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# Fast 3D model creation using FreeCAD

Anool Mahidharia

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[www.wyolum.com](http://www.wyolum.com)



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## Fast 3D model creation using FreeCAD

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# WYOLUM EMERGENTS

<https://wyolum.com>

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# FreeCAD

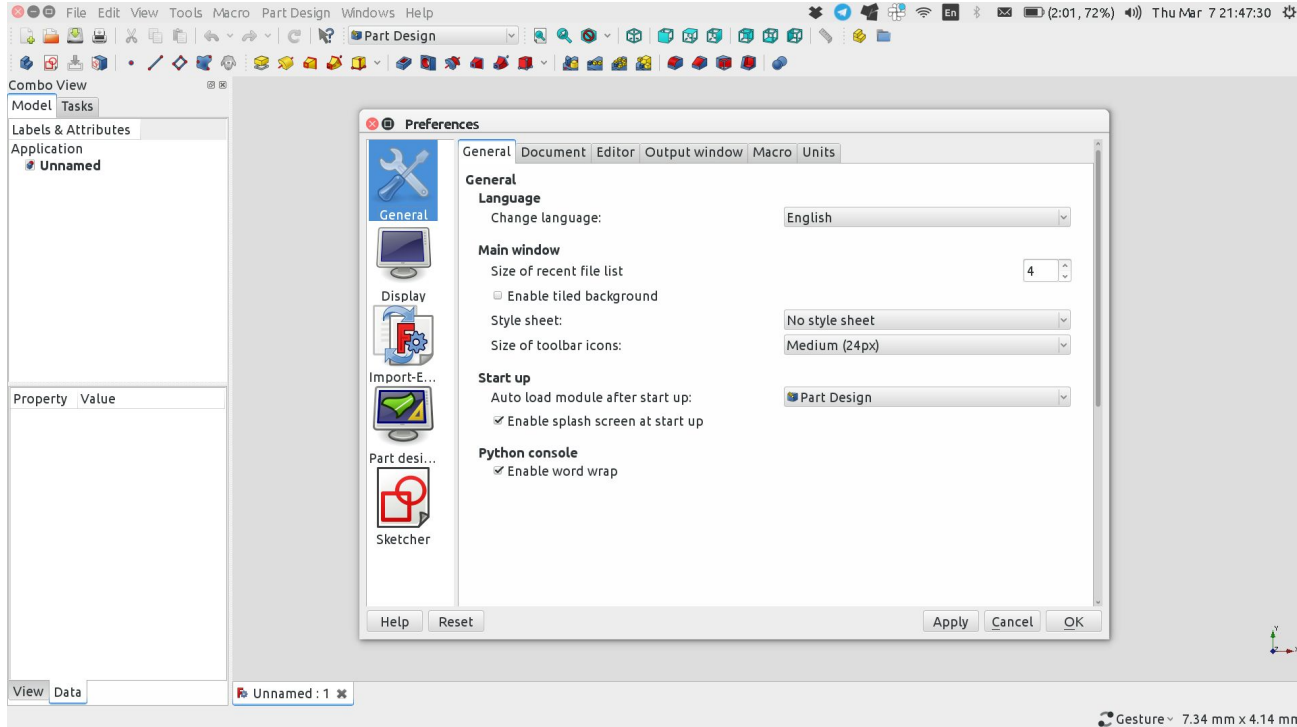
<https://www.freecadweb.org>

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- Open-source parametric 3D modeler
  - Easily modify design by changing its parameters
  - Sketch geometry constrained 2D shapes and use them as a base to build other objects.
  - Multiplatform (Windows, Mac, Linux), highly customizable and extensible
  - Reads and writes to many open file formats such as STEP, IGES, STL, SVG, DXF, OBJ, IFC, DAE
  - Finite Element Analysis (FEA) tools, experimental CFD, BIM, Geodata, Path (CNC), robot simulation and more
  - FreeCAD really is a Swiss Army knife of general-purpose engineering toolkits
-

# Preferences / Views / Navigation

initial startup actions + add workbenches



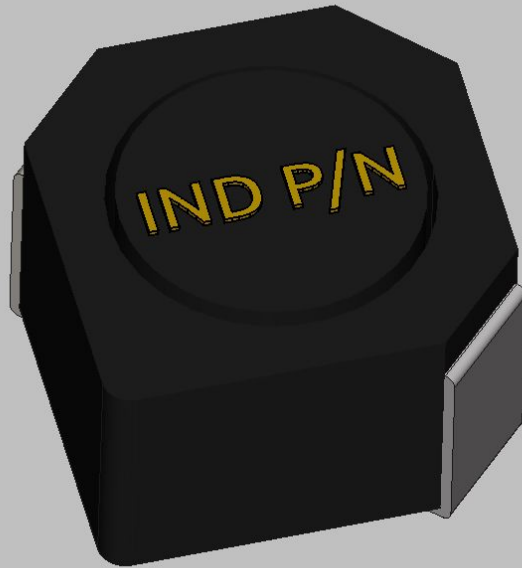
CADquery

KiCad  
StepUp  
Tools

# PART workbench

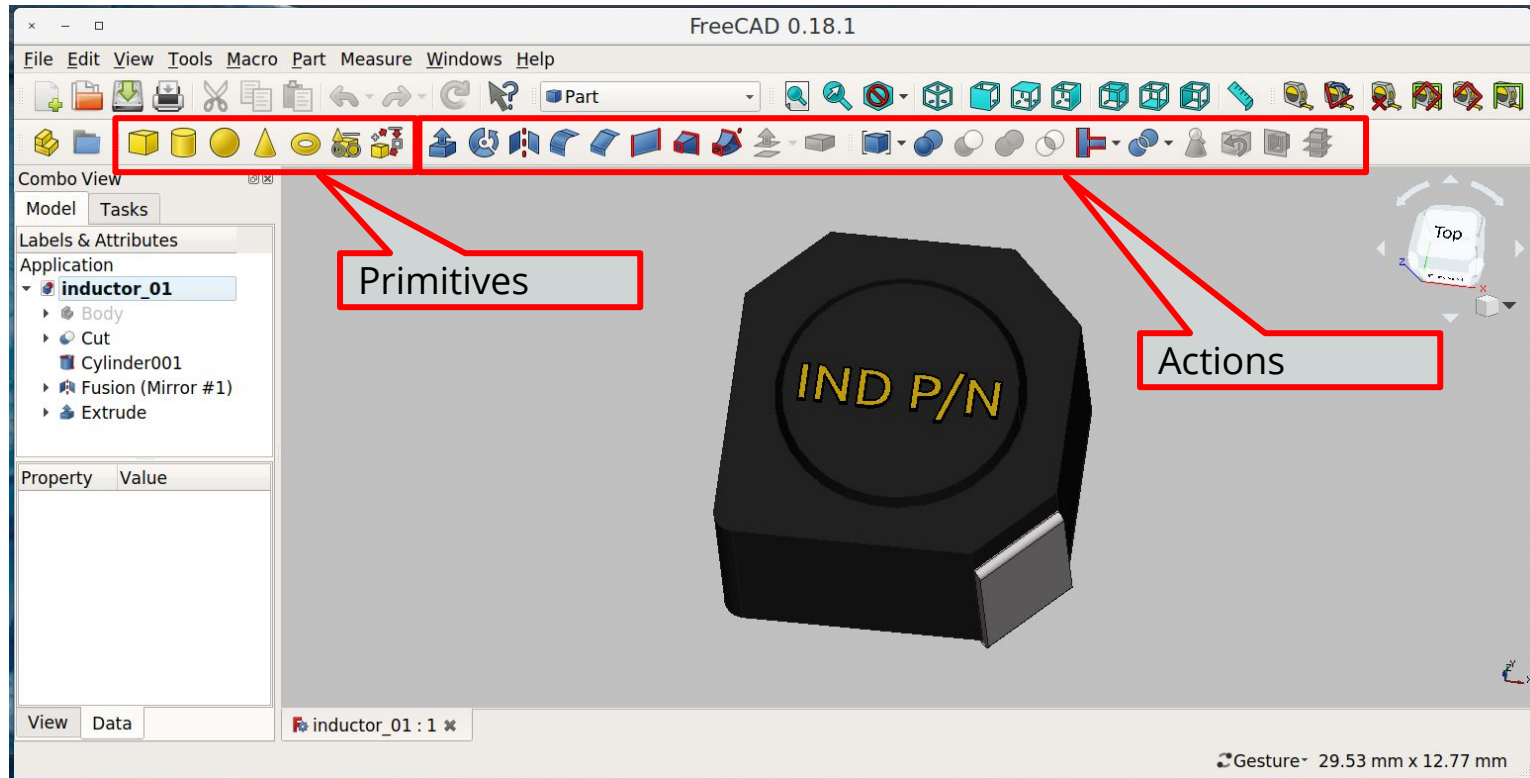
Using primitives

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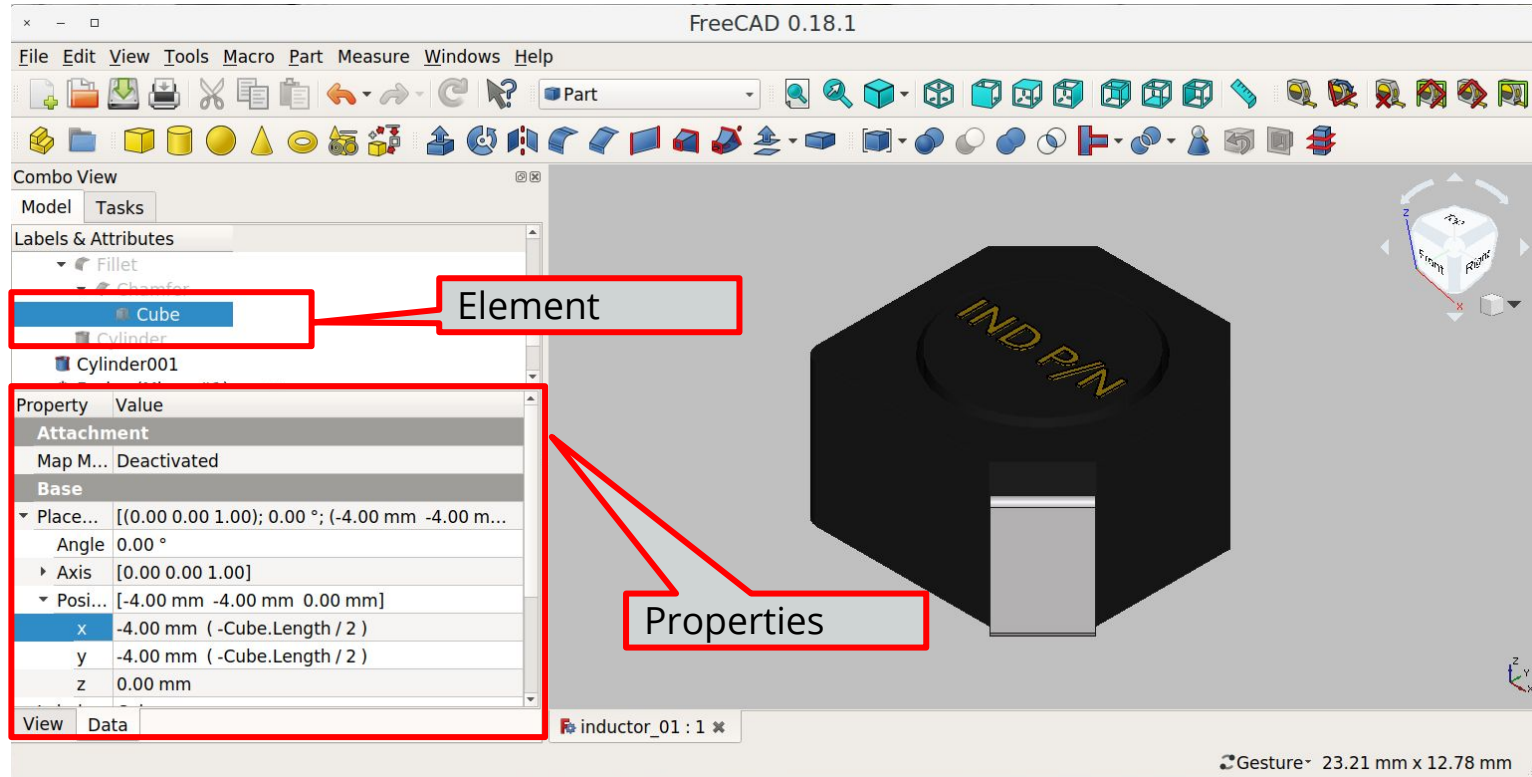
# PART workbench

## Using primitives



# PART workbench

## Using primitives

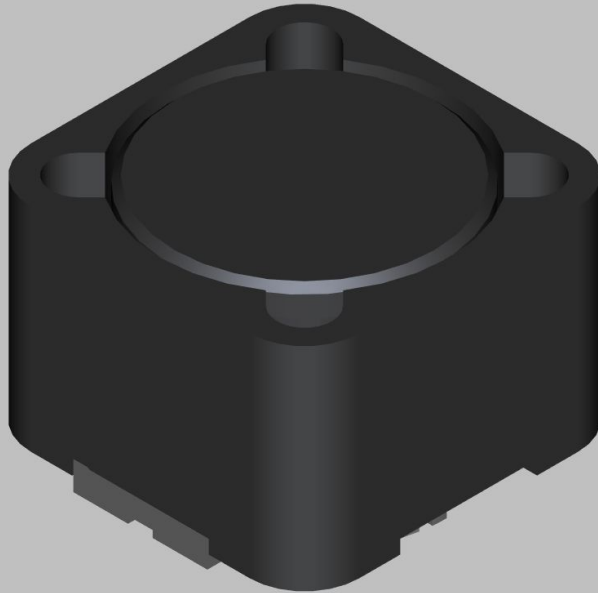




# PART DESIGN workbench

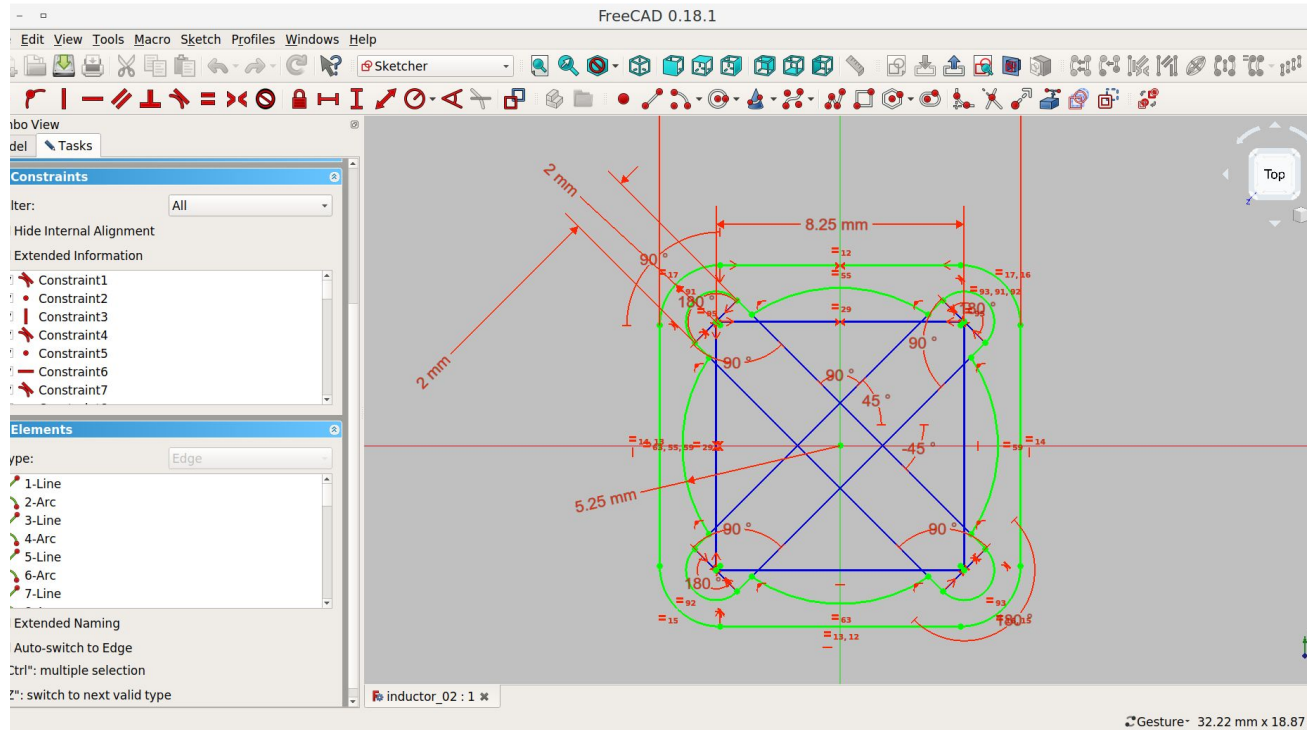
Sketches, Constraints, Extrude, Revolve, Pocket

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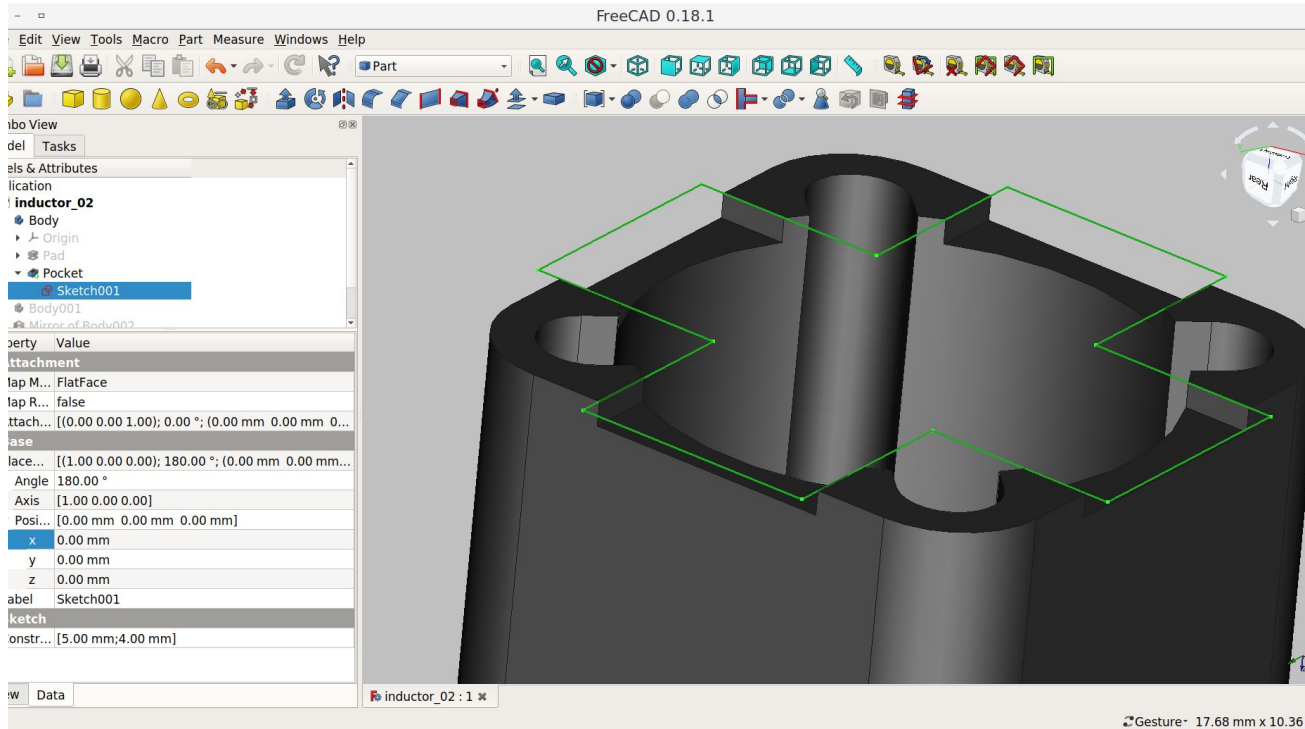
# PART DESIGN workbench

## Sketches, Constraints, Extrude, Revolve, Pocket



# PART DESIGN workbench

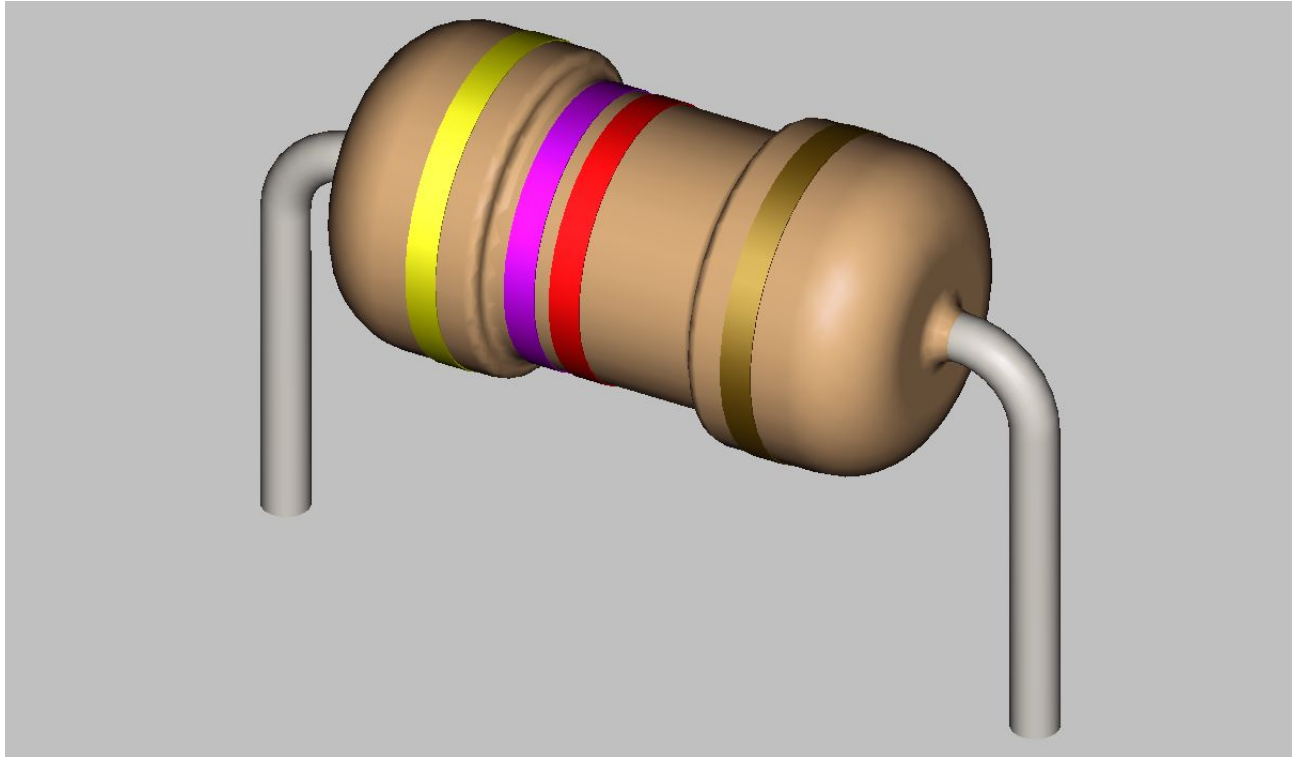
## Sketches, Constraints, Extrude, Revolve, Pocket



# PART DESIGN workbench..

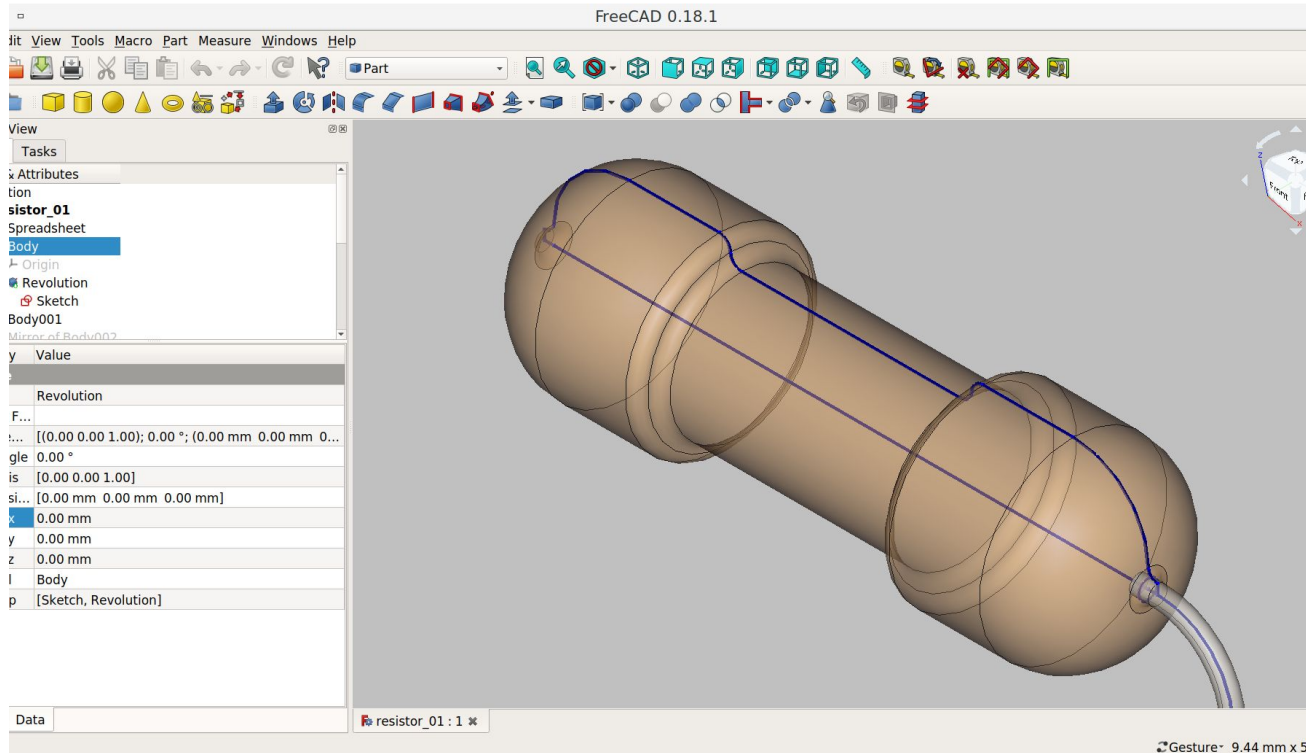
Revolve, Sweep, Mirror

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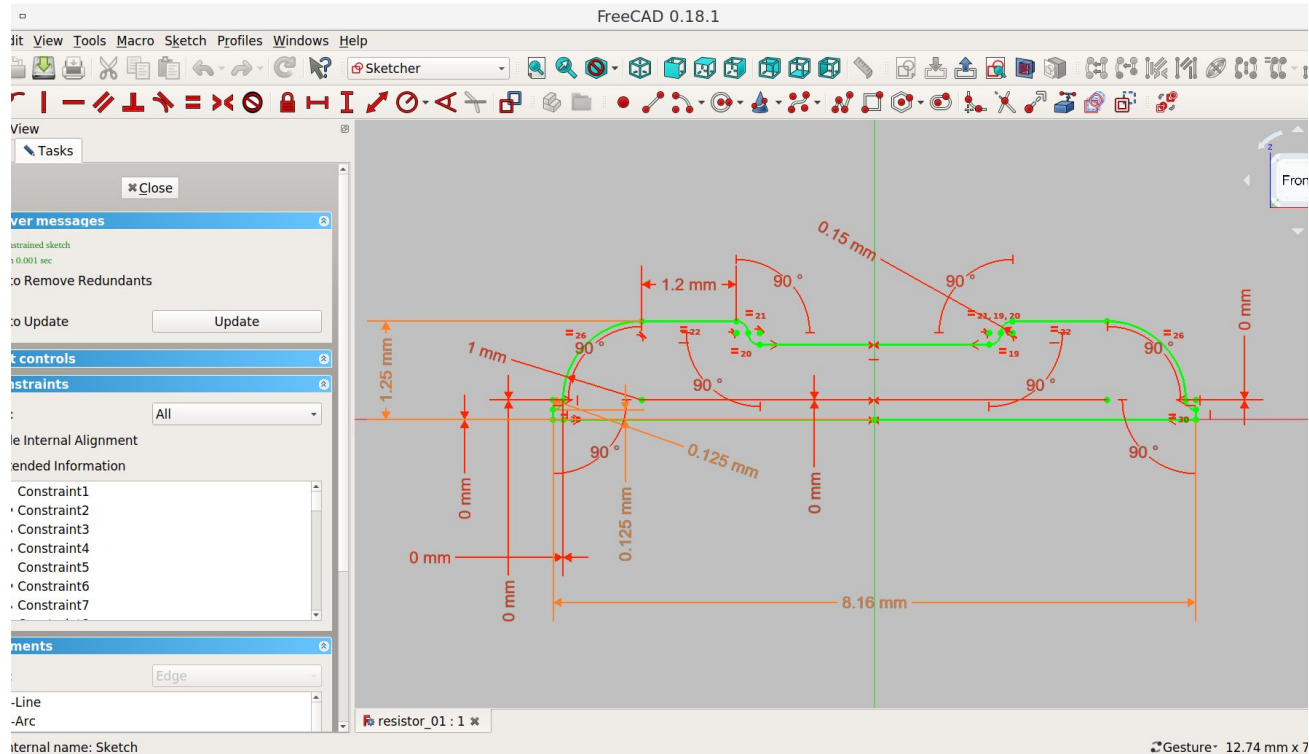
# PART DESIGN workbench..

## Revolve, Sweep, Mirror



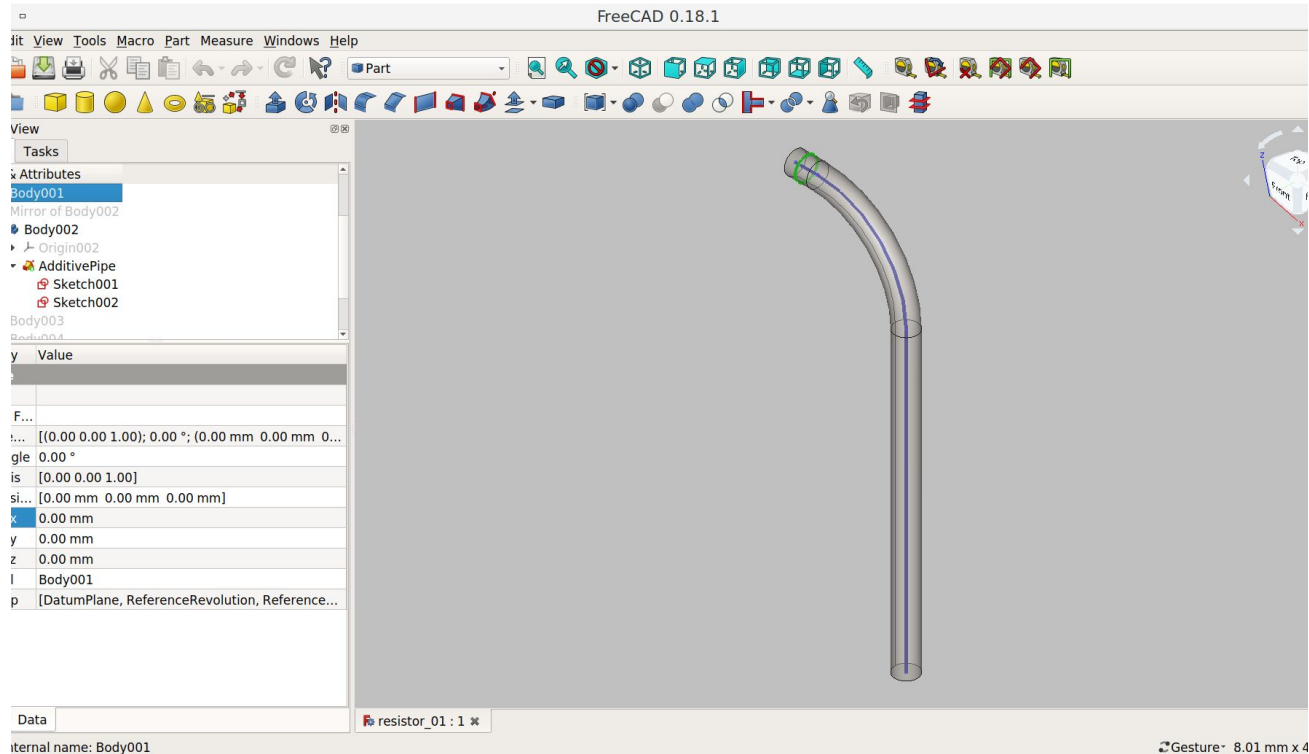
# PART DESIGN workbench..

## Revolve, Sweep, Mirror



# PART DESIGN workbench..

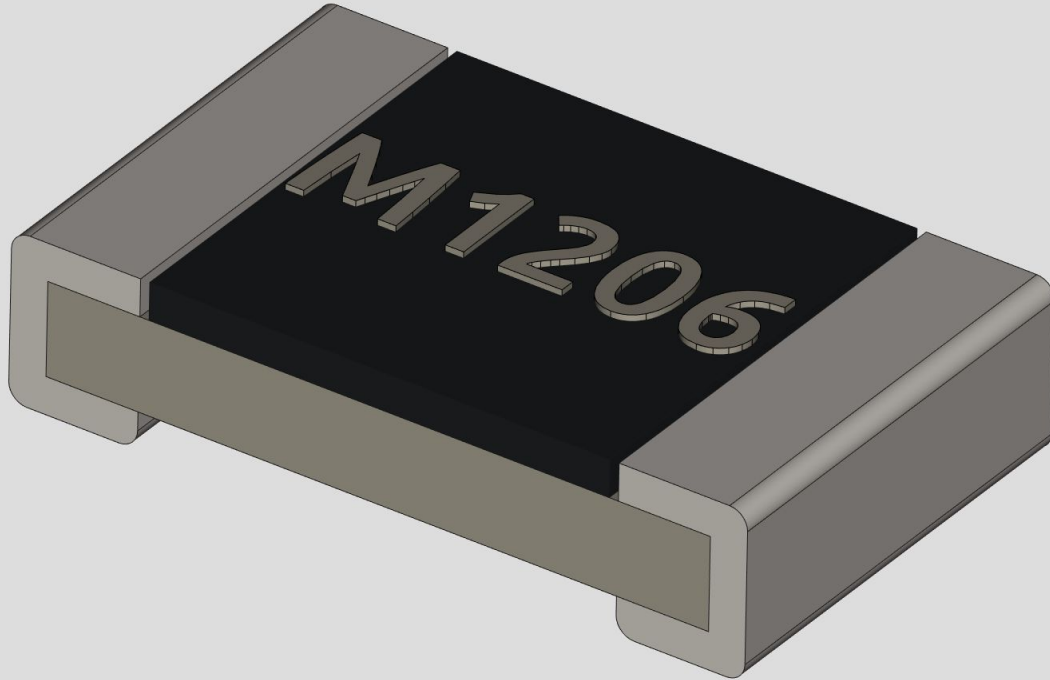
## Revolve, Sweep, Mirror



# SPREADSHEET workbench

Parametric design

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# SPREADSHEET workbench

## Parametric design

FreeCAD 0.18.1

File Edit View Tools Macro Part Design Windows Help

Part Design

3D View

Model Tasks

Labels & Attributes

- smt\_chip\_parametric
  - Body
  - Spreadsheet
  - Body001
  - left\_pad
  - right\_pad
  - Text\_Extrude
  - BlackTop

Property Value

Property	Value
Base	
Label	Spreadsheet
font_h...	0.30 mm
height	0.45 mm
length	2.00 mm
metal...	0.35 mm
metal...	0.10 mm
width	1.20 mm

Contents

	A	B	C	D	E	F	G	H	I	J	K	L	M	N
1				M0201	M0402	M0603	M0805	M1206	M1210	M1218	M2010	M2512		
2		Length	2.00 mm	0.60 mm	1.00 mm	1.55 mm	2.00 mm	3.20 mm	3.20 mm	3.20 mm	5.00 mm	6.30 mm		
3		Width	1.20 mm	0.30 mm	0.50 mm	0.85 mm	1.20 mm	1.60 mm	2.50 mm	4.60 mm	2.50 mm	3.20 mm		
4		Height	0.45 mm	0.25 mm	0.35 mm	0.45 mm	0.45 mm	0.55 mm	0.55 mm	0.55 mm	0.60 mm	0.60 mm		
5		Metal Length	0.35 mm	0.15 mm	0.25 mm	0.30 mm	0.35 mm	0.35 mm	0.45 mm	0.45 mm	0.45 mm	0.80 mm		
6		Metal Thickness	0.10 mm	0.10 mm	0.10 mm	0.10 mm	0.10 mm	0.10 mm	0.10 mm	0.10 mm	0.10 mm			
7		Font Height	0.30 mm	0.06 mm	0.15 mm	0.20 mm	0.30 mm	0.50 mm	0.50 mm	0.50 mm	1.00 mm			
8														
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View Data

