Kicad Importer for Sketchup

Overview

This plugin, written in pure ruby script, allows Sketchup users to import the kicad layout files (.brd), and manipulate them in a 3D environment. Importing the pcb in an environment as Skecthup, several operations can be performed:

- change dimensions
- measure each entity
- build a customized box for enclosures
- etc...

Features

Kicad plugin v 2.0 can:

- Import **multiple** PCB edges
- Import Component Drawings
- Import pads (trapeze pads not implemented yet)
- Load 3D components (those ones are the Skethup versions of the kicad ones)
- Import drills
- Import pcb and component text
- Change color of pcb, pads, and text
- Autoplace features

Installation

The installation is pretty easy. The plugin is composed by 3 files:

- *kicad.rb*
- *kicad_parser.rb* (inside *kicad* folder)
- *kicad_class.rb* (inside *kicad* folder)

An optional file (*kicad_convert.rb*) is used to create new sketchup components, using the wings files in the Packages3D folder of Kicad installation path.

All of them can be copied in the folder plugins of the Sketchup installation path.

On OSX, the files can be copied in one of the following paths:

- *SketchUp.app/Contents/PlugIns* (application folder)
- *~/Library/Application Support/Google SketchUp 7/SketchUp/plugins* (home folder)

On Windows, the files can be copied in the following path:
- *C:\Program Files\Google\Google Sketchup 7\Plugins*

Copy the folder Kicad under the "*Components*" folder of the Sketchup installation path.
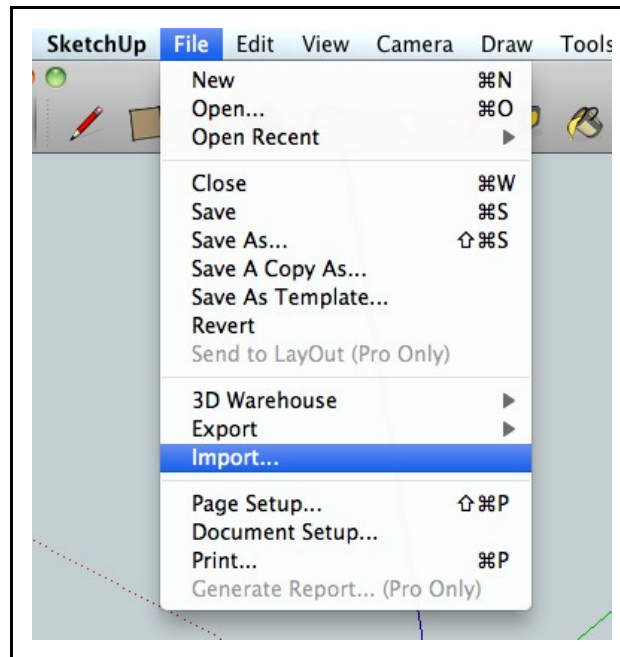
Inside this folder there are all the sketchup models needed to build the 3D shapes for our pcb.
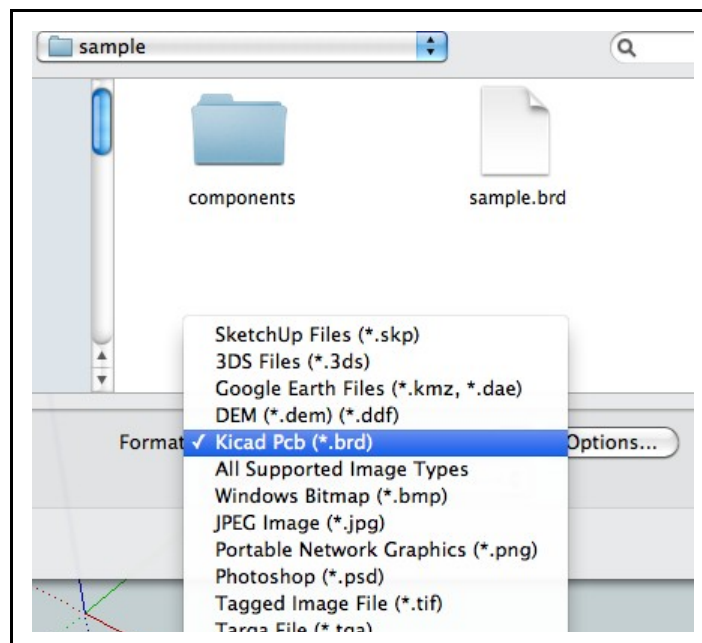
Import a Kicad pcb (.brd file)

