3D Production Printers

Customer Information Bulletin

Advisory Upgrade / Repair / Retrofit Safety Alert

Purpose: Tips and Info – Accura® Bluestone™ Material

Accura® Bluestone™ Material

Tips and Info - Accura® Bluestone™ Material

1. Each material on an SLA® system uses a specific material entry in the Buildstation™ or 3D Print software, specifically Dp and Ec values and shrink factors used for each material. See the Buildstation or 3D Print Users' Guide for details about where to enter this information. In addition Line width compensation values are used in the 3D LIghtyear™ or 3DManage™ part preparation software. See the 3D Lightyear or 3DManage User's Guide for details about where to enter this information. The baseline or starting values to be used with Bluestone SL material are given below:

Recommended Starting Parameters:

	Viper™ system	SLA® 5000 system	SLA®7000 system	ViperPro™/iPro™
Dp (mils)	4.1	4.1	4.1	4.1
Ec (mJ/cm²)	6.9	6.9	6.9	6.9
Baseline Shrink Factors (x, y, z)	1.000, 1.000, 1.000	1.000, 1.000, 1.000	1.001, 1.001, 1.000	1.001, 1.001, 1.000
Baseline Line width Compensation Value	0.200mm (0.008")	0.125mm (0.005")	0.125mm (0.005")	0.125mm (0.005")

Tips and Info – Accura® Bluestone Material – CONTINUED

2. Precise creation of supports is critical for success with Bluestone SL material. Supports positioned too close together may limit the flow of resin and result in mounding on the tops of supports. Mounding that occurs during the support building, prior to sweeping, can become cured. This cured material can cause a blade collision, ultimately causing build failure. To minimize this mounding, the following should be observed:

   2.1. Excess supports should be edited, to ensure there is sufficient spacing between support vectors. Because this resin is more viscous than other resins, without this space there will not be sufficient space for the material to flow, and it will not form a flat surface during the z-wait interval. This is only a problem when many supports are generated in a small area, sometimes called “clusters” of supports. Eliminating braces and merging support regions are effective tools to minimize support clusters. Care should be used in deleting supports, as required supports must not be eliminated.

   2.2. Take care that excessive bubbles are not created during the support building process. Effort should be made to remove bubbles created during support building, if they are not eliminated by recoating. If using FinePoint supports, this is particularly important. If bubbles are not removed by recoating, you should pause the build and manually remove bubbles. Bubbles can be removed by either blotting the resin surface with a paper towel, or by using a hair dryer or low-pressure compressed air. In addition, any bubbles present prior to starting a build should be removed.

   2.3. When building supports that are significantly taller than 1” (25 mm), increase the support overcure by an additional +0.002” (0.05 mm). In these situations the use of curtain (SRG-type) supports may also result in better success. Alternatively, users can increase the strand thickness from 0.016” to 0.024” on the fine point supports.

   2.4. AccuBluStn_LFLT.srg curtain support style are included. In part preparation, users can generate curtain supports by selecting SRG instead of FRG type options.

3. Trapped volumes may be difficult to build, using Bluestone material. This is especially true on the SLA 5000, SLA 7000 and ViperPro/iPro systems. For these systems, use the provided trapped volume build style included in 3D LightYear and 3DManage software.

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4. Parts with large flats may require additional anchoring supports. When building parts that have large flat areas that are significantly larger than 2.00 inch (50 mm) across, the use of SRG (curtain) type supports may be needed. SRG information is noted above. In addition, where the area is greater than 4.00 in. (100mm) across, the support border overcure values should be increased by an additional 0.002 in. (0.05mm). Parts with several small flat areas should not require additional anchoring.

5. Before installing a vat or RDM of material, or performing the recoater calibration function (ViperPro/iPro), make sure that the resin surface is free of all bubbles. It is especially important that the area under the leveling sensor is free of any bubbles. If there are bubbles under the leveling sensor, the leveling system cannot and will not operate properly.

