

**COMPOSITE ENVISIONS KNOWLEDGE HUB
PRACTICAL AND INSIGHTFUL COMPOSITES INFORMATION**

HOW TO PROPERLY TRIM KEVLAR PARTS



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HOW TO PROPERLY TRIM KEVLAR

INTRODUCTION

Kevlar is the lightest weight and toughest fabric type widely used in composite industry. It is used today as a fabric alone in bullet proof vests, impact and cut resistant safety equipment, and used as a fire retardant. Kevlar can also be difficult to cut and process unless the correct tools are used. This piece will cover some best practices and procedures for cutting and trimming Kevlar, both raw cloth and finished parts.

CUTTING RAW CLOTH

Kevlar (or Aramid) cloth is not easy to cut. Kevlar's energy absorbent nature only adds to the headache. However, using the proper tools and process tips, there are pain free ways of getting fibers cut effectively.

Safety First: Cut resistant gloves are needed when using any cutting blade such a razor knife. Individual fiber movement largely contributes to making raw Kevlar Fibers difficult to cut. Use of a masking tape over the Kevlar fibers will mitigate fiber movement or slippage during cut. Place the masking tape of which area will cut cutting through, on both sides of the fabric. This will aid with using scissors or a razor knife in the ply cut process.

When using scissors, it is advised to use sharp scissors with serrated edges along the blade; household scissors and some industrial scissors simply do not cut it. There are ceramic scissors and Kevlar specific cutting scissors available are made that make the process much easier. Usually these types of scissors feature a serrated blade to "grab" onto the individual fibers to mitigate fiber slippage during the cut process. In addition, electric scissors are also available with serrated edges to perform cuts along Kevlar fabrics.

Differing scissors will have an array of uses. It is advised to only use the selected type of scissors for cutting dry fibers. Although these scissors will cut through Carbon Fiber and Fiberglass alike, if these are used for cutting wet layup plys or cured parts or through different surfaces, they will dull quickly. Proper care taken for these tools is extremely important. When not in use, place into a dry area or bag to increase longevity of scissors.

Safety First: Cut resistant gloves are needed when using any cutting blade such a razor knife. Using a razor knife is an option to cut plys, especially when wanting clean straight edges. If cutting multiple pieces, it is advised to get a blade that will "snap off" to provide a fresh cutting tool. It may take multiple passes if the chosen Kevlar fabric is thicker.

Tip: With straight cuts, place a straight edge with some hand pressure to keep fibers down. Use a hard surface (not wood) as the "cutting board" below the fabric.

Prepreg Kevlar is a little easier to cut as fiber slippage will not be as likely to cause problems.



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TRIMMING FINISHED PARTS

For those that do not have a waterjet machine laying around the house please be advised: Composites are inherently abrasive, whether cured or uncured. Kevlar presents a challenge all its own because of its tendency to fray while even cured into a laminate (also why it absorbs energy so well). When trimming cured Kevlar parts or any reinforced fibers, all cutting edges of the tool are going to be dulled quickly. However, if you take the time to learn to cut Kevlar, the practice will help further experience into cutting any composite in the future.

Safety note: While cutting Kevlar or any composite, wearing proper protective equipment is important. Composite dust is an irritant. A mask or respirator will keep composite dust from possible irritation of throat and lungs. A sleeve will keep the dust from itching skin. Properly sized, cut resistant gloves will provide peace of mind and allow for precision while using rotary tools for cutting. Please DO NOT forget safety glasses and ear plugs. In addition to this, a shop vac with vacuum hose placed near or under the trim area will aid in mitigating any dust caused by cutting or sanding laminate edges.

Rotary Tools are the most commonly tools used to cut cured composite parts. These tools vary from an electric Dremel to an “angle”, “pencil”, or “die” grinder to name a few. If resources are handy, use of a pneumatic rotary tool may yield the best result. Rotary tools also provide an advantage in cutting along complex angles and changing surface dimensions.

Special bits or blades are needed to cut Kevlar. A Diamond Wheel is the best option for cutting through Kevlar laminate edges, as diamond is harder than any other cutting material. Tungsten carbide cutting blades will cut Kevlar laminates as well but are only about half as effective as a diamond wheel. (Tip: The thinner the cutting blade, the easier it will be to get through any laminate.) For diameter sizing of the blade, smaller diameter blades (1/2 - 1”) will dull quicker, however will allow for tighter dimensional criteria whereas a larger blade (2-5”) may last longer but may not get into tighter areas.

When cutting along complex contours of a Kevlar composite, making a trim template from an overlay of an existent part can be utilized to achieve a close accurate cut, providing a line close to your finished edge. Trim templates also allow for the same cut to be made to multiple pieces in the future. (Note: Composites in general are unforgiving on edges, to alleviate the chance of cutting into your final part, leave ~ .100” to .250” of trim excess.

Tip: When cutting parts using a rotary tool, check the spin direction of the cutting blade. Spin direction of the cutting tool will determine if the dust from the laminate will come back towards the person performing the cut or go down and away, allowing that person to keep a steady on the surface in which is being cut.

After utilizing the cutting blade to get a near net cut, wet sand the laminate edges with a



HOW TO PROPERLY TRIM KEVLAR

fine grit sandpaper or light abrasive pad to achieve final part dimensions. Wet sanding can be performed by hand or with a right-angle grinder /pencil grinder attached with circular sanding disk or other media such as “scotch brite” red, gray, or white. Grit size may vary slightly per user, but for part quality ~600 grit is a good starting point. Use of a hand block sander in a back and forth motion will aid in this process when detail is needed for tighter dimensional tolerances. Wet sanding edges will keep heat away from the laminate edge to prevent possible delamination of cured edges and mitigate dulling of blades / bits.

Afterword, an optional layer of resin can be applied with a small brush over cutting edges. This will provide protection to the composite edge.

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