# Bits and Speeds

## Cutting Speeds:

<table>
<thead>
<tr>
<th>Material</th>
<th>Bit Options</th>
<th>Spindle Speed Settings (Controlled in the shop)</th>
<th>feed rate (speed in the x-y plane)</th>
<th>plunge rate (speed in the z plane)</th>
<th>pass depth</th>
<th>special notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acrylic</td>
<td>upcut foam bits</td>
<td>170</td>
<td>1.2</td>
<td>1.2</td>
<td>.1</td>
<td>(using 1/4 upcut bit)</td>
</tr>
<tr>
<td>Foam</td>
<td>upcut foam bits</td>
<td>180-200</td>
<td>8</td>
<td>8</td>
<td>equal or less than cut length of bit (see bit graphic)</td>
<td>greater resolution comes with higher density foam (ie. pink foam)</td>
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<td></td>
<td>• 1/4” for 2” cut depths or less</td>
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<tr>
<td></td>
<td>• 3/8” for 3 1/2” cut depths or less</td>
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</tbody>
</table>
| Formaldehyde-free MDF   | Up to 1.5” prelaminated           | 300                                           | 8                                 | 8                                 | Up to 2x Diameter (wood bits) 1x Diameter (foam bits) | • if material is smaller than 18” x 18”, screw it down to a separate piece of plywood or MDF  
• plywood can be bought in many variations, and the settings need to be adjusted accordingly |
| Plywood                 | straight cut wood bits            | 190-260                                       | 1-2                               | 1-2                               | equal or less than half of diameter of bit (see bit graphic) | always (doesn't matter the size) screw solid wood to a separate piece of plywood or MDF because it WILL warp during routing 
• solid wood can be bought in many variations, and the settings need to be adjusted accordingly |
| Solid Wood              | straight cut wood bits            | 190-260                                       | 1-2                               | 1-2                               |            |                                                                                |
| Aluminum                | 1/16” Spiral Downcut Carbide     | 300                                           | 0.2                               | 0.2                               | 0.01”      | • Use tape to tape down sheet metal perimeter to bed to reduce air leakage and stabilize vacuum hold down.  
• MUST use air cooling system!!! - Notes: Make sure bit extends at least 1.5” out of collet. Aim cold air nozzle at bit as close as possible to bit at ~45 to 60 degree down angle with center of flow centered on bit and about 0.25” above tip. |

## Bits:
FOAM UPCUT BITS:
- 1/8” diameter, 1 1/8” cut length:
- 1/4” diameter, 2 1/8” cut length:
- 3/8” diameter, 3 1/2” cut length:

WOOD STRAIGHT, DOUBLE FLUTE BITS:
- 1/8” diameter, 0.31” cut length:
- 1/4” diameter, 1” cut length:
- 3/8” diameter, 1 1/4” cut length:
- 1/2” diameter, 2 1/2” cut length: