CUTTER BLADE KNOWLEDGE
Cutter Blade Knowledge

Cutter Blade Materials

- **Steel Tip**
  - Rarely used anymore and difficult to find
  - Material is ductile and less prone to chipping

- **Carbide or Cemented Carbide**
  - Provides excellent wear resistance and hardness
  - Material offers better rigidity than steel which enables the cutter blade to provide better cutting accuracy
  - Brittle material and can be chipped if dropped or dense material is cut
  - Can be sharpened better than steel blades, but lifespan is shorter
CUTTER BLADE KNOWLEDGE

- Blade Angle
  - Blade angle should be chosen based on thickness and density
  - Thickness is determined by substrate without backer
  - Density is determined by material construction and lamination
  - Blade should be able to cut through entire substrate layer and into the backing without going deeper than blade edge
**Blade Offset**

- The offset determines the blades turning radius and compensation from the cutting carriage.
- A blade with a higher offset can handle thicker/laminated substrates better.
- Offsets over 1mm are simulated to compensate for material properties to avoid Figure B below.

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**Perfect**

![A](image)

**Not Enough**

![B](image)

**Too Much**

![C](image)
Blade Extension

- Changing blade extension can substitute for changing pen pressure
- Max blade extension is designed for pre-printed graphics
- Blade extension should be minimized for cut substrates
- Change blade extension by twisting blade holder cap
- Blades with shorter blade edges need less extension

[Rough Estimate for the Amount of Blade Extension]

Use the following dimension as a rough estimate for setting the amount of blade extension.

\[
\text{Amount of blade extension} = \text{Thickness of the material portion} + \frac{\text{Thickness of the carrier paper}}{2}
\]

Min. : 0 mm  Max. : 2.5 mm
## Roland DG Blade Options

<table>
<thead>
<tr>
<th></th>
<th>ZEC-U5022 (Bundled with GX-640)</th>
<th>ZEC-U5025</th>
<th>ZEC-U1715</th>
</tr>
</thead>
<tbody>
<tr>
<td>Offset</td>
<td>0.25</td>
<td>0.25</td>
<td>0.25</td>
</tr>
<tr>
<td>Angle</td>
<td>55 degree</td>
<td>50 degree</td>
<td>17 degree</td>
</tr>
<tr>
<td>Suitable Sheet</td>
<td>Ordinary Vinyl Reflection Sheet</td>
<td>Ordinary Vinyl Reflection Sheet</td>
<td>Sandblast</td>
</tr>
<tr>
<td>Life Expectancy</td>
<td>4,000m</td>
<td>4,000m</td>
<td>Depending on the sheet</td>
</tr>
<tr>
<td>Comment</td>
<td>It is a basic cutter suitable for ordinary vinyl. The tip is slightly sharper than ZEC-U1005. It is not suitable for hard material such as glass fiber.</td>
<td>It is a versatile cutter suitable for ordinary vinyl, reflection sheet and laminated sheet. The cutting quality is better than ZEC-U1005 and ZEC-U5022. It is not suitable for thick laminated sheet and hard material such as glass fiber.</td>
<td>It is a special cutter suitable for Sandblast. The tip cracks easily.</td>
</tr>
</tbody>
</table>

**Design**

![Design Diagram](image)
## Roland DG Blade Options

<table>
<thead>
<tr>
<th>Blade Type</th>
<th>Offset (in)</th>
<th>Angle (degree)</th>
<th>Suitable Sheet</th>
<th>Life Expectancy</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>ZEC-U3017</td>
<td>0.175</td>
<td>45</td>
<td>Ordinary Vinyl</td>
<td>Depends on the sheet</td>
<td>It is suitable for cutting small characters or objects.</td>
</tr>
<tr>
<td>ZEC-U3050</td>
<td>0.5</td>
<td>32</td>
<td>Sandblast Card Board</td>
<td>Depends on the sheet</td>
<td>It is for thick material such as PPF, Sandblast.</td>
</tr>
<tr>
<td>ZEC-U1005</td>
<td>0.25</td>
<td>50</td>
<td>Ordinary Vinyl</td>
<td>8,000m</td>
<td>It is a basic cutter suitable for ordinary vinyl. The durability is high. If the cutter pressure is not enough, use ZEC-U5022 or ZEC-U5025.</td>
</tr>
</tbody>
</table>

### Design

- **ZEC-U3017**
  - Offset: 0.175 in
  - Angle: 45°
  - Design: Image showing the blade design with an offset of 0.175 in and an angle of 45°.
- **ZEC-U3050**
  - Offset: 0.5 in
  - Angle: 32°
  - Design: Image showing the blade design with an offset of 0.5 in and an angle of 32°.
- **ZEC-U1005**
  - Offset: 0.25 in
  - Angle: 50°
  - Design: Image showing the blade design with an offset of 0.25 in and an angle of 50°.
Common Cutting Problems & Solutions

- **Incomplete Cuts**
  - **Problem:**
    - Vinyl is not cut all the way through
  - **Possible Solutions:** (in order of diagnosis)
    - Blade dull or chipped (causes friction and doesn’t stay deep, but planes on surface like a boat)
    - Improper blade extension (blade can’t dig deep enough because blade holder cap interferes)
    - Pen pressure not high enough (same as improper blade extension)

- **Stitch Cut or Dash Cut**
  - **Problem:**
    - Cut lines in dashes or even spaced sections
  - **Possible Solutions:**
    - Blade chipped or dull (can’t cut material and jumps due to friction)
    - Blade holder needs lubrication or replacement (blade doesn’t swivel properly due to friction)
    - Slow speed (same as blade being chipped or dull)
    - Replace damaged cutter strip (blade caught in grooves and jumps to next location)
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Common Cutting Problems & Solutions

• Circles Don’t Close
  • Problem:
    • Vectors do not connect according to artwork on screen
  • Possible Solutions:
    • Use sans serif fonts (Serif fonts have sharp angled corners and the blade can’t turn fast enough)
    • Points need to be rounded (vector graphics that have small angles like serif fonts. e.g. - flame tips)
    • Incorrect offset (Plotter is over or under-compensating for vector curve)

• Small Letters and Shapes Lift Up During Cutting
  • Problem:
    • Adhesive gels back together under vinyl after being cut
  • Possible Solutions:
    • Use vinyl with a different adhesive (some adhesives don’t adhere to the liner well enough for small detail. Removable/low tack adhesives are most common problem)
    • Increase blade extension (adhesive may be too thick and not cut all the way through)
    • Replace blade (sharper blade cuts adhesive better)
    • Use higher angle blade (low angle blade may not cut through adhesive effective enough)
    • Increase pen pressure (liner could be soft and absorbing adhesive causing it to gel together)