MANUFACTURING GUIDE

IBT Flex Resin

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IBT Flex Resin is light-curable polymer-based resin designed for the additive fabrication of biocompatible, short-term use, removable dental appliances such as indirect bonding trays and trays for guided restorative techniques. This Manufacturing Guide will give equipment, printing and post-processing recommendations and requirements to ensure the correct and safe usage of this material.

Specific Manufacturing Considerations

IBT Flex Resin specifications have been validated using the hardware and parameters indicated below. For biocompatibility compliance, validation used a dedicated resin tank, build platform, wash unit and post-processing equipment that were not mixed with any other resins.

1. **Hardware:**
   a. Formlabs 3D Printer: Form 3B/3B+, Form 3BL, Form 4B
   b. Print Accessories: Formlabs Build Platforms, Formlabs Resin Tanks
2. **Software:**
   a. Formlabs Preform
3. **Printing Parameters:**
   a. Layer Thickness:
      - Form 3B/3B+: 50 µm, 100 µm, 200 µm
      - Form 3BL: 100 µm
      - Form 4B: 50 µm, 100 µm
   b. Part Orientation:
      - For 50 µm and 100 µm Print Settings: Parts may be printed flat on the build platform without supports. If desired, parts may be printed on supports at up to a 40° tilted angle, with the intaglio surface facing away from the build platform.
      - For 200 µm Print Settings: Print parts flat on the build platform without supports.
   c. Part Thickness: 1 mm minimum
4. **Recommended Post-Processing Equipment and Accessories:**
   a. Formlabs Processing Accessories: Resin Pumping System
   b. Formlabs Validated Wash Unit: Form Wash, Form Wash (2nd Generation), Form Wash L
   c. Formlabs Validated Cure Unit: Form Cure, Form Cure L, Fast Cure

A. PRINTING

1. **Shake cartridge:** Shake the cartridge before every print job. Color deviations and print failures may occur if the cartridge is shaken insufficiently.
2. **Set up:** Insert resin cartridge into a compatible Formlabs 3D printer. Insert resin tank and attach mixer to the tank.
3. **Printing:**
   a. Prepare a print job using PreForm software. Import desired part STL file.
   b. Orient and generate supports if needed.
   c. Send the print job to the printer.
   d. Optional: If starting with an empty resin tank, save time by manually pre-filling the tank by pouring in resin directly from the cartridge.
   e. Begin print by selecting a print job from the print menu. Follow any prompts or dialogs shown on the printer screen. The printer will automatically complete the print.

B. PART REMOVAL

Remove the build platform from the printer. To remove parts from the build platform, wedge the part removal tool under the printed part raft, and rotate the tool. For detailed techniques visit support.formlabs.com.

C. WASHING

Place the printed parts in a Formlabs-validated wash unit with 99% Isopropyl Alcohol (IPA).

1. Form Wash, Form Wash (2nd Generation) - High speed*, or Form Wash L:

a. Wash for 20 minutes in the wash unit, then either rinse down parts completely with fresh IPA from a spray bottle, or soak parts in fresh IPA for 10 minutes.
b. If parts do not appear clean after washing, consider replacing used Isopropyl Alcohol in the wash unit with fresh solvent.

**For Form Wash (2nd Gen), High speed settings are validated for use.*

D. DRYING

1. Remove parts from Isopropyl Alcohol and leave to air dry at room temperature for at least 30 minutes. **NOTE:** Dry times can vary depending on the design of parts and ambient conditions. Do not let parts sit in Isopropyl Alcohol for longer than needed.
2. Inspect printed parts to ensure that parts are clean and dry. No residual solvent, excess liquid resin or residue particles should remain on the surface before proceeding to subsequent steps.
3. If the residual solvent is still present, dry parts longer. If resin residue is still visible, rewash parts until clean and dry.

E. POST-CURING

Place the printed parts in a Formlabs-validated post-curing unit and cure for the required time.

1. Form Cure or Form Cure L:
   a. Submerge parts in a transparent, water filled container. Place the container inside the cure unit, and cure for 30 minutes at 70 °C.
   b. Allow the cure unit to cool down to room temperature between cure cycles.
2. Fast Cure:
   a. Submerge parts in a transparent, water filled container. Place the container inside the cure unit, and cure for 5 minutes at Light Intensity 9
   b. Allow the Fast Cure unit to cool for at least 10 minutes between cure cycles.

F. SUPPORT REMOVAL & POLISHING

1. Remove supports, with assistance of cutting pliers or other appropriate finishing tools as needed.
2. Inspect the parts for any cracks. Discard if any damage or cracks are detected.

G. CLEANING & DISINFECTION

1. Parts may be cleaned and disinfected according to facility protocols. Tested disinfection method: soaking the finished part in fresh 70% IPA for 5 minutes. Do not leave the part in the alcohol solution for longer than 5 minutes.
2. After cleaning and disinfection, inspect the part for damage or cracks to ensure that the integrity of the designed part meets performance requirements. Discard if any damage or cracks are detected.

H. ADDITIONAL REQUIREMENTS AND RECOMMENDATIONS FOR USAGE

1. For trays used for guided restorative techniques, apply a separating agent to reduce adhesion of the tray to composite materials.

I. HAZARDS, STORAGE & DISPOSAL

1. Cured resin is non-hazardous and may be disposed of as regular waste.
2. See SDS for more information at support.formlabs.com