

LASERCUTTING INSTRUCTION – Trotec Lasercutter

To obtain your cut parts quickly follow the following steps, or walk by for more info:

1. Send your files (in accepted formats) to Makerzone@tdvg.nl
2. Send along the required material (from materials list) and required number of parts.
3. When parts are finished an email will be send and parts can be picked up inside the Makerzone.

Preferred file format – Adobe illustrator file (.ai)

For cutting operations DXF files (.dxf) are also accepted. Because the shapes in dxf files are separate lines, the laser might cut the lines one by one. Therefore, to get smoother results illustrator files are preferred.

The Trotec lasercutter has a range of 1200x700 mm, larger dimensions might be possible when discussed. Preferably nest multiple parts in one drawing. Some standard materials are available, specific materials can be brought or ordered if needed.

Illustrator instruction:

- The cutting width of the laser beam is 0.1 – 0.2 mm depending on the material and its thickness. It is therefore possible to put parts tightly against each other to use material efficiently.

RGB colour codes are used for different types of cutting operations:

- The **black colour** RGB (0,0,0) is used to engrave text and surfaces.
- The **green colour** (RGB 0,255,0) is the first one to be cut. This is for example for a bore of a gear. If the gear is cut first it is possible that it will move slightly after cutting the outlines. Cutting the bore afterwards may result in the hole not being perpendicular and centred with the gear. Select a stroke thickness of = 0,01mm.
- The **blue colour** RGB (0,0,255) is used to engrave lines. Stroke= 0,01mm.
- The **red colour** RGB (255,0,0) is for the final cut. Stroke= 0,01mm.

On default the Trotec software cuts inner geometries first. The green colour is used when parts are nested, and geometries are preferred to be cut first (see picture below).

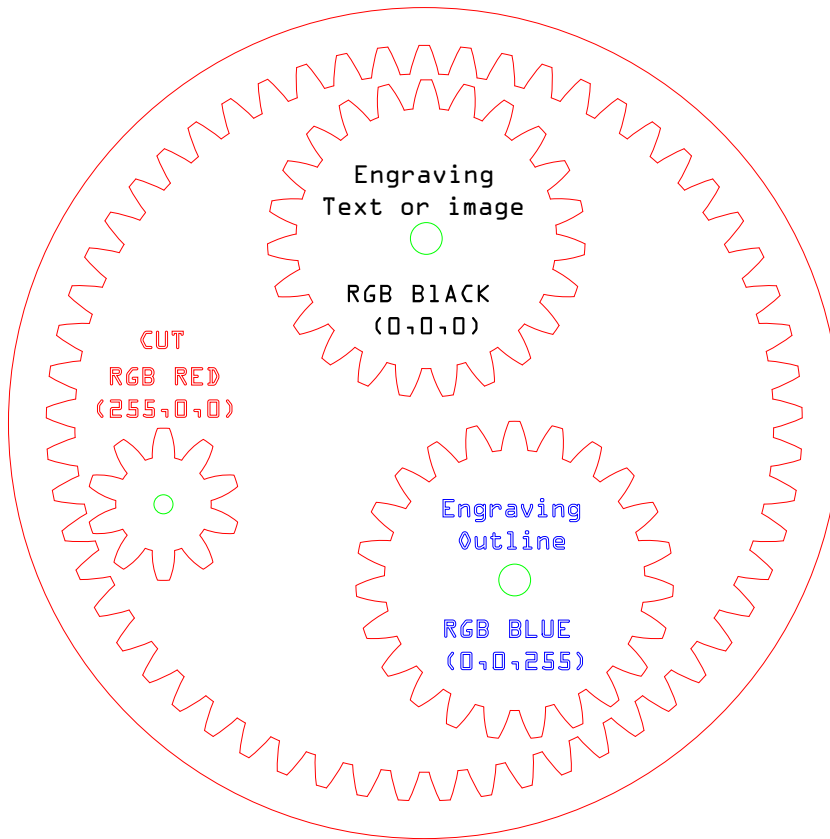


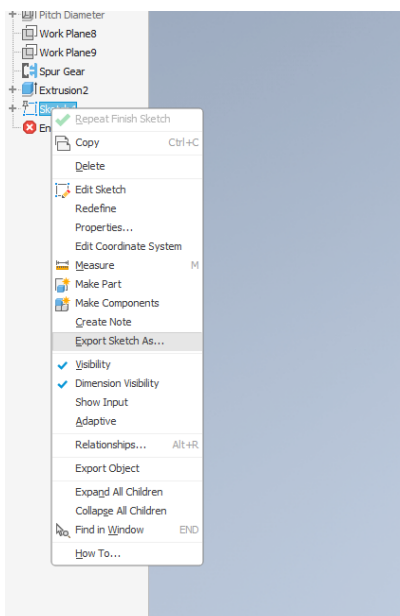
Figure 1 Cutting colours for nested objects

DXF instructions

Please make sure no double lines are present in your drawing. When projecting your drawing make sure no invisible sketches are present. Watch out with parts that have chamfered sides, this can make the sketch have double lines.