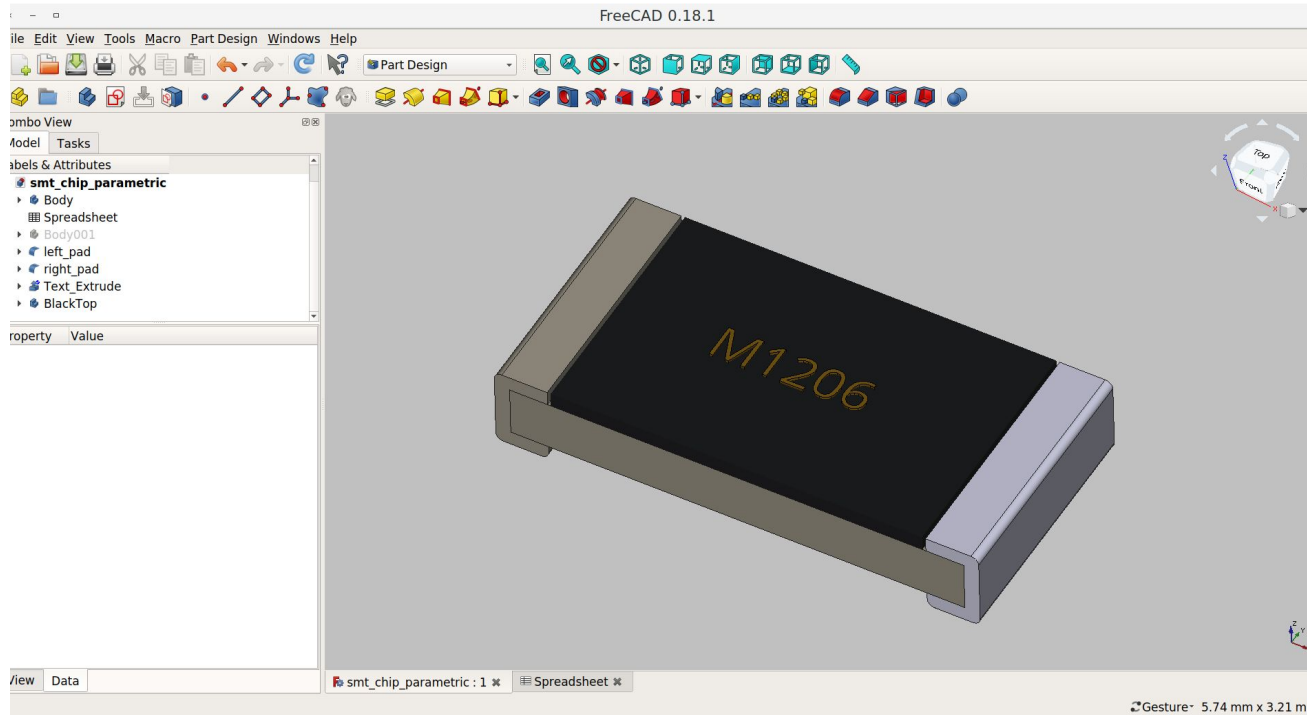
smt\_chip\_parametric : 1 Spreadsheet

alid, Internal name: Body002

Gesture 4.80 mm x 2.38 mm

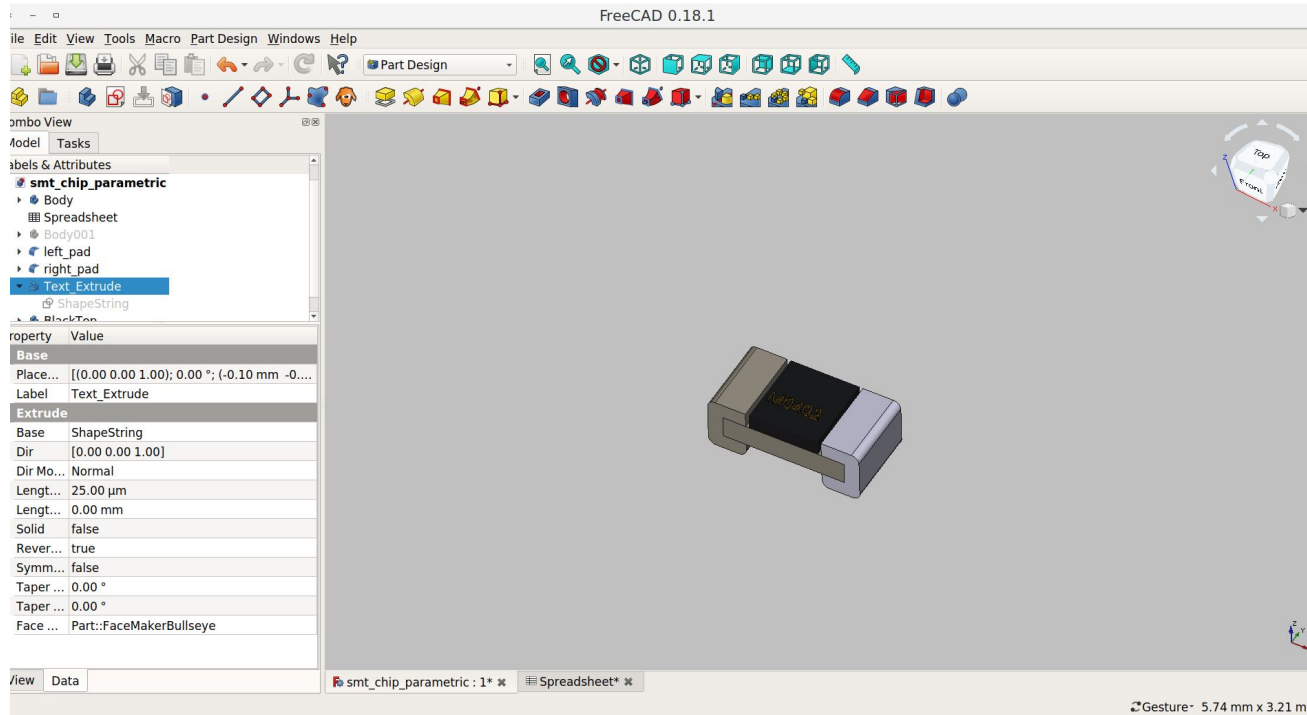
# SPREADSHEET workbench

## Parametric design



# SPREADSHEET workbench

## Parametric design

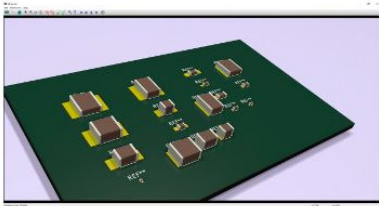


# CADquery workbench

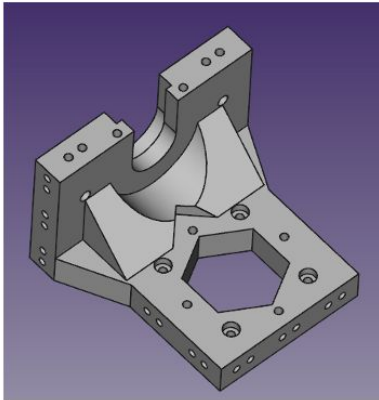
## Programmatic parametric design

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KiCad uses cadquery to build high quality models of electronic components. (<https://github.com/KiCad/packages3D>)



This Prusa i3 extruder support uses cadquery to build the model (<https://github.com/adam-urbanczyk/cadquery-models>):



<https://github.com/dcowden/cadquery>

# LINKS

## For reference

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- [Official KiCad 3D model libraries for rendering and MCAD integration](#)
  - [KiCad 3d models using CADquery in FreeCAD by easyw](#)
  - [A module-workbench combo that adds a CadQuery editor to FreeCAD](#)
  - FreeCAD - [library of Parts](#)
  - Video - [Getting started with CADquery scripting](#)
-

