FDM BEST PRACTICE:

SOLVENT SMOOTHING

Stratasys®
3D Printers and Production Systems

SOFTWARE/PRODUCT/**FINISHING**

OVERVIEW

Reference materials:
- Video
  - Show Me How
- Processes
  - Best Practice: Media Blasting

The normal surface finish of FDM® parts is suitable for most purposes, but in applications where a smoother surface is required, solvent smoothing is an alternative to sanding, filling and mass finishing.

Solvent smoothing utilizes a chemical agent to smooth a part's surfaces (Figure 1). This process modifies the surface of FDM parts by eliminating layer lines while preserving feature detail and part accuracy. The smoothing agent can be applied either as a liquid or a vapor and it is quick and nearly labor-free. The finish achieved can mimic that of injection molded parts.

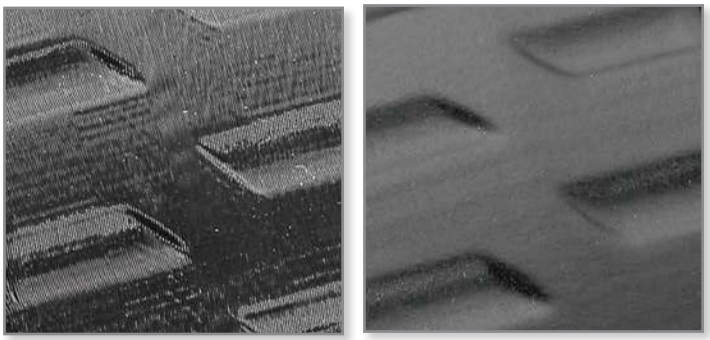

Figure 1: Close-up of an FDM part before (left) and after solvent smoothing (right).

Solvent smoothing is applicable for SR30™ and the ABS family of materials. Parts that have been solvent smoothed may have surface bubbling when exposed to temperatures above 70°C (160°F).

Common applications where solvent smoothing is applicable:

- Painting
- Electroplating/vacuum metallization
- Liquid sealing (low pressure)
- Air pressure (low pressure)
- Mold masters (i.e., silicone molding, sand casting, investment casting, and thermoforming)

Figure 2: The Finishing Touch Smoothing Station preserves details while smoothing parts.

1. OPTIONS

Liquid Smoothing: Dipping FDM parts in a solvent bath yields a smooth, glossy surface finish. It has the advantage of requiring no additional equipment. However, the results are influenced by technique; over-exposure to the solvent will alter feature definition and detail.

NOTE: Dip coating is reserved primarily for smaller parts. For larger parts, consider evenly brushing or spraying the solvent onto the part or vapor smoothing.

Vapor Smoothing: Vapor smoothing requires a Finishing Touch® Smoothing Station (Figure 2). The advantages of this method are greater control of feature detail and accuracy by controlled exposure to the chemical solvent.

2. PROCESS

2.1. Dip Smoothing

STEP 1: Lightly sand the part to smooth any seams or defects.

STEP 2: Remove dust and debris.

STEP 3: Fill a glass beaker or other solvent-safe container with solvent solution such as IPS® Corporation Weld-On® 4 or acetone.

STEP 4: Attach a wire or similar material so the part can be suspended.

STEP 5: Immerse part in solvent (typically for 15 to 30 seconds). Avoid longer durations as this will cause features to deform (Figure 3).

Figure 3: Dipping the part into solvent.

TIP: Use multiple shorter immersions for greater finishing control.

STEP 6: Ensure that there is no pooling of solvent on the part.

TIP: Remove any pooling with a paint brush.

STEP 7: Allow part to dry for 15-20 minutes.

STEP 8: Inspect part. Repeat Steps 1 through 5 as needed.

STEP 9: Allow the part to rest 12-18 hours to ensure complete solvent evaporation and surface hardening.

Figure 4: Transfer part to the smoothing chamber for a 15 to 30 second exposure.

TIP: For a matte finish, media blast the part. For details, see the *Best Practice: Media Blasting.*

STEP 10: Dip Smoothing procedure complete.

2.2 Vapor Smoothing

STEP 1: Lightly sand the part to smooth any seams or defects.

STEP 2: Remove dust and debris.

STEP 3: Attach a wire or similar material to suspend the part in the cooling chamber. The Finishing Touch Smoothing Station will signal the completion of the cooling cycle which typically takes 30 minutes.

TIP: To prevent solvent pooling, suspend the part so that pockets and cavities face downward.

STEP 4: Confirm that the solvent vapor has risen to the top of the smoothing chamber. If it has not, leave the part in the cooling chamber and wait for the vapor to rise.

STEP 5: Transfer the part to the smoothing chamber (Figure 4) for a 15 to 30 second exposure.

STEP 6: Ensure that there is no pooling of solvent on the part.

TIP: Remove any pooling with a paint brush.

STEP 7: Return the part to the cooling chamber and allow it to rest for 15 minutes.

STEP 8: Inspect the part. If further smoothing is needed, repeat steps 1 through 6 as necessary (typically 2 - 4 times).

STEP 9: The part will be dry to the touch after 45 minutes but allow 12 to 18 hours for the part to fully harden and the solvent to completely evaporate.

TIP: For a matte finish, media blast the part. For details, see the *Best Practice: Media Blasting.*

STEP 10: Vapor Smoothing procedure complete.

Figure 5: Vapor smoothed part with a smooth, near injection-molded look (left) compared to a normal FDM printed part (right).

3. SAFETY

Observe manufacturer's recommendations for safety, material handling and storage. This information can be found in the Safety Data Sheet (SDS).

4. TOOLS & SUPPLIES

4.1. Dip Smoothing:

- Glass beaker
- Wire
- Solvent: IPS Corporation Weld-On 4 or acetone

4.2. Vapor Smoothing:

- Wire
- Finishing Touch Smoothing Station
- MicroCare® Smoothing Station Fluid (SSF)

4.3. Optional:

- Media blaster
- Blasting media
- Paint brush
- Spray gun

5. MATERIALS

Acceptable materials:

- ABS
- ABSi™
- ABSplus™
- ABS-M30™
- ABS-M30i™
- ABS-ESD7™
- SR-30™

NOTE: Surface resistivity of ABS-ESD7 parts should be tested after solvent smoothing to confirm it is still within the ESD range.

CONTACT:

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