MATERIAL SELECTOR GUIDE

Figure 4® Material Properties and Applications Guide
## Figure 4® Material Properties and Applications Guide

### Suitability for Part Geometries (% Printability Potential)*

<table>
<thead>
<tr>
<th>Fine Details and Features</th>
<th>Thin Wall Parts</th>
<th>Fitted Part Assemblies</th>
<th>Medium Cover Parts</th>
<th>Large Cover Parts</th>
<th>Non-Uniform Wall Thickness Parts</th>
<th>Large Cross Sectional Area Parts</th>
<th>Jigs and Fixtures</th>
</tr>
</thead>
<tbody>
<tr>
<td>TOUGH-GRY 10</td>
<td>75</td>
<td>85</td>
<td>45</td>
<td>75</td>
<td>85</td>
<td>35</td>
<td>15</td>
</tr>
<tr>
<td>TOUGH-GRY 15</td>
<td>75</td>
<td>85</td>
<td>75</td>
<td>75</td>
<td>85</td>
<td>35</td>
<td>15</td>
</tr>
<tr>
<td>TOUGH-BLK 20</td>
<td>95</td>
<td>90</td>
<td>85</td>
<td>85</td>
<td>90</td>
<td>75</td>
<td>35</td>
</tr>
<tr>
<td>FLEX-BLK 10</td>
<td>85</td>
<td>85</td>
<td>55</td>
<td>75</td>
<td>85</td>
<td>75</td>
<td>15</td>
</tr>
<tr>
<td>FLEX-BLK 20</td>
<td>90</td>
<td>90</td>
<td>90</td>
<td>90</td>
<td>95</td>
<td>95</td>
<td>55</td>
</tr>
</tbody>
</table>

### Mechanical Properties

<table>
<thead>
<tr>
<th>Tensile Modulus (MPA)</th>
<th>Elongation @ Break (%)</th>
<th>Impact Strength (Notched J/M)</th>
<th>HDT @ 0.455 MPA (°C)</th>
</tr>
</thead>
<tbody>
<tr>
<td>PROTOTYPING AND DESIGN VERIFICATION</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TOUGH-GRY 10</td>
<td>2180</td>
<td>25</td>
<td>29</td>
</tr>
<tr>
<td>TOUGH-GRY 15</td>
<td>2120</td>
<td>35</td>
<td>32</td>
</tr>
<tr>
<td>TOUGH-BLK 20</td>
<td>1780</td>
<td>36</td>
<td>27</td>
</tr>
<tr>
<td>FLEX-BLK 10</td>
<td>1400</td>
<td>104</td>
<td>55</td>
</tr>
<tr>
<td>FLEX-BLK 20</td>
<td>1150</td>
<td>76</td>
<td>91</td>
</tr>
</tbody>
</table>

### Production

| PRO-blk 10 | 2320 | 12 | 24 | 70 |
| Rigid White | 2100 | 20 | 21 | 65 |
| Rigid Gray | 2400 | 30 | 21 | 72 |
| Rigid 140C Black | 2800 | 5.6 | 16 | 140 |
| TOUGH 65C Black | 1700 | 35 | 31 | 70 |
| TOUGH 60C White | 1500 | 23 | 34 | 65 |
| High Temp 150C Black | 2600 | 4 | 10 | >150 |
| HI TEMP 300-AMB | 4100 | 2.3 | 10 | 300 |
| MED-AMB 10 | 2765 | 4 | 18 | 119 |
| MED-WHT 10 | 3090 | 3 | 17 | 102 |
| RUBBER-65A BLK | 23 | 126 | 8.5** | 65*** |
| EGGSHELL-AMB 10 | 2765 | 5 | 15 | 89 |

### Application Specific

| RUBBER-BLK 10 | 540 | 80 | 76** | 97*** |
| ELAST-BLK 10 | 3.6 | 83 | 11** | 65*** |

* Top 8 types of part geometries based on years of additive experience. Each part was printed with the suite of Figure 4 materials and assigned a % of parts in that category that the material was well suited for producing.

** Tear Strength Type-C kN/m

*** Shore A Hardness

### Rating System

- = VERY HIGH
- = HIGH
- = MEDIUM
- = LOW
<table>
<thead>
<tr>
<th></th>
<th>Long Term Indoor Environmentally Stable</th>
<th>Long Term Outdoor Environmentally Stable</th>
<th>Differential Shrink</th>
<th>Bottom Surface</th>
<th>Warp</th>
<th>1st Article Success</th>
<th>Supports</th>
</tr>
</thead>
</table>
| TOUGH-GRY 10 | ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ▣  

**Prototyping and Design Verification**

- **TOUGH-GRY 10**
  - Fast printing prototyping material
  - Good surface quality for prototyping
  - Light gray material good for contrast and definition

