Vibratory Finishing of Rigid PolyJet Parts

**Overview**

Polishing PolyJet™ 3D Printed parts in a vibratory finishing system (also known as a tumbler) improves their surface finish by removing minor surface irregularities and sharp edges. With this process you can save time and manual labor, especially when dealing with large quantities or complex models. A tumbler system can polish multiple parts, hands-free, in only a few hours, depending on the size of the parts and the tumbler. This method is usually performed on metal parts, but it was tested on PolyJet models from the Digital ABS™ and Vero™ material families and found suitable.

**The System**

The tumbler system is a combination of several elements. The main component is the vibrator, which is usually a round tub or bowl with a vibrating rod in the center. The rod increases the tumbler’s working strength and reduces part collisions.

Parts are inserted into the tumbler filled with abrasive material, which is then rotated. As the tumbler revolves, the abrasive materials mix around the parts creating a circulation inside the tumbler. The moving contact between the parts and the abrasive materials achieves the polishing action. The vibration rate can be modified manually according to the delicacy of the models.

Vibrator sizes vary from about 25 liters (approximately 1100 mm [43 in.] diameter), suitable for several small parts, to 100 liters (approximately 2000 mm [79 in.] diameter), appropriate for a large number of small parts or several large parts. A large vibrator can be also divided into smaller chambers to separate groups of parts or to use a different abrasive material.

Stratasys has tested and recommends the TAMEX-ZLZ series vibrators from Dalian Yincheng Polishing Equipment Company. Work with the vendor to choose the right size system for your typical part.
In addition to the vibrator, a dosage unit is needed to control the amount of liquid compound (one of the materials used in the finishing process) inserted during the operation, with a flow meter that operates an automatic tap.

1. Options

   **Abrasive Media and Fluid Compounds**

   Abrasive media is available in a variety of materials and shapes, and using a mixture of them provides the best results. Other materials and solutions may be used with the abrasive media for lubrication, cleaning and other purposes. Stratasys testing included the following three materials:

   1. **Media** – Abrasive media is made from materials such as sand, granite chips, glass, ceramics and synthetics in a wide variety of shapes. Each achieves a different surface finish.

      Consider the size and geometry of your most-used parts when choosing media. Small parts require small media, and highly detailed parts or parts with fine features require complex media shapes such as star or triangle. Be aware that manufacturer finish descriptions such as "brushed" or "satin" describe results for metal parts, not PolyJet materials.

      Stratasys has tested ceramic media types RS14/05E and RSD 10/10DZS from Rosler (www.rosler.com).

   2. **Liquid Compound** – Liquid compounds form the foundation of the surface finishing process. They remove contaminants such as model debris and ensure that the media perform properly. They also provide lubrication to the entire process.

      Stratasys has tested liquid compound type FC 1236 from Rosler.

   3. **Powder Compounds** – Powder compounds are similar to liquid compounds in that they also help facilitate the finishing process by degreasing, etching, cleaning and enhancing the cutting performance of the abrasive media.

      Stratasys has tested powder compounds type RSP 506S from Rosler.

2. Process

   When your parts have achieved the desired surface finish, pour water into the tumbler for several minutes to wash residue left on the parts before removing them. If the parts have some narrow slots or if an additional delicate polish is needed, add dish soap to the tumbler for about 10 minutes.

   Results may vary depending on the specific PolyJet material being finished, the type of media used and the time spent in the tumbler. Performing a test to determine the best combination of finish parameters for your particular material is recommended.
Regardless of the abrasive material being used, it is important to remove the parts from the system at the end of the finishing process to prevent sediment from collecting on them. Don’t allow parts to dwell in stationary media. Rinse parts in clean water to remove any residue.

3. Safety
Observe manufacturer’s recommendations for safety, material handling and storage. This information can be found in the safety data sheet for each material.

4. Tools And Supplies
4.1. Equipment:
   • Mass finishing vibratory system
   • Compound dosing system
4.2. Media
4.3. Fluid compound
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CONTACT
For questions about the information contained in this document, contact Stratasys at www.stratasys.com/contact-us/contact-stratasys.