The following procedure has been tested on MacOSX. I've never been testing on Microsoft OSs, but I'm quite confident that it works too.
First of all, we copy the .skp files contained in the archive. These files are the 3D versions of the components contained in single.brd .
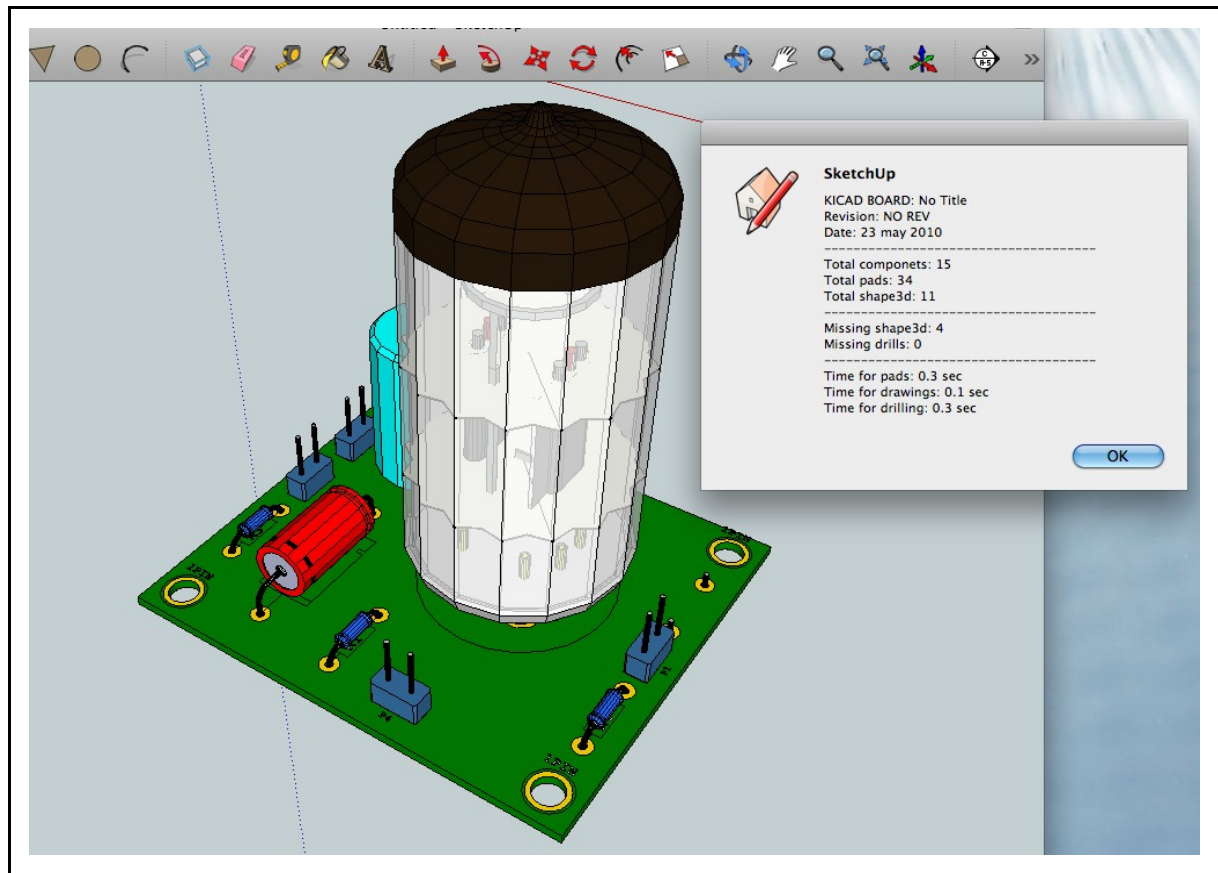Launch Sketchup and choose "Import" from the menu File.
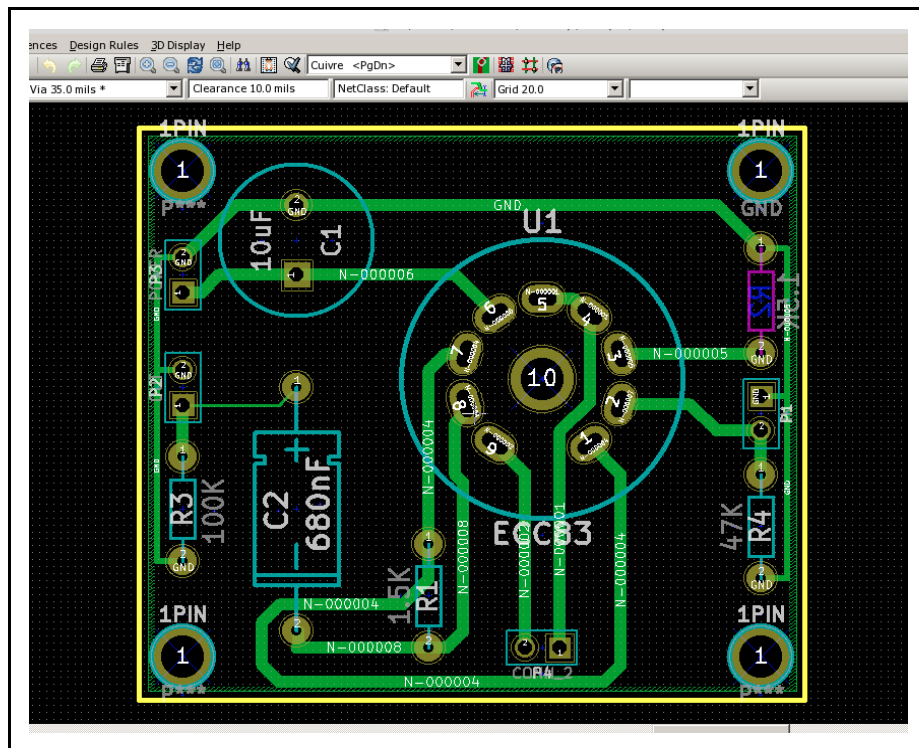

