

Laser Cutter Materials

Never cut these materials

WARNING: Because many plastics are dangerous to cut, it is important to know what kind you are planning to use.

Material	DANGER!	Cause/Consequence
PVC (Poly Vinyl Chloride)/vinyl/pleather/artificial leather	Emits chlorine gas when cut!	Don't ever cut this material as it will ruin the optics, causes the metal of the machine to corrode as chlorine is released and ruins the motion control system.
Thick (>1mm) Polycarbonate/Lexan	Cuts very poorly, discolors, catches fire	Polycarbonate is often found as flat, sheet material. The window of the laser cutter is made of Polycarbonate because <i>polycarbonate strongly absorbs infrared radiation!</i> This is the frequency of light the laser cutter uses to cut materials, so it is very ineffective at cutting polycarbonate. Polycarbonate is a poor choice for laser cutting. It creates long stringy clouds of soot that float up, ruin the optics and mess up the machine.
ABS	Melts / Cyanide	ABS does not cut well in a laser cutter. It tends to melt rather than vaporize and has a higher chance of catching on fire and leaving behind melted gooey deposits on the vector cutting grid. It also does not engrave well (again, tends to melt). Cutting ABS plastic emits hydrogen cyanide, which is unsafe at any concentration.
HDPE/milk bottle plastic	Catches fire and melts	It melts. It gets gooey. It catches fire. Don't use it.
PolyStyrene Foam	Catches fire	It catches fire quickly, burns rapidly, it melts, and only thin pieces cut. This is the #1 material that causes laser fires!!!
PolyPropylene Foam	Catches fire	Like PolyStyrene, it melts, catches fire, and the melted drops continue to burn and turn into rock-hard drips and pebbles.
Epoxy	burn / smoke	Epoxy is an aliphatic resin, strongly cross-linked carbon chains. A CO2 laser can't cut it, and the resulting burned mess creates toxic fumes (like cyanide!). Items coated in Epoxy or cast Epoxy resins must not be used in the laser cutter. (see Fiberglass)
Fiberglass	Emits fumes	It's a mix of two materials that can't be cut. Glass (etch, no cut) and epoxy resin (fumes)
Coated Carbon Fiber	Emits noxious fumes	A mix of two materials. Thin carbon fiber mat can be cut, with some fraying - but not when coated.
Any foodstuff (such as meat, seaweed 'nori' sheets, cookie dough, bread, tortillas...)	The laser is not designed to cut food, and people cut things that create poisonous/noxious	If you want to cut foodstuffs, consider sponsoring a food-only laser cutter for the space that is kept as clean as a commercial kitchen would require.

	substances such as wood smoke and acrylic smoke.	
Material with Sticky Glue Backing	Coats lens, cracks lens	There are many normally laserable items such as thin wood laminates that you can purchase that become un-cuttable when the manufacturer adds a layer of peel-off glue on the bottom to attach them to surfaces. Examples include cork tiles, thin wood laminate, acrylic tiles, and paper stickers. Never cut these materials in the laser cutter if they have this backing. The glue will vaporize forming a coating on the lens that will coat it, cloud it, heat it, and then potentially crack the lens. The glue residue is worse than resin and can't be removed without risking damage to the lens.

Safe Materials

The laser can cut or etch. The materials that the laser can cut materials like wood, paper, cork, and some kinds of plastics. Etching can be done on almost anything, wood, cardboard, aluminum, stainless steel, plastic, marble, stone, tile, and glass.

Cutting

Material	Max Thickness	Notes	WARNINGS!
Many woods	1/4"	Avoid oily/resinous woods	Be very careful about cutting oily woods, or very resinous woods as they also may catch fire.
Plywood/Composite woods	1/4"	These contain glue and may not laser cut as well as solid wood.	
MDF/Engineered woods	1/4"	These are okay to use but may experience a higher amount of charring when cut.	
Paper, card stock	thin	Cuts very well on the laser cutter, and also very quickly.	
Cardboard, carton	thicker	Cuts well but may catch fire.	Watch for fire.
Cork	1/8"	Thin cork can be cut, but the quality of the cut depends on the thickness and quality of the cork. Engineered cork has a lot of glue in it and may not cut as well.	Avoid cutting thicker cork (5mm). Engraves well, cuts poorly.
Acrylic/Lucite/Plexiglas/PMMA	1/2"	Cuts extremely well leaving a polished edge.	
Thin Polycarbonate Sheeting (<1mm)	<1mm	Very thin polycarbonate can be cut but tends to discolor badly. Extremely thin sheets (0.5mm and	Watch for smoking and/or burning

		less) may cut with yellowed/discolored edges. Polycarbonate absorbs IR strongly, and is a poor material to use in the laser cutter.	
Delrin (POM)	thin	Delrin comes in a number of shore strengths (hardness) and the harder Delrin tends to work better. Great for gears!	
Kapton tape (Polyimide)	1/16"	Works well, in thin sheets and strips like tape.	
Mylar	1/16"	Works well if it's thin. Thick mylar tends to warp, bubble, and curl	Gold coated mylar will not work.
Solid Styrene	1/16"	Smokes a lot when cut but can be cut.	Keep it thin.
Depron foam	1/4"	Used a lot for hobby, RC aircraft, architectural models, and toys. 1/4" cuts nicely, with a smooth edge.	Must be constantly monitored.
Gator foam		Foam core gets burned and eaten away compared to the top and bottom hard paper shell.	Not a fantastic thing to cut, but it can be cut if watched.
Cloth/felt/hemp/cotton		They all cut well. Our lasers can be used in lace-making.	Not plastic coated or impregnated cloth!
Leather/Suede	1/8"	Leather is very hard to cut but can be if it's thinner than a belt (call it 1/8").	Real leather only. Not 'pleather' or other imitations ... they are made of PVC.
Magnetic Sheet		Cuts beautifully	
NON-CHLORINE-containing rubber		Fine for cutting.	Beware chlorine-containing rubber!
Teflon (PTFE)	thin	Cuts OK in thin sheets. See https://www.ulsinc.com/materials/teflon ; the issues listed in https://en.wikipedia.org/wiki/Polymer_fume_fever should not matter because our lasers are fully vented and exhausted.	
Carbon fiber mats/weave that has not had epoxy applied		Can be cut, very slowly.	You must not cut carbon fiber that has been coated!!
Coroplast ('corrugated plastic')	1/4"	Difficult because of the vertical strips. Three passes at 80% power, 7% speed, and it will be slightly connected still at the bottom from the vertical strips.	

Etching

All the above "cuttable" materials can be etched, in some cases very deeply.

In addition, you can etch:

Material	Notes	WARNINGS!
Glass	Green seems to work best...looks sandblasted.	
Ceramic tile		
Anodized aluminum	Vaporizes the anodization away.	
Painted/coated metals	Vaporizes the paint away.	
Stone, Marble, Granite, Soapstone, Onyx.	Gets a white "textured" look when etched.	100% power, 50% speed or less works well for etching.

Marking

Cermark is the brand name of a marking compound containing molybdenum that costs ~\$50-100 for a 12oz spray can, which can be sprayed onto stainless steel, brass, aluminum, copper, nickel, glass or light-colored stone/tile before being etched to leave behind a permanent dark black mark. Some people have had some luck using dry moly lube spray to the same effect. It is thought that the molybdenum sulfate in the dry lube breaks down to molybdenum which either oxidizes or reacts with the underlying surface to create the mark.