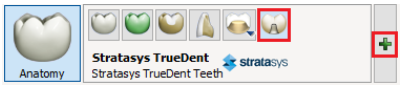


Figure 4: Artificial Tooth parameter

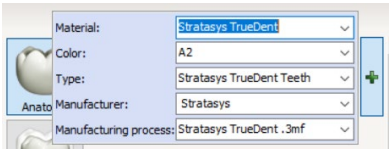


Figure 5: Gingiva option

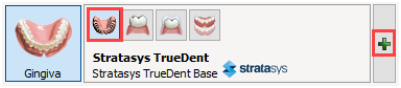
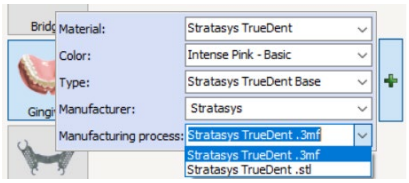


Figure 6: Dentures Gingiva parameters



Designing in Other CAD Software

Follow these design considerations:

- For monolithic prints, make sure to set the *offset* between the teeth and gingiva to *0* in your design.
- The minimum base thickness should be 2.5 mm (0.098 inches) in the final product.

> To compensate for material loss during polishing, design as follows:
> - the upper arch denture base with a minimum thickness of 2.75 mm.
> - the lower arch denture base with a minimum thickness of 3 mm.

Preparing the Printer

1. When switching between non-TrueDent materials and TrueDent or TrueDent-D materials, run the *Shutdown* wizard using the *More than 30 days* option to flush the system with cleaning fluid.
   For detailed instructions, refer to “Shutting Down the Printer” in the printer User Guide.

   > If you have a new printer that is already loaded with cleaning fluid, you do not need to run the *Shutdown* wizard.

2. To print dental appliances, load all the TrueDent or TrueDent-D model and support materials in the printer.

   > **Important:**
   > All of the TrueDent or TrueDent-D materials need to be loaded.

3. Run the *Material Replacement* wizard:
   a. From the *Wizards* screen, tap *Material Replacement*.
   b. In the opening screen, tap **Start**.
   c. In the *Material Replacement* screen, select *Denture* (Figure 7).
   d. For each channel, select the specific material (Figure 8).
   e. Insert cartridges according to the order indicated (Figure 9).
   f. After replacing materials in all of the required channels, tap **Next**.
      For detailed instructions, refer to “Changing Printing Materials” in the printer User Guide.
   g. Run the *Advanced Head Optimization* wizard.
      For detailed instructions, refer to “Optimizing Print Heads” in the printer User Guide.

Preparing for Printing

Follow these guidelines when preparing for printing TrueDent or TrueDent-D dental appliances:

- In GrabCAD Print >*TrueDent IFU*, click **Open**, and make sure to review the TrueDent or TrueDent-D Instructions for Use (IFU)
- Verify that all the TrueDent or TrueDent-D materials are loaded and appear in GrabCAD Print > *Tray Settings* (Figure 10).

Figure 7: Material Replacement wizard

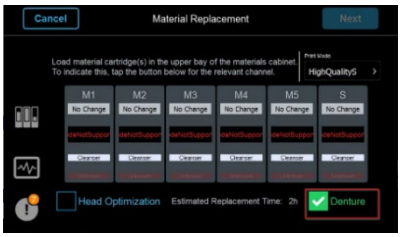


Figure 8: Material selection for a channel

Figure 9: Cartridge insertion

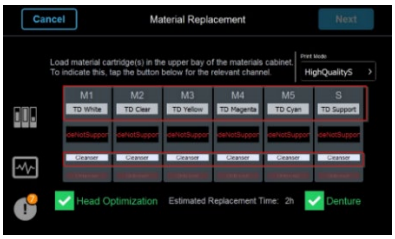
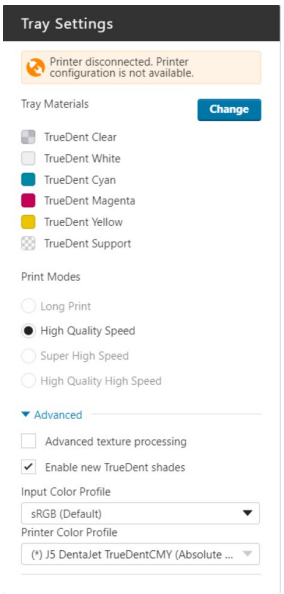


Figure 10: TrueDent materials loaded in GrabCAD Print



- When *Enable new TrueDent shades* is checked in *Tray Settings* > *Advanced*, the most up-to-date teeth and base shades are used (Figure 10).