Select Kicad Pcb file format and open single.brd.

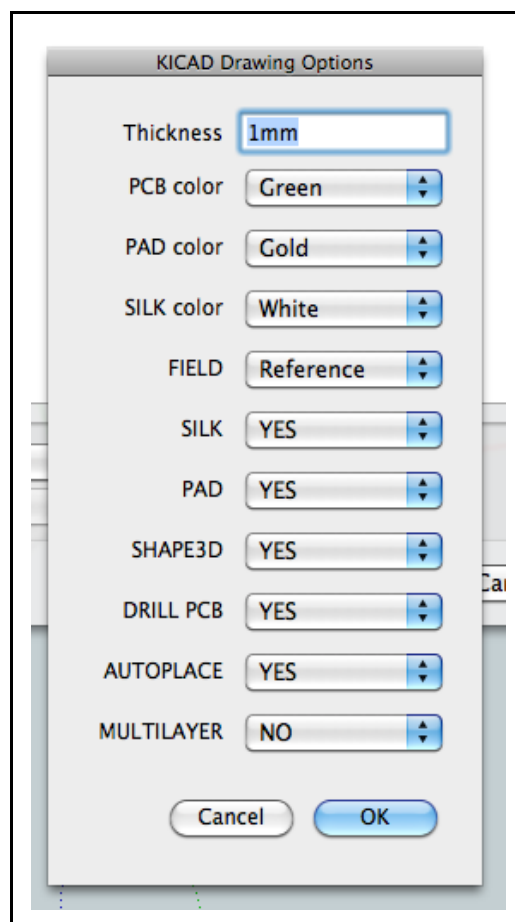Sketchup will import the kicad pcb and show a model like this:

The picture below shows the same file as opened by kicad pcbnew.

The Import operation can be partially customized with the following options (option button of the sketchup open dialog).

- Thickness : defines the thickness of the Pcb model
- PCB color: choose the color for the pcb
- PAD color: choose the color for the pads
- SILK color: choose the color for the components drawings
- FIELD: this option allows to choose which info we want to be displayed on the pcb (component reference or value)
- SILK: add or not the SILK info to the model
- PAD: add or not the pads of each component to the model
- SHAPE3D: add or not the 3D components to the model
- DRILL PCB: drill or not the PCB
- AUTOPLACE: place the PCB in a specific position of a SKP model
- MULTILAYER: Create the model using a single layer or kicad layers. In the first case, a layer named "pcb" will be created.