6. Since the specific density of Bluestone is high, the vacuum setup for the recoater will be different from the setup for other Accura resins. After installing a vat or RDM of Bluestone material, make sure that the resin level in the blade is correct. The level should be approximately one quarter of the way up the window in the recoater, and must not be higher than half-way up the window. If the resin level in the recoater is not correct, please contact your local service engineer for assistance.

7. Setting the build-start position is important. At the beginning of the build, the top surface of platform must be very close to the resin surface. The resin should fill the holes on the platform, but not cover the top surface of the platform. This is to allow for proper adhesion of cured supports to the platform, but to avoid supports getting cured deep within the holes, which can prevent free flow of material. Please reference the photos at the end of this document.

8. Some software enhancements have been made to facilitate the use of Bluestone material. Please make sure that current software is loaded. At a minimum, it is recommend that users have Buildstation 5.4 software Update 1 installed or 3DPrint version 1.0 or greater.

9. The Bluestone material support .FRG file was designed to work as follows with various software versions:
   - 3DManage: Any version of 3DManage can be used, but the latest version is always recommended.
   - Lightyear™ 1.4 software or newer: Lightyear 1.4 or newer software automatically creates a fence at the bottom of each FinePoint™ support strand to ensure that it won't fall through holes in the platform.
   - Lightyear 1.3 software: the support .FRG file can also be used with Lightyear 1.3 software by adjusting two parameters (Minimum Base Width and Triangular Offset Width) within the support generation style, Bluestone_GNRL.frg. The .FRG file values for *"Minimum Base Width"* and *"Triangular Offset Width"* should be adjusted to 0.300 to insure that the supports that are generated are larger than the diameter of the holes in the platform.

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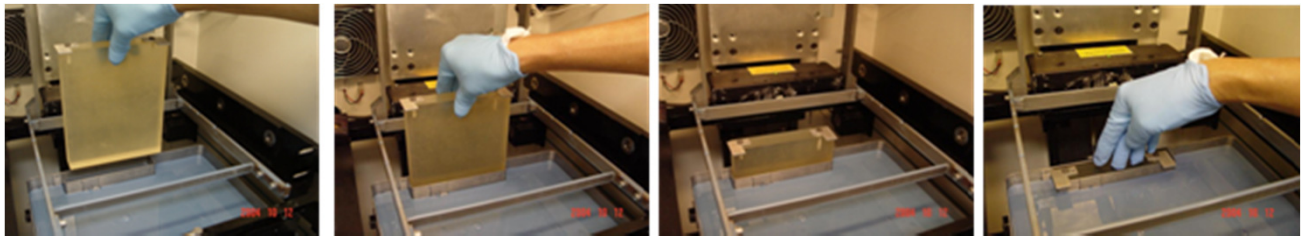
10. Stirring

Bluestone is a filled material. While the formulation has been specially engineered to minimize settling of the filler it is still recommend that the material be mixed with the SLA or ViperPro/iPro system's build platform at least once per week. This can be done by using the STIR RESIN command or STIR function of the Buildstation or 3D Print software respectively. It is recommended that vats of Bluestone material be stirred once per week for 30 minutes or when adding additional material to the vat.

10.1 Stirring in a Viper system

- Resin level in the vat should be 0.5" below the vat rim.
- Using a solid block, push all resin out of the baffle and leave the block there.(See photos below). The block can be made of stainless steel, or another material that does not react with resin.



- Install a platform and move it 0.2" below resin surface.
- Stir resin with stir function (if it is available) for about 1 hour using the full stroke of 10.00" and velocity od 0.2"/sec (max. allowed).
- Remove the block.
- Remove all bubbles in baffle area.
- Wait until all bubbles and micro bubbles disappear.
- System is ready for part building.