> Verify that the build tray is empty before enabling (or disabling) the new TrueDent shades.

- To load assembly files, select *File* > *Add as Assembly*, and then select the files (Figure 11).
- To load single *.3mf* files (teeth and base in one single file), select *File* > *Add Models*, then select the file.
- Click **Analysis Mode** to repair any errors in the models.
- Assign colors for the *.stl* files in GrabCAD Print, as follows (Figure 12):
  1. In *Model Settings*, do the following:
     a. Select the teeth model(s) and select the different available *Teeth Shades.*
     b. Select the base model and select the relevant *Base Shade* and *Translucency Level.*
     c. To pin your go-to shades in the shade selection window, click **Edit** and drag the shades between *All Available Shades* and *My Favorite Shades.*
     d. Click *Apply Gingiva Selection* to apply.
  2. Repeat step 1 for the remaining cases.
- Assign labels to models in GrabCAD Print, as follows:
  1. Right-click the model and select *Add Label to body*.
  2. Place the label in the desired position on the model.
  3. Add the label text, select the desired font and color, and click **Save** (Figure 13).
  4. Click **Update** when finished.
- Arrange tray in GrabCAD Print according to one of the following modes (Figure 14):
  - *Default*—Uses a standard part orientation and position for optimal results
  - *Shortest Tray Print Time*—Uses the 2 inner swaths to achieve the quickest print time
  - *Optimize Time Per Part*—Uses the 2 outer swaths for highest throughput (time per part)
  - *Full Tray*—Uses the entire tray, packed tighter than the Default mode.

> - Using any of the non-Default modes packs the models as tightly as possible.
> - Models that do not fit in the tray are placed outside of the tray and are not printed.

Post-Print Processes

Proper support material removal and post-print treatment of the 3D printed dental appliances are important for ensuring that the dental appliances are clean, biocompatible, and suitable for the intended use.

> Start the cleaning process soon after removing the parts from the printer.

Figure 11: Adding files as an Assembly

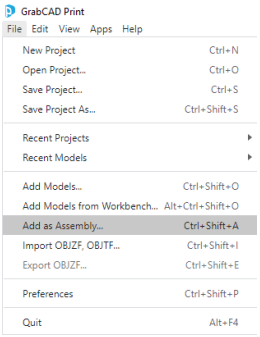


Figure 12: GrabCAD Color Assignment

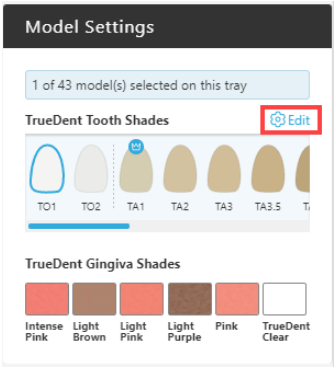


Figure 13: Adding a label to a model

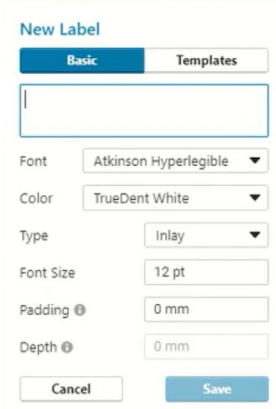
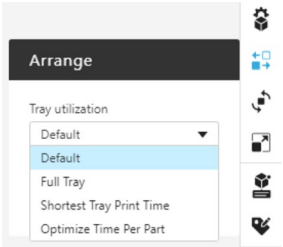


Figure 14: GrabCAD Tray Arrangement



Follow these steps for support removal and post-print treatment of TrueDent dental appliances:

1. Clean printed parts thoroughly in a cleaning system. For detailed instructions, refer to the relevant system:
   - For the Objet WaterJet—Refer to “Objet WaterJet Installation and User Guide” on the Stratasys Support Center (Figure 15).
   - For the Soft Relax-HTM USA (or Europe) dental cleaner—See Using the Soft Relax-HTM Dental Cleaner to Remove Support Material below (Figure 16).
2. Soak the parts in a container with a freshly prepared 2-percent solution of caustic soda (20 grams of flakes to 1 liter of water), for 30 minutes at room temperature (No stirring is required).