Some of the above options can speedup the creation of the model. For example, if your pcb have many drills, the import procedure could spend more time (seconds). Choosing "OFF" for "DRILL PCB" option, the drawing is faster.
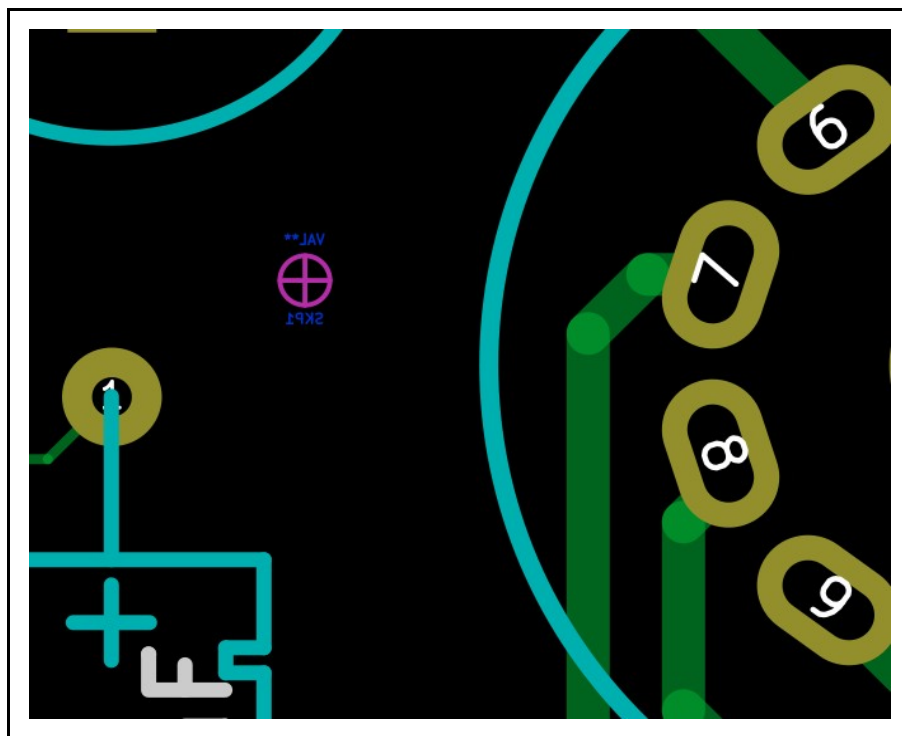
Autoplace feature

This feature allows to import the kicad board in a Sketchup model with a desired position and orientation. The autoplace works using 2 additional components:

- SKP module, placed in Kicad board
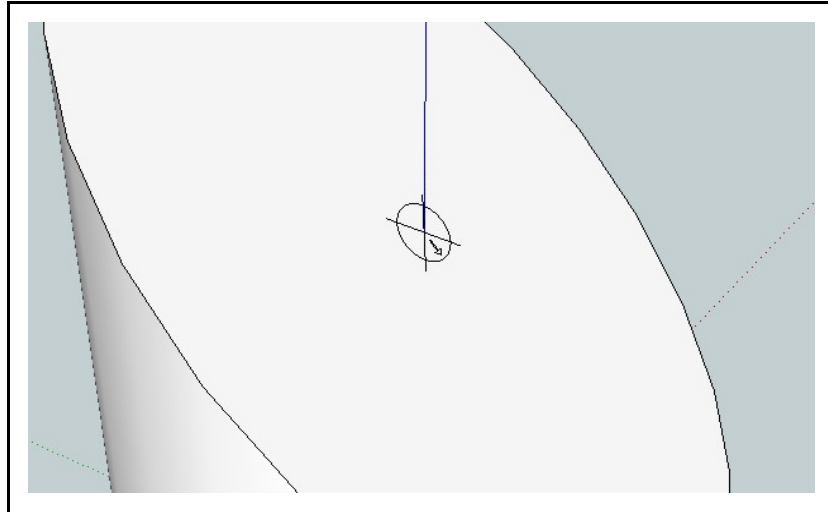- Kicad component, placed in Sketchup model