- **Tips and Info – Accura® Bluestone Material – CONTINUED**

10.2 Stirring on SLA 7000

- Be certain that the resin volume in the vat is ready for part building.
- Move the vat down until resin surface is lower than the bottom of the baffle.
- Install a platform and move it 0.2” below resin surface.
- Stir resin with stir function for about 1 hour, using the full stroke of -20.00” and velocity of 0.2”/sec (max. speed allowed).
- Remove all bubbles in baffle area.
- Move vat to build position, be certain that there are no bubbles when resin touches the bottom of the baffle.
- Wait until all bubbles and micro bubbles disappear.
- System is ready for part building.

10.3 Stirring on ViperPro/iPro 8000/iPro 9000

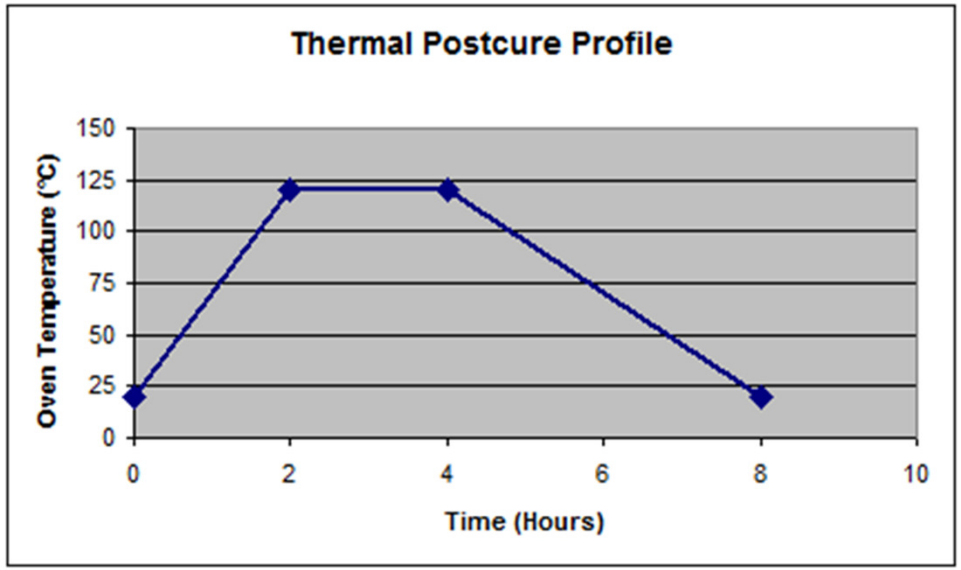
- Be certain that the resin volume in the vat is ready for part building.
- Using a solid block, push all resin out of the baffle and leave the block there (reference Viper photos above, approach is the same). The block can be made of stainless steel, or another material that does not react with resin.
- Install a platform and move it 0.2” below resin surface.
- Stir resin with stir function (if it is available) for about 1 hour, using a full stroke of -20.00” and velocity of 1 inch/second.
- Remove the block if it is left in the baffle or install the baffle (if it was removed).
- Remove all bubbles in baffle area.
- Wait until all bubbles and micro bubbles disappear.
- System is ready for part building.

Tips and Info – Accura® Bluestone Material – CONTINUED

11. When cleaning Bluestone material parts, a white reside may remain. This residue can be easily removed by scrubbing the parts prior to UV postcure with an abrasive sponge (such as a Scotch-Brite pad) or by beadblasting the part using fine grit sand. It is recommended that parts be beadblasted prior to UV postcure. Parts treated in this way will have a nice blue satin appearance.
12. Parts can be cleaned to produce a beautiful semi-gloss surface finish. To achieve this follow the recommendations above, the simply wipe/spay parts with a silicone or oil based spay and wipe away any excess. The use of soy-based cleaners, such as SoyClear® 1500, has a similar effect. SoyClear is manufactured by AG Environmental Products.
13. Bluestone material contains chemically bound silica. During certain polishing and sanding operations, it cannot be excluded that silica particles may become respirable. Care should be used to avoid breathing this dust. Therefore, when sanding or performing secondary operations with Bluestone, protect against silica dust by the following means:
    - Install a water hose to wet down the dust at the point of generation
    - Work under local exhaust ventilation
    - During drilling, flow water through the drill stem
    - Use concrete/masonry saws that provide water to the blade
    - Use a respirator when the dust exposure cannot be controlled by the actions above