# KiCad Best Practises

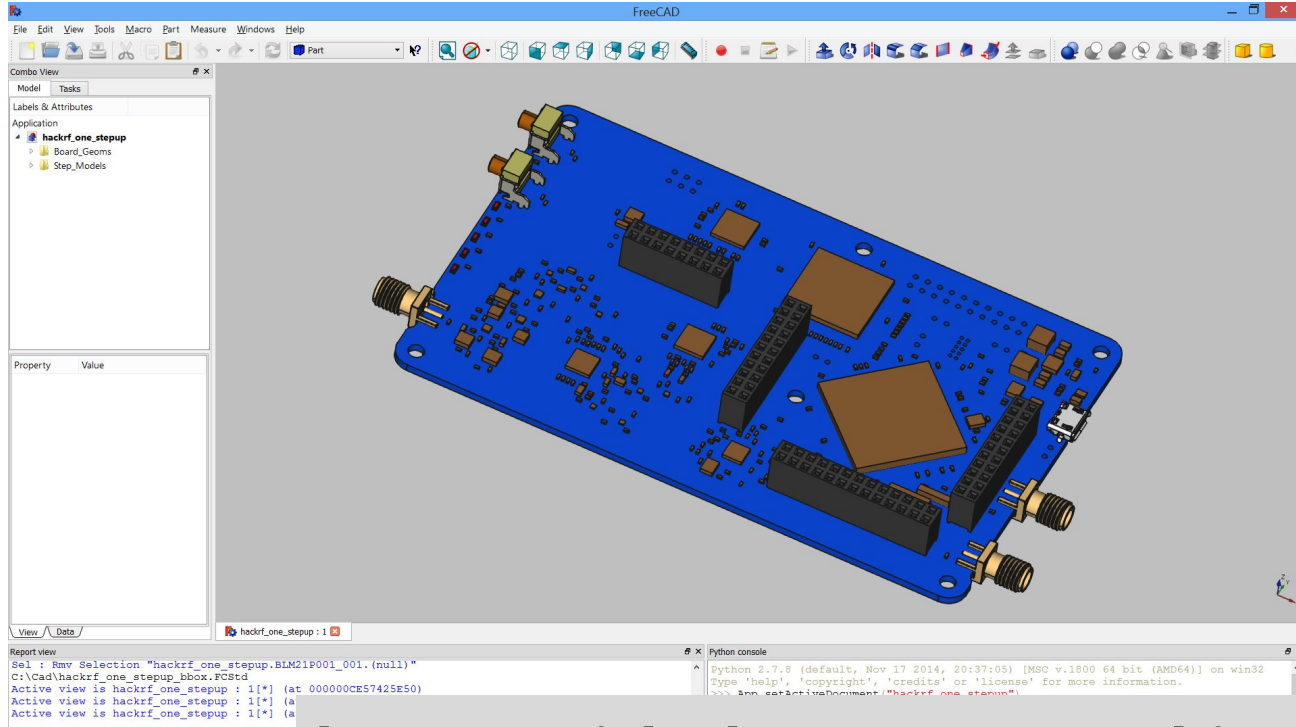
Ambient, Diffuse, Specular, Shininess

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- Preferred method to create 3D models
  - VRML Materials Docs
    - KiCad 3D-Viewer component-materials-reference-list MarioLuzeiro
    - KiCad 3D-Viewer Illumination model and materials-MarioLuzeiro
-

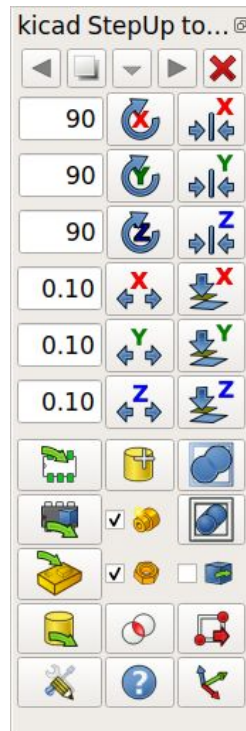
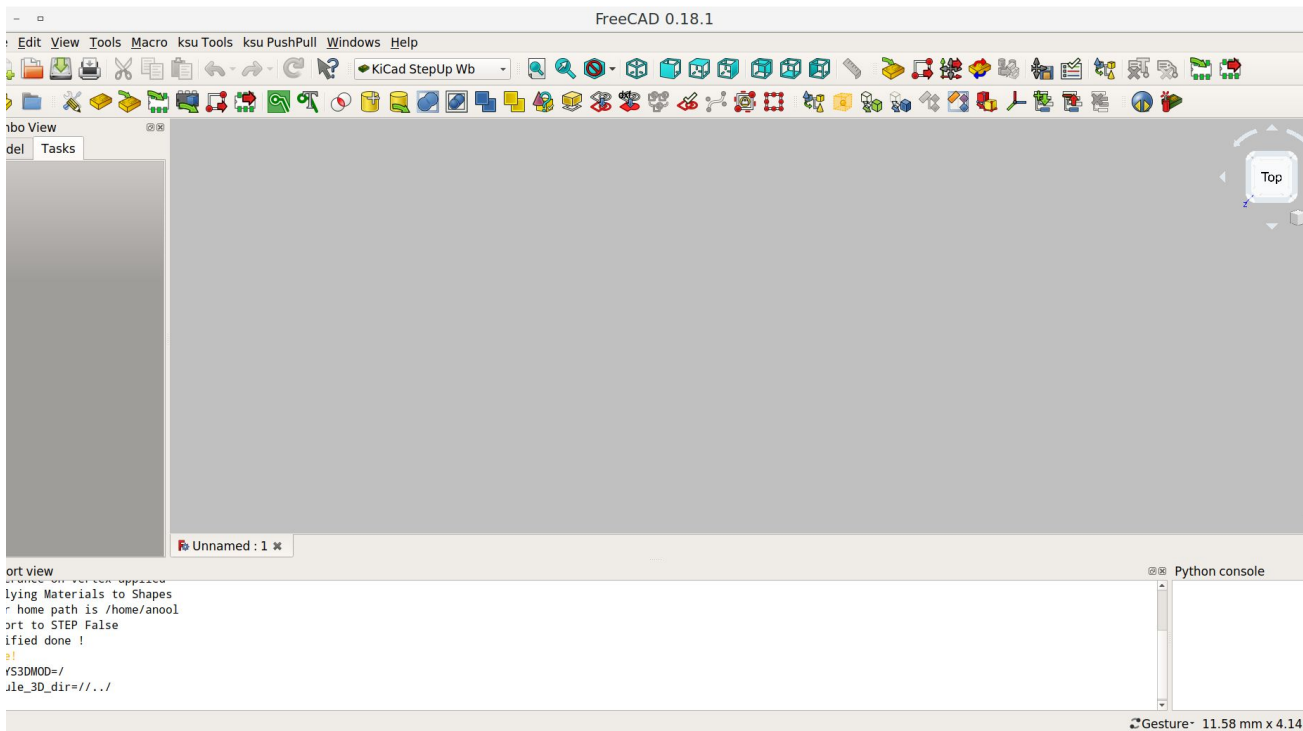
# KiCad StepUp Tools workbench