The SKP module is contained within the file sketchup.mod, whereas the KICAD component is kicad.skp. What the autoplace feature does, is to move and orient the imported board in order to match the two components.
The following figure shows the SKP module of the single.brd file placed in the Kicad board:
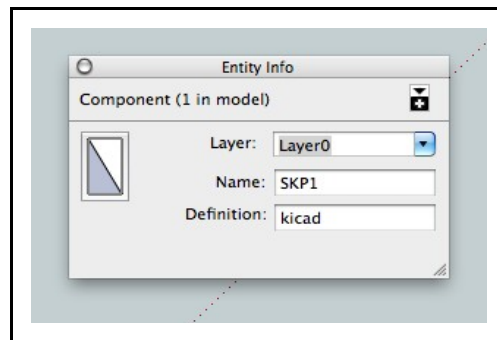

The module is very small, 1mm diameter, and doesn't have any pad. The center of the cross within the circle represents the real reference center. From version 2.0 the reference field is used to identify the board. When a .brd file contains more boards, each board can contain an SKP module with a unique reference field.
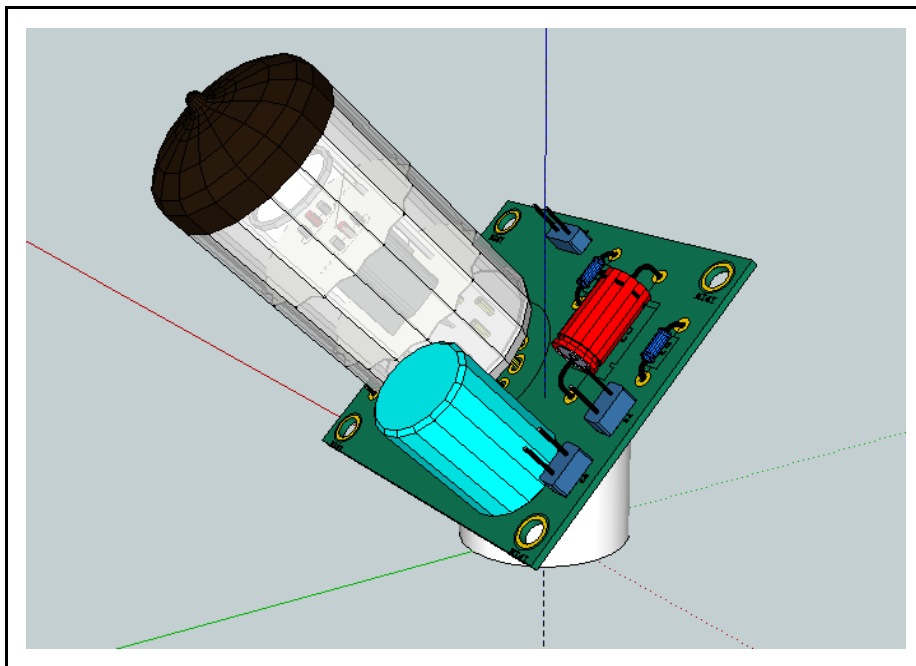The following figure shows a KICAD component, placed at the center of the axes in a Sketchup model. The component is oriented at 45 degrees on the plane RED,GREEN, and at 30 degrees in the plane BLUE,RED.

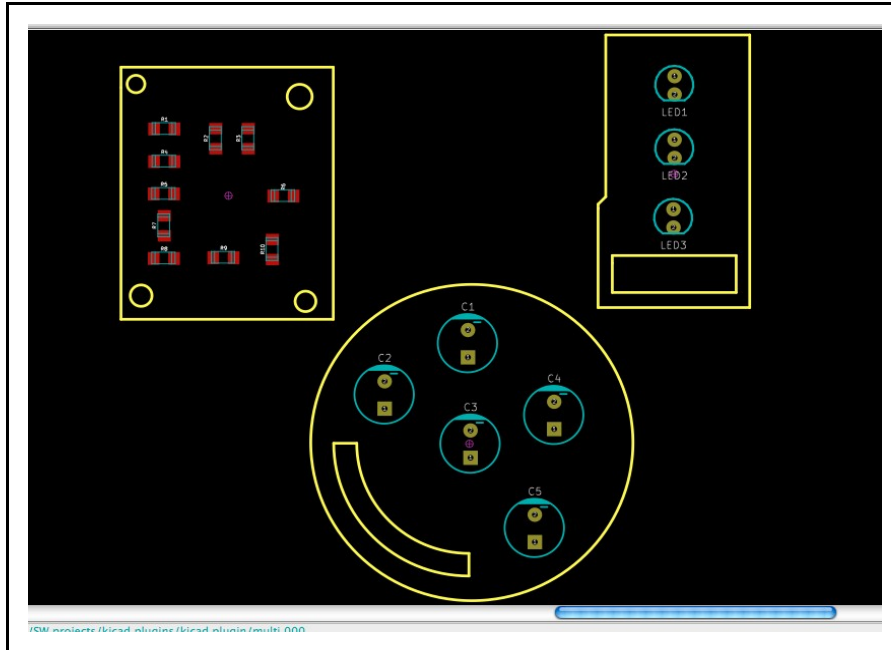The component has the same name of the kicad module, as showed below.