Tips and Info – Accura® Bluestone Material – CONTINUED

14. Parts built in Bluestone material can be thermal postcured to achieve enhanced thermal resistance. This can result in parts that will perform at over 200º C (a 100º C+ increase). This is particularly beneficial for high temperature applications. In order to thermally postcure a Bluestone material part, the part should be cleaned and UV postcured as normal. Following the UV Postcure the part should be placed in an oven. The oven temperature should be slowly raised to 120° C (~250° F) over a period of approximately 2 hours. The temperature should then be held for at least 2 hours depending on the thickness of the part. Thin parts, those around 3mm (~0.125”), require only 2 hours at elevated temperature. Thicker parts will require more. Following the heating, the oven should be shut off and slowly returned to room temperature over approximately 4-8 hours. It is important not to cool parts rapidly as thermal shocking may occur and result in cracks in the part.



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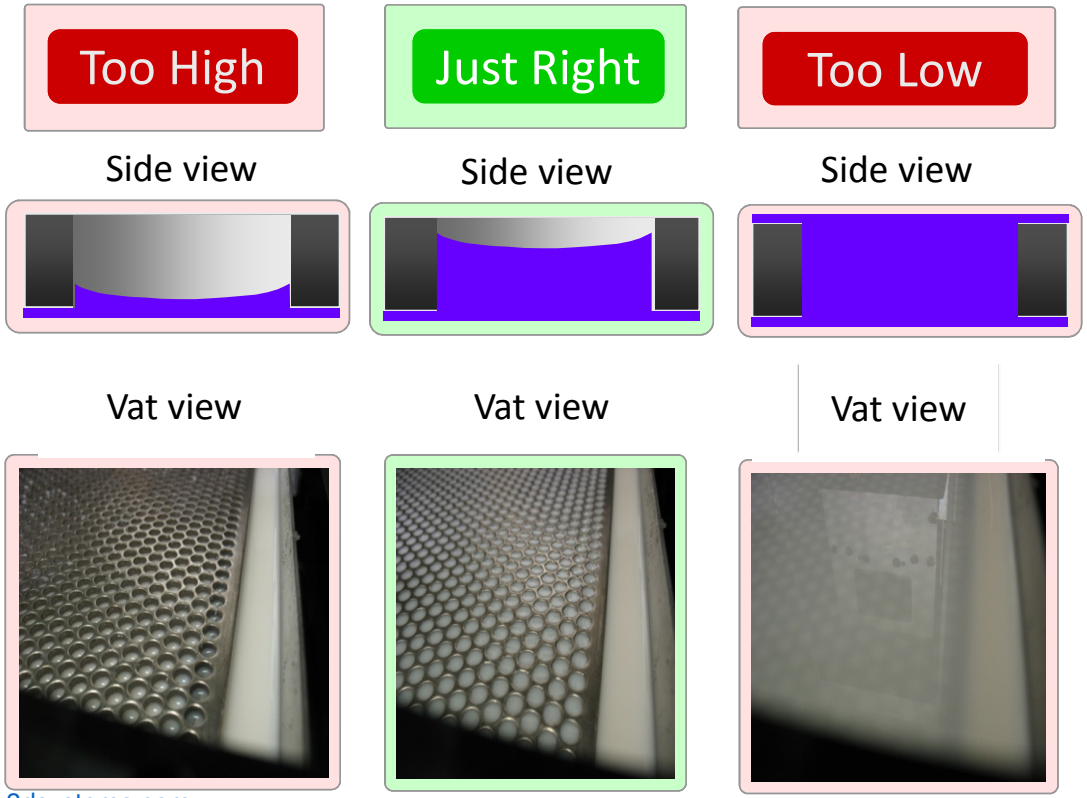
Reference from item 7:
Photos show platform height for build start



Customer Information Bulletin

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