

Enhanced DXF to Gcode generator

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Introduction

Many CAD tools produce dxf files as an output option, including openSCAD. To be able to drive a milling machine, it is necessary to convert these files into codes that the machine can understand. Almost all CNC machines use GCODES which are simple commands to tell the machine to move to specific positions, switch on the cutting tool etc.

There is proprietary software that can do this task however for the hobbyist the open source and free options are rather limited. One project DXF2GCODE (<https://sourceforge.net/projects/dxf2gcode/>) is written in Python and has a nice clean interface. It is missing several important features however:

- DXF2GCODE always cuts outlines in the clockwise direction by default. Milling machines will produce a “good edge” and a “poor edge” on either side of a slot that is milled out due to rotation of the tool. Ideally therefore we need to cut the outer edges of a part counter clockwise and any inner cutouts clockwise to ensure the outline of the part is comprised of the good edges. Automating this process requires analysis of the shapes to determine what are outlines and holes.
- If a part is cut out of a sheet completely it is likely to move toward the end of the cut causing damage to the part. To avoid this we want to leave a few small sections along the outline where the material is only partially cut through. DXF2GCODE partly includes a way of doing this by using shapes on another “layer” of the DXF file to specify these tabs as rectangles. There are two problems with this. One is that OpenSCAD only exports files as a single default layer, so it is necessary to generate the tab objects alongside the main design (which adds substantial effort) export them separately and then manually edit two separate files together (non trivial and tedious) changing the layer name of the objects to be used for the tab layer. A simple solution would be to automate the joining of these files (thus avoiding the tedious bit) but including a “load as tab layer” facility. Generating the tab objects is still a manual process and rather tedious, since it must be redone if the design is changed or even if the layout of the parts on the material is changed. Better would be to allow automatic generation of tabs using some rules such as “minimum of 4 tabs per part”, “tabs at least every 20cm” within then DXF2GCODE program etc.

The project would aim to add these two useful functionalities to DXF2GCODE and would thus also require in depth understanding of the open source code. The code is not particularly well documented, so a good set of design documentation would be extremely useful also.

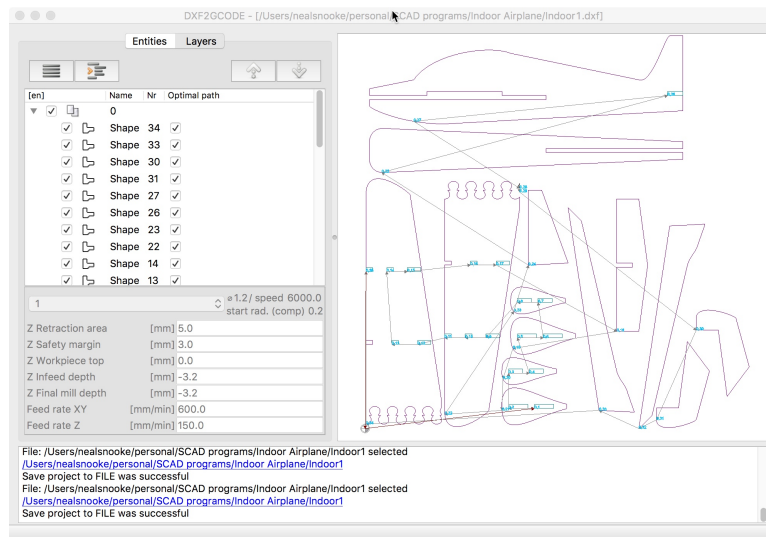


Figure 1: Existing DXF2GCODE tool - written in Python

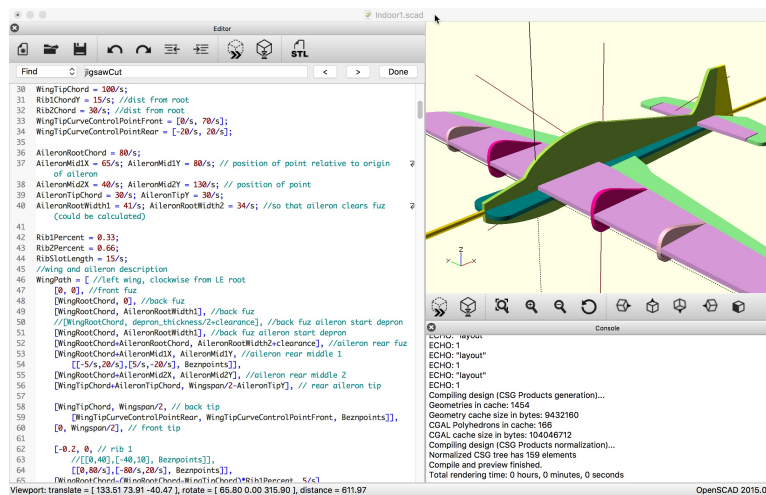


Figure 2: OpenScad tool - 3D depron airplane program

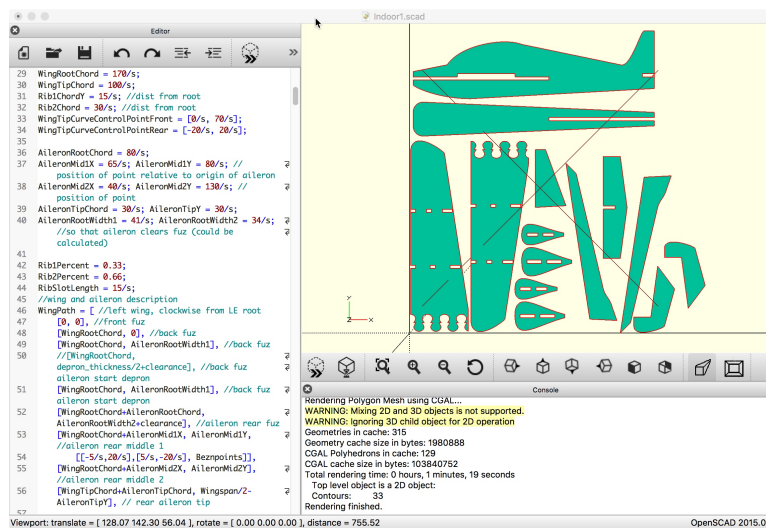


Figure 3: OpenScad tool - flat part view