At this point the kicad board can be imported, verifying that the AUTOPLACE feature is enabled in the options menu.
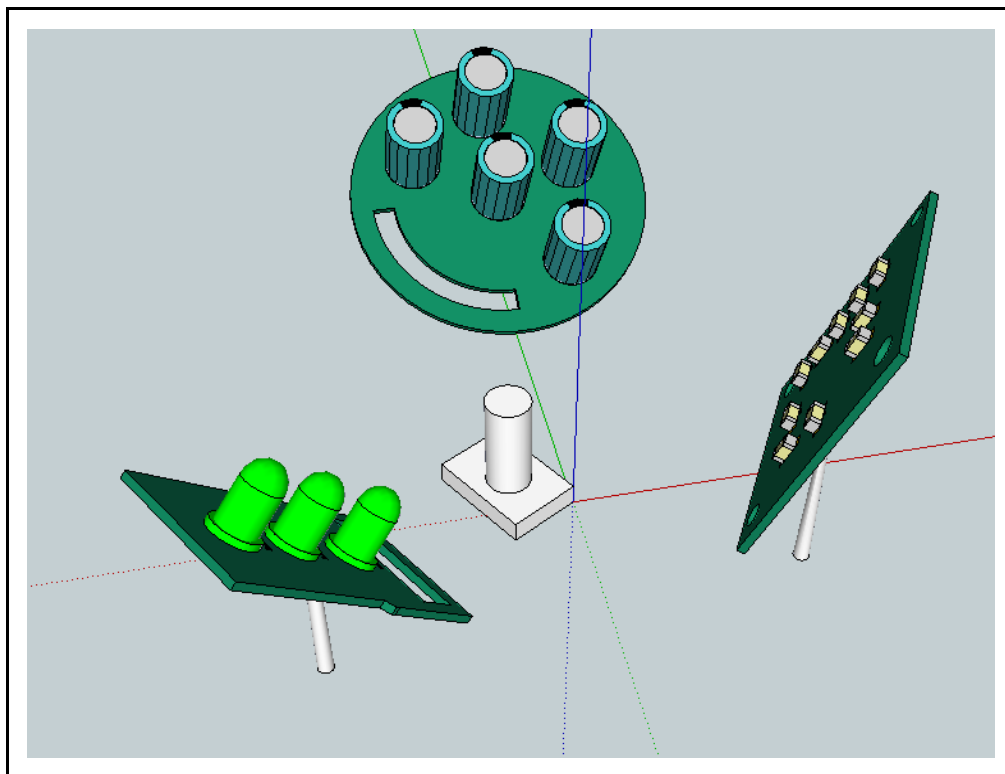
Import multiple boards

From version 2.0, kicad plugin can import multiple PCBs. Here below is showed the file multi.brd. Each board has an skp module with different reference values. These values have the correspondent ones in the multi.skp file.

Opening multi.skp and importing the file multi.brd, the boards will be loaded and placed according to the position and orientation of each Kicad component.
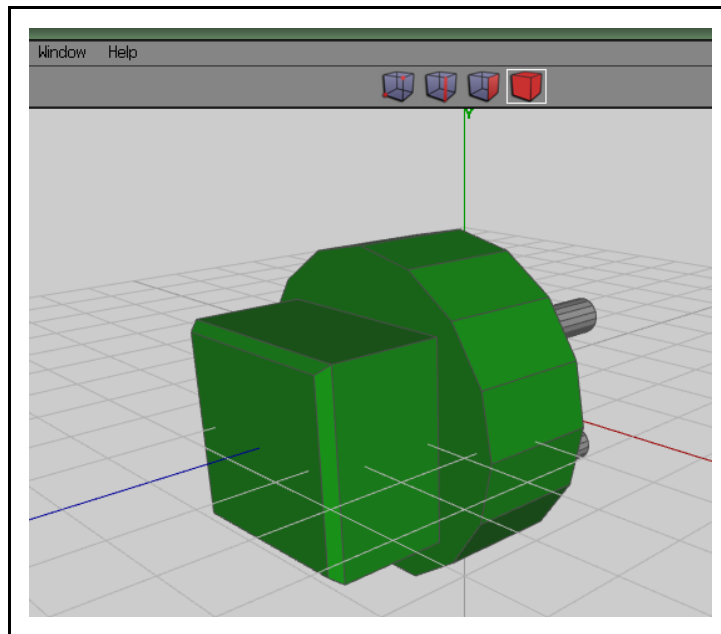
Import 3D components