   Replace the caustic soda solution when it is murky.

   Warning:

   Caustic soda may cause chemical burns, scarring and blindness. Mixing it with water generates heat that could ignite other materials. Never pour water into a caustic soda solution. When diluting the solution, always add caustic soda to water. Take adequate safety precautions as follows:
   - Always use nitrile gloves when handling caustic soda and the models soaked in it.
   - Always wear protective eyewear.
   - Make sure the area is ventilated.
3. Wash the parts using a cleaning system such as WaterJet to remove the caustic soda and any support residue that remains.
   When using the Soft Relax-HTM dental cleaner, place the parts in the cleaning drum and wash for 3 minutes.
4. Visually inspect the printed parts and make sure that no support material residue remains on the parts. If you identify any support residue, continue with step 3.
5. Place the parts in transparent glass container(s) with Glycerol (with the teeth facing upward).
   - Replace the glycerol when it is murky.
   - Make sure that the parts are fully immersed in the glycerol.
6. Cure the parts. For detailed setup, operation, and maintenance instructions, refer to the relevant system:
   - For the TrueDent Cure Curing Chamber— See Using the TrueDent Cure Curing Chamber (Figure 17).
   - For the Stratasys ProLight UV Curing Box—See Using the Stratasys ProLight UV Curing Box (Figure 18).
7. Rinse the parts thoroughly in tap water.

Figure 15: Cleaning parts in the Objet WaterJet

Figure 16: Soft Relax-HTM

Figure 17: TrueDent Cure Curing Chamber

Figure 18: ProLight UV Curing Box

Using the Soft Relax-HTM Dental Cleaner to Remove Support Material

For more details, refer to “Soft Relax-HTM Quick Start Guide” and other related documents on the Stratasys Support Center (Figure 16).

1. Place the parts in the cleaning drum.
2. Set the temperature to 45°C and the water pressure to 20 bar.
3. Select the appropriate cycle time and tap **START**:
   - 1–4 models: *8 minutes*
   - 5–9 models: *10 minutes*

   > The times serve as an initial reference. The cycle time required to remove all support material can vary depending on model geometry, water temperature, and the number of models.
4. After the cycle is complete, inspect the models to verify that all of the support material is removed.
5. Perform additional shorter cycles if needed until no support is visible.

   > To avoid damaging the models:
   > - Use the Soft Relax-HTM dental cleaner for a maximum of 20 minutes.
   > - If additional cleaning is still required, switch to the Objet WaterJet to remove the remaining support material.

Using the TrueDent Cure Curing Chamber

For more details, refer to “TrueDent Cure Curing Chamber – Product Guide” on the Stratasys Support Center.

1. Place the container(s) in the TrueDent Cure chamber and close the door (Figure 17)
2. From the menu on the display, select *Custom*.
3. From the *Custom Setting* screen, use the up and down arrows to set the time and temperature to 60 mins and 80°C (176°F), respectively.

   > Heating times can vary. Pre-heat the chamber 30-45 minutes before use.

   > **Warning: Hot Surface and Liquid Hazard**
   >
   > Handling hot glycerol can cause burns and injury. Take adequate safety precautions, as follows:
   > - Always wear protective eyewear and heat-resistant gloves.
   > - Always use plastic tweezers to remove the part from the heated glycerol.
4. Cure the parts for 1 hour.
   When curing appliances printed in TrueDent Clear or TrueDent-D Clear, cure the parts for 2 hours to achieve improved translucency.

Using the Stratasys ProLight UV Curing Box

For more details, refer to “Stratasys ProLight User Guide” on the Stratasys Support Center.

1. Place the container(s) in the Stratasys ProLight UV Curing Box and close the door (Figure 18).
2. Select the *PolyJet TrueDent* curing cycle and tap **Start**.
3. Pre-heat the curing box for 20 minutes, then cure the parts for 55 minutes.
   When curing appliances printed with TrueDent Clear or TrueDent-D Clear, cure the parts for additional cycles until the desired translucency is achieved.

Polishing and Relining

TrueDent dentures can be polished and relined by conventional industry methods. For more information, refer to “TrueDent and TrueDent-D Repair and Reline Dental Appliances” and “TrueDent Polishing Protocol” on the Stratasys Support Center.

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ISO 13485:2016 Certified

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