# MANUAL FOR HPGL FILES WITH COREL DRAW

**Tips to make engraveable HPGL files with Corel Draw**

HPGL is the abbreviation for the "Hewlett Packard Graphics Language" file format. The file extension is PLT. This format was invented for printing of designs on pen plotters. Front Panel Designer can import HPGL files, which were designed in other programs. You can use the capability of plot routines for designing of graphics and logos on your front panels.

Since graphics are engraved on the plates and not printed, a few characteristics in the generating of HPGL files need to be considered to obtain optimal results. The function "simulated filling" in some programs creates poor engraving results. High quality engravings can be produced with the outline function. The following guidance describes the production of HPGL files with Corel Draw. This procedure can be adapted to other programs.

Guidance:

1. Resize the graphic to the size you want to use on your front panel.

2. Switch to outline mode (*View* and *Outline*).

3. The goal is to transform your graphics into engraving lines for the milling tool to follow. Therefore, you need to decide first what tool size you would like to use.

    • For outline engravings, the tool size represents the width of the engraving line.

    • For filled areas, it is necessary to have the lines both sufficiently close and smooth for optimal results.
    The smaller the tool size, the more engraving lines are necessary to fill an area and the longer the manufacturing time. But using a larger tool will give you larger contour radii. Depending on your design the usage of several different tools might be necessary for best results.

    You can choose among the following milling tools:

| Tool | Diameter (Size) |
|---|---|
| Engraving tool | 0.2 mm |
| Engraving tool | 0.4 mm |
| End milling cutter | 0.6 mm |
| End milling cutter | 0.8 mm |
| End milling cutter | 1.0 mm |
| End milling cutter | 2.0 mm |
| End milling cutter | 2.4 mm |
| End milling cutter | 3.0 mm |

Engraving tool        End milling cutter
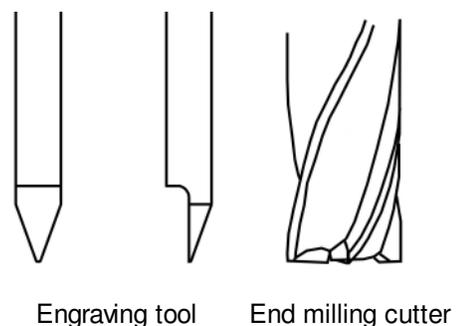
4. In the first step the outer contour needs to be shifted half drill width inward. So unwanted enlargement of graphics is avoided. Therefore, existing groups of elements have to be *Ungrouped*. Then select *Effects* and *Contour* in the menu. Here select the option *Inside.* The *Offset* needs to be chosen half of the width of the engraving tool you want to use. Set *Steps* to 1. Now you have doubled the outer contour inwards.

5. The outside contour is no longer needed and can be deleted. To do so, click *Arrange* and *Break Contour Apart*. Now you can delete the outer line.

6. If you only want an outline engraving continue to step 7.

   To fill your object, all inner lines are created with the contour *To Center* feature. The *Offset* of the lines should be spaced properly to avoid gaps. Gaps can cause burrs and poor milling results. Using an end milling cutter, select half the tool width for the offset. Engraving tools have a further reduced *Offset*, because they are tapered.

   Optimal offset values:

   | Tool | | Offset |
   |---|---|---|
   | Engraving tool | 0.2 mm | 0.07 mm |
   | Engraving tool | 0.4 mm | 0.15 mm |
   | End milling cutter | 0.6 mm | 0.30 mm |
   | End milling cutter | 0.8 mm | 0.40 mm |
   | End milling cutter | 1.0 mm | 0.50 mm |
   | End milling cutter | 2.0 mm | 1.00 mm |
   | End milling cutter | 2.4 mm | 1.20 mm |
   | End milling cutter | 3.0 mm | 1.50 mm |

   If your graphic contains more then one object and you want to fill between the two, select both and choose *Arrange* and *Combine*. Now fill your combined object *To Center* with the appropriate *Offset* as mentioned above. For graphics using multiple tools select different color lines. Each color represents one milling tool.

7. In the next step all contour lines need to be separated again (*Arrange* and *Break Contour Apart)* otherwise Corel Draw tries to keep the distances among the lines constant. For getting smoother contours the graphic should be scaled up. We recommend *Scaling* your drawing to 500% (size will be reduced in Front Panel Designer after import). Now you can *Export* to a .plt file. In *Export Menu* select *Advanced* and set *Contour Resolution* to 0.0.

8. Go to Front Panel Designer, click on the *HPGL Icon* and import your file at 20% to restore the original size. Select tools and engraving colors according to your design.

9. Zoom the graphic to full screen. Engraved areas should now be displayed fully filled and all arches should be smooth.