The following procedure describes how to convert the 3D shapes contained in the Packages3D folder inside Kicad in Sketchup components. First of all, we need Wings3D. Wings3D is a modeler that can import and export models in several formats. The format we need to export is the Collada format.
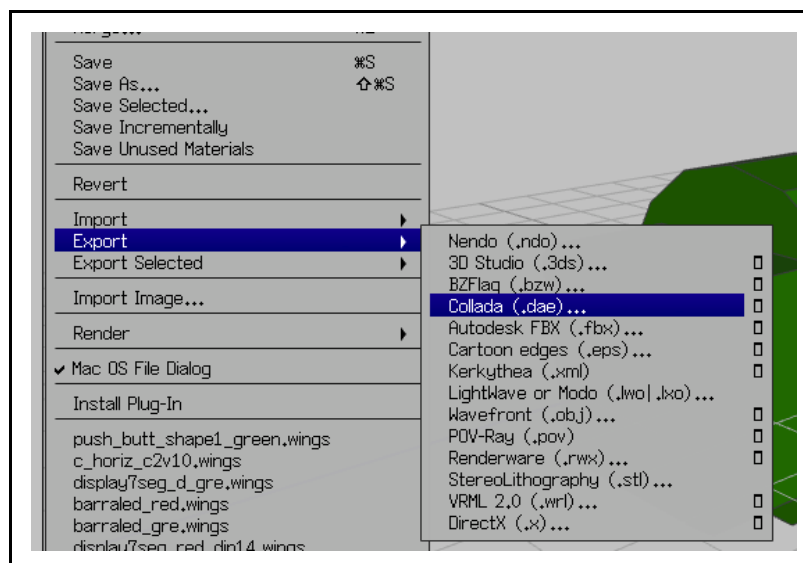Wings3D can be downloaded from www.wings3d.com.
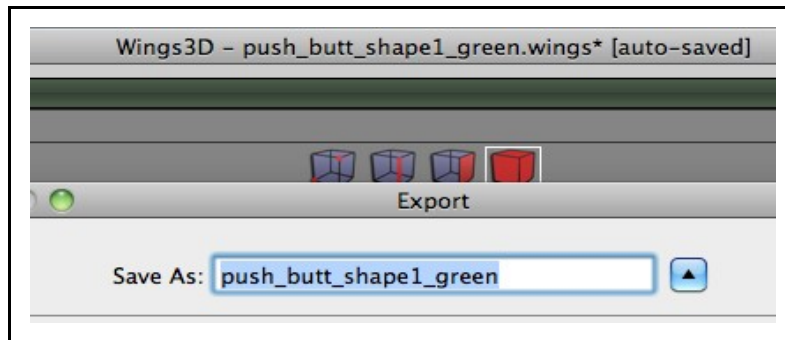Here below the steps for the conversion:

– Load a 3D shape from the folder *kicad/share/modules/packages3d/*. For my example I chose *push_butt_shape1_green.wings*, under discret folder. Once opened in Wings3D, the shape appear as follow:
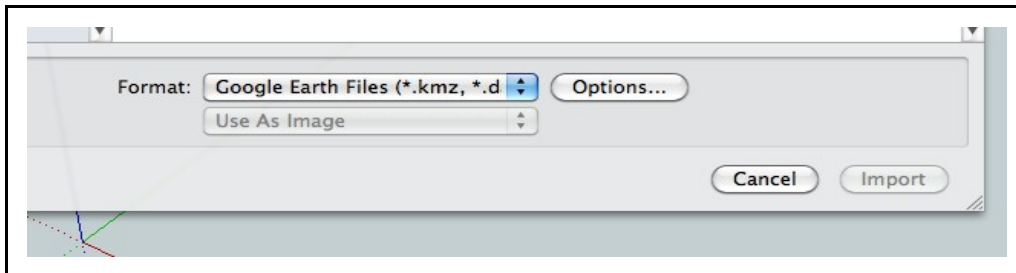