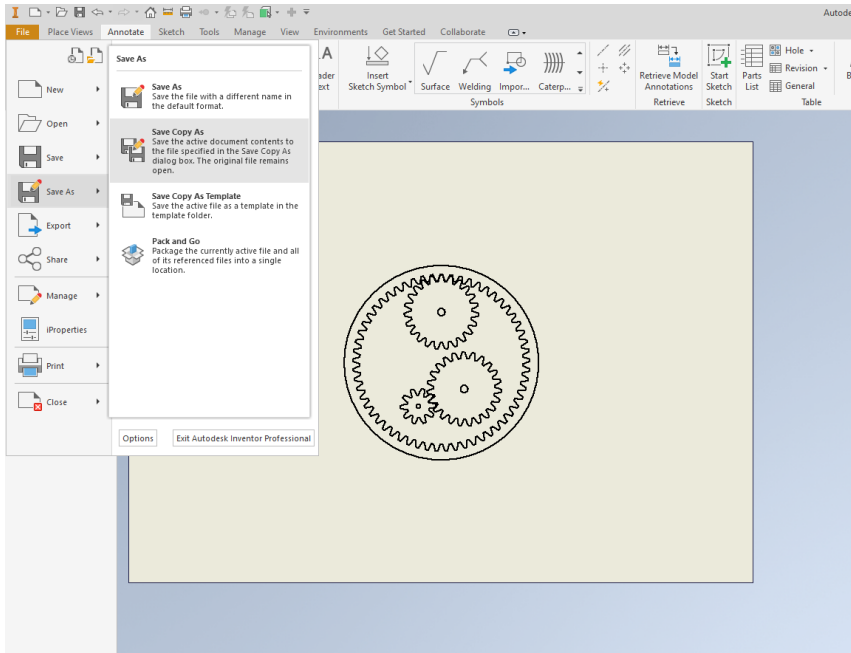
When only cutting one part:

- Export your sketch as DXF file in your 3D modelling software, from the modelling tree.



When cutting multiple parts:

- Make drawing file from your parts
- Scale your drawing as 1:1
- Don't use an angled view, or view with hidden lines visible.
- Select the view to be an outline (no colours or fill)
- Make sure you don't have borders or annotations on your drawing sheet
- Save drawing file as DXF file



Materials for the lasercutter

Safe materials for laser cutting:

Material	Max thickness	Notes	WARNING
Acylic/PMMA/Plexiglass/Lucite			
Woods	20 mm	Avoid oily/glued woods	Be careful with wood, it may catch fire
Plywood/composite woods	20 mm	These contain glue, and may not laser cut as well as solid wood.	Low quality plywood may develop a lot of smoke while cutting
MDF	20 mm	These are okay to use but may experience a higher amount of charring when cut.	Low quality MDF may develop a lot of smoke while cutting
Paper, card stock	Thin	Cuts very well on the laser cutter,	
Cardboard, carton	Thicker	Cuts well but may catch fire	Watch for fire
Cork	20 mm	Cuts nicely, 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 thicker cork.	Avoid thicker cork.
Delrin (POM)	2 mm	Delrin comes in a number of shore strengths (hardness) and the harder Delrin tends to work better. Great for gears!	
Kapton tape (Polyimide)	2 mm	Works well, in thin sheets and strips like tape.	
Mylar	2 mm	Works well if it's thin. Thick mylar has a tendency to warp, bubble, and curl	Gold coated mylar will not work.
Solid Styrene	2 mm	Smokes a lot when cut, but can be cut.	Keep it thin.
Depron foam	20 mm	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	thin	They all cut well.	Not plastic coated or impregnated cloth!
Polyester fabric	Thin	Cuts well, leaves no fraying edges.	
Leather/Suede	10 mm	Leather is very hard to cut, but can be if it's thinner than a belt	Real leather only! Not 'pleather' or other imitations!
Magnetic Sheet		Cuts beautifully	
NON-CHLORINE-containing rubber	10 mm	Fine for cutting.	Beware chlorinecontaining rubber!
Carbon fiber mats/weave		Can be cut, very slowly.	You must not cut carbon fiber that has been coated!

Do not cut these materials!!!:

Material	DANGER!	Cause/Consequence
PVC (Poly Vinyl Chloride)/vinyl /pleather/ artificial leather	Emits pure chlorine gas when cut!	Don't ever cut this material as it will ruin optics, cause the metal of the machine to corrode and ruin the motion control system.
Polycarbonate/ Lexan	Cut very poorly, discolor, catch fire, breaks lens	Polycarbonate is often found as flat, sheet material. The window of the laser cutter is made of Polycarbonate because polycarbonate strongly absorbs infrared radiation! 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
ABS	Emits cyanide gas and tends to melt	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).
HDPE/milk bottle plastic	Catches fire and melts	It melts. It gets gooey. Don't use it.
PolyStyrene Foam	Catches fire	It catches fire, it melts. This is the #1 material that causes laser fires!!!
PolyStyrene Foam	Catches fire	Like PolyStyrene, it melts, catches fire, and the melted drops continue to burn and turn into rock-hard drips and pebbles.
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.

Etching:

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

Material	Notes	Warnings!
Glass	Green seems to work best, looks sandblasted.	Only flat glass
Ceramic tile		
Anodized aluminium	Vaporizes the anodization away.	
Painted/coated metals	Vaporizes the paint away.	
Stone, Marble, Granite, Soapstone, Onyx.	Gets a white "textured" look when etched.	
d	Removes tape so underlying material can be painted in that shape	White type of painterstape