✓	2D Design & Laser Cutting WorkFlow	Considerations			
	2D Design				
	Object Description Form Fit and Function (FFF)				
	Design for laser *cut* elements				
	.bmp or .jpg	**at least 300 dpi**			
	border	allow 1/8”margin for boarder of the material			
	image solid color for tracing	make sure your traced shapes are a single solid color - Black RGB 0,0,0 or #000000			
	trace image	select image, trace and expand, remove background			
	image setting	Set no fill and cross hairs			
	colors	cut lines in red when engraving and cutting			
	cleaning up drawing	remove overlapping lines, cut and stitch floating paths			
	drawing outlines set	Select All - Change your stroke thickness - Stroke - cross hairs .001 inches or .07 pt for cuts			
	colors	cut lines in red			

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	holes	• Tap holes: subtract ~0.004” from the desired tap drill diameter for the kerf compensation. • Body holes: subtract 0.004” from the desired body drill diameter for the kerf compensation. • Clearance-fit holes: subtract 0.008” from the desired diameter for the kerf compensation. • Blind tap holes: For blind tap holes (threaded holes that don’t go all the way through the piece) in plastic, use concentric vector circle cuts, starting with the outside diameter as in the table above, decreasing the *radius* by .010” at each step, down to .010” minimum.			
	tab-in-slot	Snug Fit: For a tab-in-slot snug fit in ~0.2” acrylic, cut the slot ~0.012” smaller than the thickness of the acrylic. You may have to experiment. Remember the entrance size of a hole will be larger than the exit (bottom) when cutting through.			
	nesting and min cut width	• Nesting: If compiling a file with lots of components on one sheet of material, make sure there is a gap of at least 2mm between the components. • Small details / cut widths: The laser burns away a portion of material which ranges from 0.1mm – 0.4mm depending on a lot of different factors. This means any areas in your design where cut lines come closer than 0.5mm together they could burn away entirely. • Any details narrower than 1mm are likely to be very fragile and in some cases can cause the material to warp whilst cutting. • Min Cut: We recommend that minimum cut widths be no smaller than the thickness of the material. If cutting from 3mm acrylic, its best not to allow cut widths less than 3mm.			

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	maintain continuous vector geometry	Try to make sure all your vector paths are continuous. If a lines are constructed from more than one path, make sure that you join / close the nodes.			
	simplify drawing	Draw with least amount of nodes with our sacrificing appearance. Too many nodes can effect quality.			
	text	• Any text you use in your design file needs to be converted to vectors (paths). This way the laser cutter will follow your design correctly, regardless of whether or not it has the font installed. • This is as simple as selecting your text and then choosing Path > Object to Path from the top menu. You won't be able to edit the text once you've done this so do it last, after your spell check. • You can create text using raster fill engraving, vector line engraving, or a combination of both.			
	size - min and max	12x24 inches less border			

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	Design for laser *etch* elements				
	Grayscale engrave	• Laser cutter uses gray scale to determine potency and focus of laser • Thickness and depth depends on parameters of machine and material density • if value is all the same, clipart solid black and white, it will engrave to 1 depth for all value • you can assign for potency for color values • using analog principles, you can assign potency or cutting depth to brightness of pixels in image • if power is low (grayscale print) no depth • if power is high, similar effect bas relief - depth of bas relief by doing multiple engraves rather than max power to prevent burning or melting material • Z buffer images - some images store depth value in a 3D image, associating them to brightness of pixel. similar output as bas relief • A depth of engraving will always be within a tolerance of +/-0.2mm.			
	Colors	When you upload the vector file into *Visicut*, the program will recognize the different colors and allow you to specify which laser function and setting you want for each color. An exception to the color rule is **Engrave**. When engraving, *Visicut* will rasterize the specified area or image and turn it into a grey scale. Specifying a fill color will affect the grey scale process because some colors are darker/lighter than others.			
	Color Mapping	Mapping which can be found just below the Material settings. Here you can specify what kind of action you want the laser cutter to make (Cut, mark, engrave) by assigning jobs to each color. This is done by first selecting "Map by color".			

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	Text and Images	remember to group outlines with pathfinder to into one object so etching following design, otherwise etching will following the single lines and fill inside			
	Save object as .svg file				

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	Laser Cutting				
	Laser Cutter - Epilog				
	Laser Cutting Machine	**Turn on fume evacuator**. It's next to the washer and dryer in the front of room 3004. The power switch is above the sink and looks like a light switch.			
		Turn on the machine. (Epilog mini24) - On the left side of the laser cutter, switch the power on.			
		Press the Home button if laser is not in upper left corner			
		Place material in the machine and align to upper left corner of bed			
		Manually Focus Laser using laser focus tool.			
		Push focus button			
		Place the focus tool on the laser			
		The cutting bed needs to be raised up or down to be in focus on your material, you will have to use the control panel to make this adjustment.			
		Proceed to move the Z axis up and down arrows until manual focus tool barely touches material.			
		Remove Focus Tool and place on pegboard hook			
		If you are satisfied with the position you can press [RESET].			
	Prep file for laser cutting/etching				

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	Open File	Open File in Illustrator			
	Choose Printer	Choose Print From Illustrator			
	Select Epilog	In the printer dialogue, select the right printer name, set the scaling to 'actual size' and keep the rotation on 'portrait'.			
	Make sure Document and Media Match	In Epilog Preference set up Piece Size to Match Design Size			
	Open Epilog Print Settings	Click on the [PROPERTIES] tab to set the laser cutter's options.			
		Here you will need to determine the settings that correspond with the material you have placed in the laser cutter.			
	Choose engrave, cut or both	Click Box Engrave, Vector or Both			
	Engraving	**Settings**			
		Speed	Power	Frequency	Remarks
		100	5	500	Very light/ surface is breached but not charred
		100	25	500	Clearly legible/ good for general use
		75	50	500	Very dark
		Color mapping is used to define multiple settings within 1 design file. The speed, power and frequency work in the same as in the general options.			
		To remove a color just mark it and hit the [–] button. To Add a color you hit the [+] button. You can also move the color up and down the list using the arrows. The color that is at the top is the one that is going to get cut first.			

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	Cutting	**Settings**			
		Speed	Power	Frequency	Remarks
		100-30	100	500	Backside of the board is not breached
		20	100	500	Start to see an outline on the backside
		12	100	500	May cut all the way through
	Send file to Epilog	When ready click on ok of the properties menu and print menu. The job will be waiting in the laser cutter display.			
	Air pressurizer	Switch on the air pressurizer.			
	Start File in Laser Cutting	And then hit the green [GO] button on the machine.			
	Stay with machine	When running the job, DD NOT leave them machine unsupervised.			
		When display say's 'done", please wait 10 - 30 seconds before opening machine (ventilation time).			

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