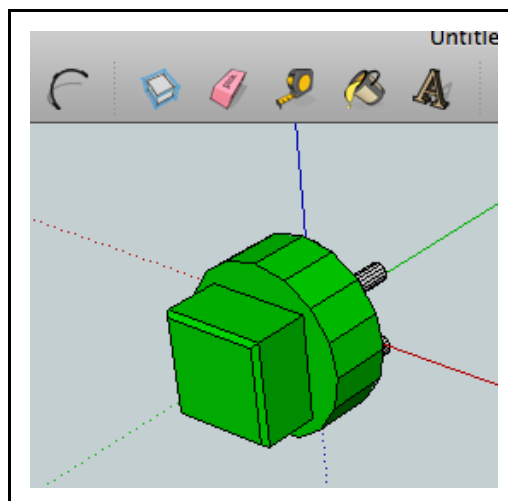– From the file menu, choose export->Collada.

– Save the file using the same name as the .wings one. A new file will be generated, called *push_butt_shape1_green.dae*.

– Import this file using Sketchup. From the menu File, choose import, and select *push_butt_shape1_green.dae* using the format Google Earth File.

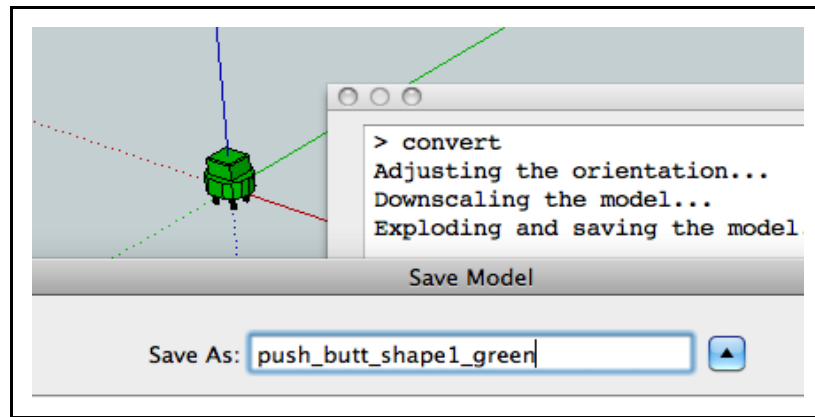Our model will be imported in Sketchup but is not ready to use it yet.

We need to adjust the orientation and the scale.
To do this, the ruby script kicad_convert.rb contains some useful functions.
Type "convert" from the Ruby console, and the script will do the following steps:

- adjust the orientation
- adjust the scale
- explode the model
- open the save dialog

Save the model using the same name of the imported file, than place the .skp file in the folder Kicad, under Components folder of the Sketchup installation path.

Known issues and limitations

- Actually the plugin doesn't perform any action described by the following lines of the .brd file format, so some 3D shapes, especially for discreet components (resistors, capacitors...), could appear in a wrong dimension or position.

$SHAPE3D	Start description
Na "device/bornier_6.wrl"	*FileName* (default path is kicad/modules/packages3d/)
Sc 1.000000 1.000000 1.000000	X Y Z *scale factor*
Of 0.000000 0.000000 0.000000	X Y Z *offset* (move vector, in 3D units (0.1 inch))
Ro 0.000000 0.000000 0.000000	X Y Z *rotation* (in degree)
$EndSHAPE3D	End description

- Some "arc" elements of the component drawings could be incorrect.
- If PCB text is too small, text representation under Sketchup could be ugly.
- Kicad pads of "HOLE" and "MECA" type are not drawn. This is due to my bare acknowledge of the usage of these pads.
- The script could fail with some old .brd files, as their format have been changed through the several stable releases of kicad (at least, this is what I noticed).
- Whole script code needs optimizations
- When **Components Dialog** is opened, Sketchup could hang for a lot of time. At the moment I don't know how to solve the problem. What I suggest is to open Sketchup with **Components Dialog** closed (better close **Components Dialog** and the restart Sketchup).

For further clarifications, suggestions, critics, and questions, you can contact me by email at giodi1973@yahoo.com or giodi1973@gmail.com .

Giovanni Di Trapani