

Basic Laser Cutting

with EZ Laser and Rhino

Things to remember when exporting drawings to a laser cutter.

Basics on your drawing

In order for the Laser Cutter to read your drawing, it needs to be in 1:1 scale, only contain lines and curves, be in 2D, and it must not contain redundant lines.

1:1 Scale

You do not want your cut objects to be ten times too big or too small. When drawing for the laser cutter, use millimeters as your unit and draw 1:1. Scale your drawing up or down if needed.

Lines and curves only

This means no surfaces. This you can tjeck by viewing your drawing in shaded view NOT wireframe.

If you messed up and have to convert surfaces to curves and lines do this:

Select one surface, turn off the iso lines in the properties window.

When you Extractwireframe from the surface you get the lines.

Hide or delete the surface if you dont need it.

TIP: fewer control points equals faster laser cut. Rebuild and reduce if possible.

2D in topviewport

It also means that lines in 3D should be aligned to the xy-plane.

There are at least two way to do this:

1. Select the viewport that presents your drawing as the should be printed and use the command `Make2D`. Then a 2D drawing will appear in the xy-plane at origo (0,0,0).

2. Align the lines and curves in the front view using the command `align` and selecting the Top option. Then move the lines and curves to the origo (0,0,0). Check for lines outside the xy plane and delete them in front or right viewport.

No double lines

If the drawing contains two or more lines on top of each other, the laser will burn the same path more than once. This can burn away more material than you intend and it will probably wear on the laser's board. So tjeck for redundant lines:

Use the `SelDub` command to reveal unwanted lines.

Exporting your drawing

If cutting on the shcool workshops machine, export or save as *.ai Illustrator format. This is preferred amongst the workshop staff. Bring the file on a memory stick to the staff.

Cutting on the Institut 4/CITA laser requires autoCAD *.dwg. Bring the Rhino file and the dwg file on a memory stick. Consult the appendix: ez laser operation if needed.

Illustrator *.ai

The Illustrator format is converted without prompting for options and is accepted by the schools laser workshop.

AutoCad *.dwg

Some laser cutting machines only read the dwg file format. In these cases you will save as or export selected object to dwg.

It will dramatically improve the speed of the laser cutting if you pay attention to the export options when saving your drawing for the cutter.

If you export the curves of the drawing as small line segments, the cutting will take for ever. But if you export arcs as arcs and splines as splines and tell the machine to read them as such, it will go much faster.

In the options window select any non-default scheme from the drop down window, i.e. the polyline, and press Edit Scheme. Press the Curves tab and change how Rhino Objects convert to AutoCAD objects as follows:

Lines to Lines, Arcs to Arc, Polyline to Polylines, Curves to Splines and Polycurves to Polylines w/bulge arcs. Uncheck all Curve Tessellation Parameters.

Portable Document Format *.pdf

When printing to pdf you go through the same steps as when producing a drawing for your poster:

Select Print from the file menu

Destination:

Adobe PDF and Vector Output

View and Output Scale:

Top Viewport, Scale 1:1, and 1 mm On Paper = 1 mm In Model, press the Move button to set the print area.

Linetypes and Line Widths:

Default Line Width Hairline

Press Print and choose location for save.

This is a standard operations procedure for the EZ Laser cutter.

Settings are for the Institut 4 Laser Cutter when cutting 2 or 3 mm cardboard.

Turn on the EZ laser machine

Switch the on/off button on the right side of the machine to ON. Turn on the compressor and the suction filter machines as well. Place the exhaust hose out the window.

On the laser display press "RUN"

Then press "Homing" and the laser head will return to (0,0)

Place the 2 mm cardboard in the machine (1000mmx700mm maximum)

Prepare the drawing

Open the dwg file in autocad on the PC connected to the laser cutter.

Draw a rectangle 1000 mm by 700 mm to represent the cutting area. Place the objects economically inside the rectangle.

Select All objects to be cut and set line width to 0 mm.

Select all curves (arcs and splines only) and make them red.

Lines must remain white/black

Select the rectangle and make it green

Note: Fewer control points makes for shorter cutting time.

To analyse, select an object and assess the number of blue squares. Arcs exported as short line segments take longer than splines.

Driver Settings in AutoCAD

Press Plot and select the "EZLASER driver"

Open the Properties/Custom Properties window.

Assign the 3 pen colors used in the drawing to

"Skip"	Green	(Rectangle)
"Normal"	White/Black	(Lines)
"Spline"	Red	(Curves, arcs and splines)

Change values for Red and White/Black to the following:

Lasing

Power 100%

Speed 1200

INI-P 10.0

freq: 20000

NOTE: 900 if cutting 3mm cardboard

Preferences

Working Area:
width 1000.0 mm
depth 700.00 mm

Cam Property:
Max angle 360.0
Min angle 15.00
dwell time 2
stop length 0.00
down 0
up 0

Device DPI 400

Engraving without cutting

To engrave letters or other markings, assign separate pen color and set power to 10% for this pen color only.

Return to plot window

Press OK in the Properties window and save changes.
Correct the following:

Scale

Uncheck the "Fit to paper" box and enter custom settings:
1:1 and remember to set the correct units 1 mm : 1 unit

Plot Area

Choose Window and drag print area from corner to corner of rectangle.
Press the "Apply to Layout" button

Send drawing to the laser cutter

Check the EZ Laser screen displays the
"Ready/Start/Pause/Abort" window before pressing OK to
send the drawing.

When you press the OK in autocad the pc says
"downloading starts"
and the laser displays
"Downloading"

When transfer is complete you press "Start" on the laser
display.
The cutting begins.

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When finished a high beep is heard.
Let the suction clear the chamber of fumes for 1 minute
before opening the lid.