Overview

High-temperature RGD525 model material has exceptional dimensional stability and great temperature resistance. These properties make RGD525 parts suitable for static applications that require high temperature resistance. Combined with rubber-like or color materials, you can produce models with unique material combinations, opacities, hues and hardness.

This Application Note describes recommendations and tips for achieving optimum quality and advanced mechanical properties when printing parts with RGD525.

- Designing Parts with Holes and Cavities
- Cleaning Heads
- Preparing Trays for Printing
- Printing Preferences
- Polishing Parts
- Thermal Treatment

Recommendations and Tips

A. Designing Parts with Holes and Cavities

Design parts with any required holes and cavities in your CAD program instead of drilling holes in printed parts.

High-temperature parts are fabricated from a combination of two materials, RGD525 and SUP705 (the Support material). This unique combination enhances dimensional stability. However, drilling of printed parts is not recommended.

B. Head Cleaning

RGD525 may leave more residue on the print heads than Vero materials. For best results and to maintain print heads in optimum condition, clean them daily using the Head Cleaning Wizard.

Refer to the printer user guide, “Cleaning the Printing Heads” section.

C. Preparing Trays for Printing

The arrangement of the parts on the build tray can affect the quality of the printed parts and the duration of printing. To relieve internal stresses, a buffer (time delay) is introduced after each layer is printed. However, when many parts are placed on the tray, the additional time is insignificant.
When preparing trays for printing, follow these guidelines.

**Quality considerations (RGD525 models and rigid digital materials only)—**

- Position the section requiring the highest planar accuracy along the Y-axis (see Figure 2). This is because internal stresses may cause the part to curve upwards, and this is less pronounced along the Y-axis (see Figure 3).
- If surface matching is required, place all matching surfaces face up (see Figure 4).

**Time considerations (Eden/Connex printers only and all digital materials)—**

- When printing trays that are partially full, position the parts so that they require at least three printing passes (see Figure 5). In this way, printing time is long enough to allow material relaxation, eliminating unnecessary printing delays between layers.
- If a print job requires less than three printing passes (see Figure 6), Objet Studio automatically adds the required delay. This may significantly increase printing time in order to maintain the quality of printed parts.

**D. Printing Preferences**

To reduce internal stresses that cause the part to curve upwards, prefer printing in High Quality mode.

**E. Part Thickness**

Parts thinner than 1.3 millimeters may not meet the mechanical specifications of this material.

**F. Polishing Parts**

Applying a coat of clear lacquer gives parts a shine and protects their surfaces. Extensive polishing is not recommended, especially for delicate parts or when parts have thin walls.

**G. Thermal Treatment for Rigid Parts**

Upon removal from the printer, RGD525 parts and rigid RGD525 Digital materials have an initial heat deflection temperature (HDT) of 65°C (149°F). A higher HDT—80°C (176°F)—can be achieved after thermal treatment in a programmable oven (see specifications on page 4).

To achieve a higher HDT, follow the procedure described below. This procedure is suitable for all part geometries.
**Note: Time in oven is approximately seven hours (including cooling).**

1. Clean the part and remove the support material.
2. Place the part in a programmable oven at room temperature.
3. Set the ramp-up rate to 1°C (1.8°F) per minute.
4. Set the temperature to 50°C (122°F).
5. Turn on the oven.
   The oven temperature reaches 50°C (122°F) after approximately 35 minutes.
6. Maintain the temperature at 50°C (122°F) for two hours.
7. Increase the temperature to 60°C (140°F).
   The oven temperature reaches 60°C (140°F) after approximately 10 minutes.
8. Maintain the temperature at 60°C (140°F) for two hours.
9. Increase the temperature to 70°C (158°F).
   The oven temperature reaches 70°C (158°F) after approximately 10 minutes.
10. Maintain the temperature at 70°C (158°F) for one hour.
11. Cool in oven.
12. When the oven temperature is lower than 35°C (95°F), remove the part.

**Caution:**
Always wear oven gloves when handling hot parts.

![Figure 5 Oven temperature over time](image)
Programmable Oven

Recommended Specifications

<table>
<thead>
<tr>
<th>Feature</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum operating temperature</td>
<td>250-300°C (480-570°F)</td>
</tr>
<tr>
<td>Temperature stability (PID controller On/Off)</td>
<td>±0.1/±0.2 degrees</td>
</tr>
<tr>
<td>Temperature uniformity</td>
<td>At 300°C±5° (at 570°F±10°)</td>
</tr>
<tr>
<td>Heat-up time to maximum temperature</td>
<td>25 minutes</td>
</tr>
<tr>
<td>Recovery time to maximum temperature</td>
<td>4 minutes</td>
</tr>
<tr>
<td>Dimensions</td>
<td>as required</td>
</tr>
<tr>
<td>Volume (liters)</td>
<td>as required</td>
</tr>
<tr>
<td>Air changes per hour</td>
<td>10-50 (depends on oven size)</td>
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<tr>
<td>Maximum power</td>
<td>depends on oven size:</td>
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<tr>
<td></td>
<td>750 W for 28-liter oven</td>
</tr>
<tr>
<td></td>
<td>9000 W for 900-liter oven</td>
</tr>
<tr>
<td>Holding power</td>
<td>depends on oven size:</td>
</tr>
<tr>
<td></td>
<td>300 W for 28-liter oven</td>
</tr>
<tr>
<td></td>
<td>3500 W for 900-liter oven</td>
</tr>
<tr>
<td>Controller</td>
<td>stores 4 programs and up to 16 segments (Eurotherm programmer, or similar)</td>
</tr>
</tbody>
</table>

Recommended Oven Manufacturers and Models

The following oven manufacturers and models are recommended by Stratasys and are available worldwide.

Note: Other manufacturers and oven models may be suitable if they meet the specifications listed above.

<table>
<thead>
<tr>
<th>Manufacturer</th>
<th>Oven model</th>
<th>Chamber size</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Despatch Industries</td>
<td>LLB oven series</td>
<td>as required</td>
<td>May require an additional controller</td>
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<td><a href="http://www.despatch.com">www.despatch.com</a></td>
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<tr>
<td>Nabertherm</td>
<td>TR oven series</td>
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<td><a href="http://www.nabertherm.com">www.nabertherm.com</a></td>
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