- **TOUGH-GRY 15**
  - Midline mechanical properties for prototyping including modulus, elongation, and notch impact
  - Good surface quality for prototyping

- **TOUGH-BLK 20**
  - Long-term stable material for UV and humidity
  - Better accuracy from low differential shrink & bottom surface quality
  - No settling in resin tray

- **FLEX-BLK 10**
  - Long term stable material for UV and humidity
  - Better accuracy from low differential shrink and bottom surface quality
  - Easier to clean

- **FLEX-BLK 20**
  - Faster printing FLEX material good for prototyping

**Production**

- **PRO-BLK 10**
  - Best Figure 4 Material performance for 1st article success
  - Long term stable material for UV and humidity
  - Better accuracy from low differential shrink & bottom surface quality

- **Rigid White**
  - Biocompatible, capable of meeting ISO 10993-5 and -10 standards for cytotoxicity, sensitization and irritation
  - Long term stable material for UV and humidity

- **Rigid Gray**
  - Long term stable material for UV and humidity
  - Better accuracy from low differential shrink and bottom surface quality

- **Rigid 140C Black**
  - 2 part material for Figure 4 Standalone only
  - Part-in-hand is much faster than the competition due to a short thermal cure required at 135°C
  - Does not require salt-packs or fixtures to maintain dimensional stability

- **Tough 65C Black**
  - Long term stable material for UV and humidity
  - Better accuracy from low differential shrink and bottom surface quality

- **Tough 60C White**
  - Biocompatible, capable of meeting ISO 10993-5 and -10 standards for cytotoxicity, sensitization and irritation
  - Long term stable material for UV and humidity

- **High Temp 150C Black**
  - UL 94 V0 @ 2mm, 3mm and FST 2mm, 3mm capable
  - Long term stable material for UV and humidity

- **HI TEMP 300-AMB**
  - Very high HDT at both low and high pressure (>300 °C)
  - Better accuracy from low differential shrink & bottom surface quality

---

*RATING SYSTEM*

- **HIGH**
- **MEDIUM**
- **LOW**

Note: Not all products and materials are available in all countries – please consult your local sales representative for availability.
<table>
<thead>
<tr>
<th>PERFORMANCE</th>
<th>Long Term Indoor Environmentally Stable</th>
<th>Long Term Outdoor Environmentally Stable</th>
<th>Differential Shrink</th>
<th>Bottom Surface</th>
<th>Warp</th>
<th>1st Article Success</th>
<th>Supports</th>
<th>NOTES</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>PRODUCTION</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
| MED-AMB 10 | ••••• | ••• | ••••• | ••••• | ••• | ••••• | ••••• | Biocompatible, capable of meeting ISO 10993-5 & -10 standards for cytotoxicity, sensitization and irritation  
Better accuracy from low differential shrink & bottom surface quality |
| MED-WHT 10 | ••••• | ••• | ••••• | ••••• | ••• | ••••• | ••••• | Biocompatible, capable of meeting ISO 10993-5 & -10 standards for cytotoxicity, sensitization and irritation  
Better accuracy from low differential shrink & bottom surface quality |
| RUBBER-65A BLK | ••••• | ••• | ••••• | ••••• | ••• | ••••• | ••••• | Long term stable material for UV and humidity  
Biocompatible, capable of meeting ISO 10993-5 and -10 standards for cytotoxicity, sensitization, and irritation |
| EGGSHELL-AMB 10 | ••••• | ••••• | ••••• | ••••• | ••••• | ••••• | ••••• | Easily breaks away from the injected material once cured  
Material is compatible with many platinum and tin silicones |
| **APPLICATION SPECIFIC** | | | | | | | | |
| RUBBER-BLK 10 | ••••• | ••• | ••••• | ••••• | ••• | ••••• | ••••• | High tear strength makes a very tough malleable material  
Long term stable material for UV and humidity  
Better accuracy from low differential shrink & bottom surface quality |
| ELAST-BLK 10 | ••••• | ••• | ••••• | ••••• | ••• | ••••• | ••••• | Low tear strength combined with low tensile modulus makes parts easy to tear |

**RATING SYSTEM**

- •••• = HIGH
- ••• = MEDIUM
- •• = LOW

Note: Not all products and materials are available in all countries – please consult your local sales representative for availability.

Warranty/Disclaimer: The performance characteristics of these products may vary according to product application, operating conditions, material combined with, or with end use. 3D Systems makes no warranties of any type, express or implied, including, but not limited to, the warranties of merchantability or fitness for a particular use. © 2021 by 3D Systems, Inc. All rights reserved. Specifications subject to change without notice. 3D Systems, the 3D Systems logo and Figure 4 are registered trademarks of 3D Systems, Inc.

www.3dsystems.com