easyw / Maurice / maui



<https://github.com/easyw/kicadStepUpMod>

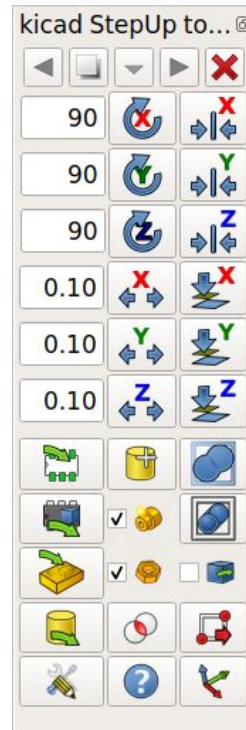
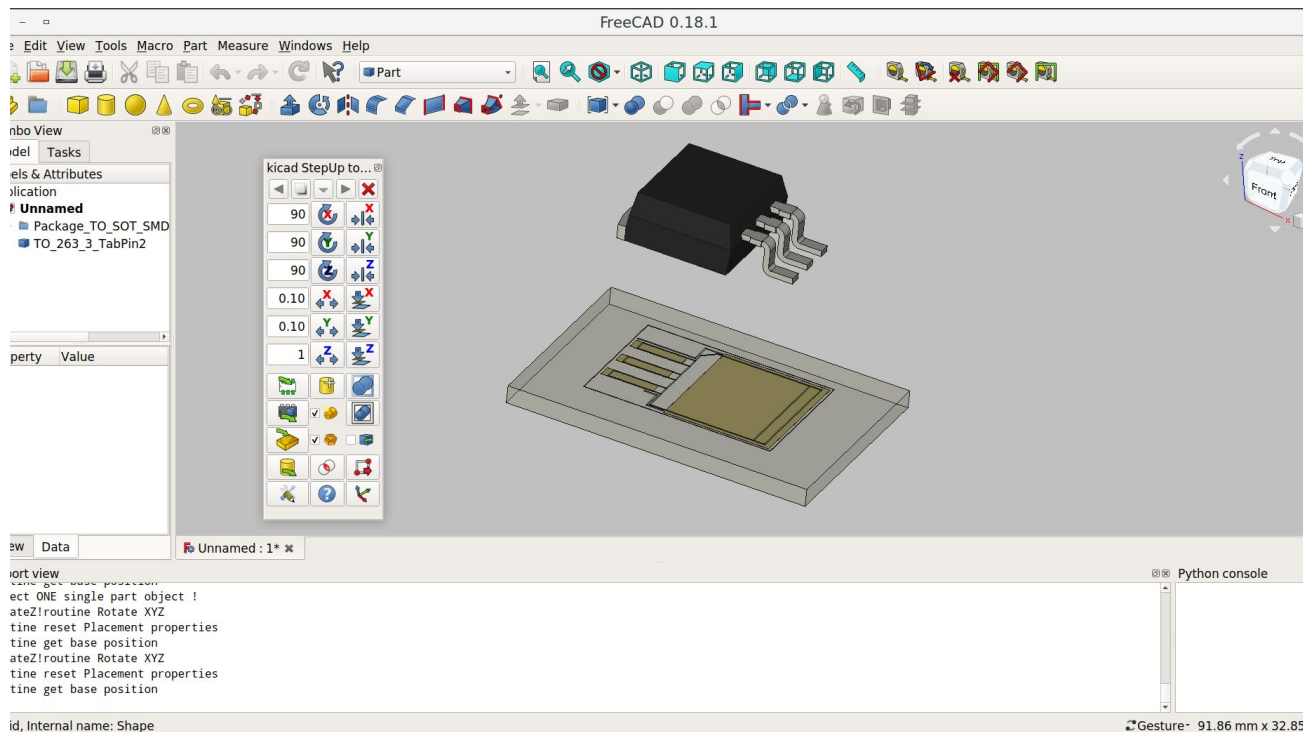
easyw / Maurice / maui





# KiCad StepUp Tools workbench

easyw / Maurice / maui



# KiCad StepUp Tools workbench

easyw / Maurice / maui

ECAD / MCAD Collaboration and Synchronization:



<https://www.youtube.com/watch?v=6R6UEUScigA>

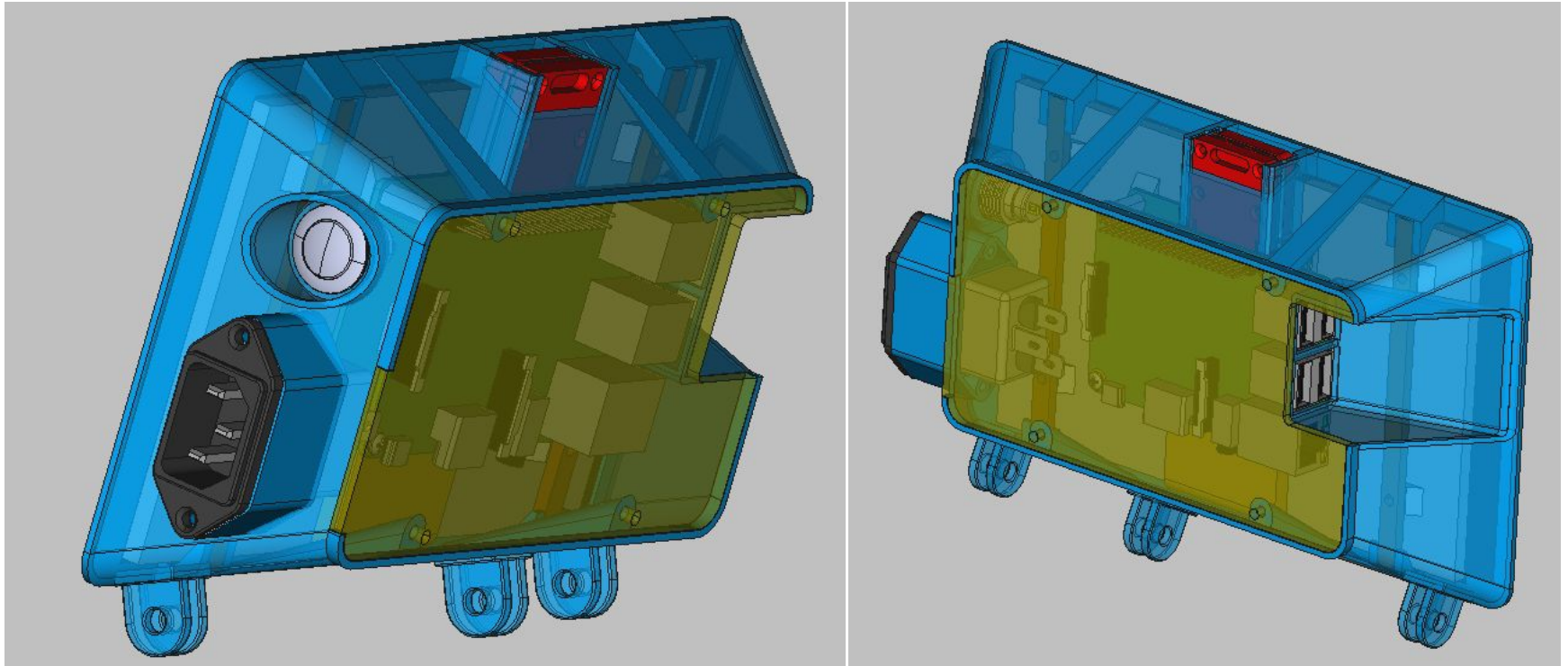


[kicad StepUp: a Seamless ECAD MCAD Synchronization](#)

# Enclosure Design

Import STEP and VRML from KiCad

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# Thanks..

## Anool Mahidharia

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Link to this Slide deck

[http://bit.ly/anool\\_kicon](http://bit.ly/anool_kicon)

Git Repo containing the Model files from this deck

<https://github.com/Anool/kicon2019>



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@anool

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[www.makersasylum.com](http://www.makersasylum.com)

[www.hackaday.com/author/anool](http://www.hackaday.com/author/anool)

