



Universal Screw Knob Maker (OpenSCAD)



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Summary

Create a custom knob, of any size, with any style grip, for any size screw, with any style head, and any style nut.

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Tags: [parametric](#) [knob](#) [customizable](#) [openscad](#) [knurled](#)
[threadedinsert](#) [hexnut](#) [countersunk](#) [knurledknob](#) [squarenut](#)
[socketcap](#) [screwknob](#) [hexheadscrew](#) [lobeknob](#) [ribbedknob](#)

Design

I found many knob designs, but none that were very flexible. I looked at the comments and suggestions of several of them and decided to create a customizable design that should satisfy just about everybody.

Using the Customizer

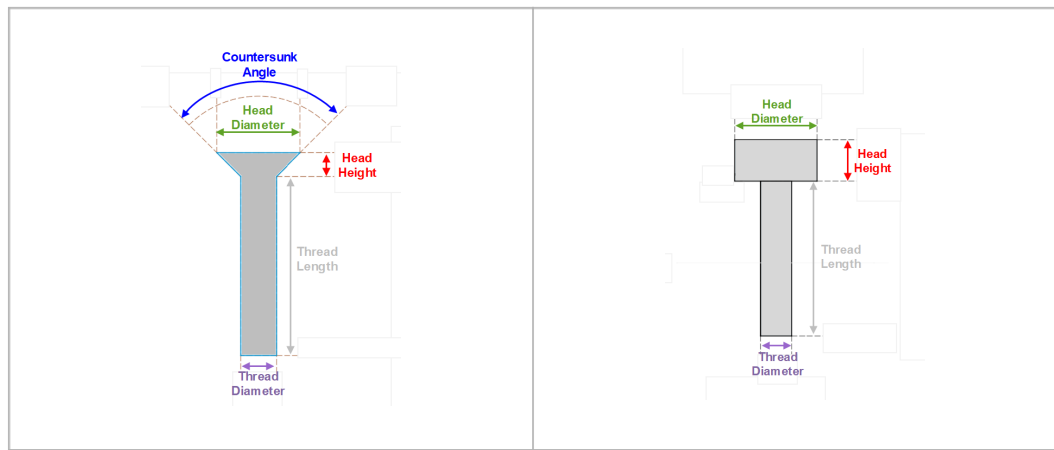
The settings in the Customizer may seem somewhat overwhelming at first, so here is an explanation:

Screw/Bolt Thread Details

- **Thread Diameter**
 - The measured diameter of the threads.
- **Thread Clearance**
 - The total space you want around the threads on all sides.
- **Thread Length**
 - This is only for your visual reference. The length from the head to the end.

Head Details

- **Head Style**
 - Round (Socket Cap, Pan, Round, etc.)
 - Countersunk
 - Hex
- **Head Diameter**
 - The measured diameter of the (round) head.
 - For hex, it is from point to point - not from flat to flat.
- **Head Hex Across Flats**
 - If you don't know or can't easily measure the distance from point to point, you may enter the easily measured distance from flat to flat and the program will calculate the diameter.
 - If you enter a value here, and the style is Hex, the Head Diameter will be calculated with it.
 - If you leave this at zero, the Head Diameter will be what you entered.
- **Head Clearance**
 - The total space you want around the head on all sides.
- **Head Height**
 - The height of the space you want for the head.
 - Note: If you set this to an amount less than the actual measurement, the head will stick up above the knob. You may enter zero for a round or hex head to be completely exposed above the knob.
- **Countersunk Angle**
 - If the style is Countersunk, the program will calculate the Head Height using this angle.
 - These are the most common countersink angles: 60°, 82°, 90°, 100°, 110°, or 120°.
 - Metric mostly uses 90°. Imperial mostly uses 82°.



Nut Details

- **Nut Style**
 - Hex
 - Square
 - Round (for threaded inserts).
- **Nut Diameter**
 - This is the measured diameter from point to point - **not** from flat to flat.
- **Nut Hex Across Flats**
 - If you don't know or can't easily measure the distance from point to point, you may enter the easily measured distance from flat to flat and the program will calculate the diameter.
 - If you enter a value here, and the style is Hex, the Nut Diameter will be calculated with it.
 - If you leave this at zero, the Nut Diameter will be what you entered.
- **Nut Square Across Flats**
 - If you don't know or can't easily measure the distance from point to point, you may enter the easily measured distance from flat to flat and the program will calculate the diameter.
 - If you enter a value here, and the style is Square, the Nut Diameter will be calculated with it.
 - If you leave this at zero, the Nut Diameter will be what you entered.
- **Nut Clearance**
 - The total space you want around the nut on all sides.
- **Nut Height**
 - The height of the space you want for the nut.

Knob Settings

- **Knob Diameter**
 - The total outside diameter you want for the knob.

- **Knob Height**
 - The height of the knob is not a parameter you can set directly. It is an internally calculated value that is the sum of Head Recess, Head Height, Shaft Height, Nut Height, and Nut Recess (but excludes Extension Height).
- **Shaft Height**
 - The height of the space inside the knob between the screw head and nut.
- **Head Recess**
 - Optional extra amount to recess the head of the screw.
- **Nut Recess**
 - Optional extra amount to recess the nut.
- **Extension Height**
 - Optional extra space under the knob to separate it from the object surface.
- **Extension Thickness**
 - The thickness of the wall of the extension.
- **Edge Chamfer**
 - The amount of the 45° angle chamfer you want on exposed edges.
- **Grip Style**
 - The style for the edge of the knob to use for a grip.
 - Three styles are available to choose from: (each has its own settings)
 - Knurl - a crisscross pattern cut with a triangular cutter.
 - Lobe - a straight repeating pattern cut with a cylindrical cutter.
 - T Handle - a rectangular handle centered on the screw.

Knurl Settings

- **Knurl Count**
 - The number of triangular shaped cuts to make around the knob edge.
- **Knurl Angle**
 - The angle of the cuts.
- **Notes**
 - The result varies also with the Knob Diameter and Knob Height.
 - The Edge Chamfer is used in the depth of the cut.
 - Experiment for different patterns.
 - A zero angle will make vertical cuts. Use to make a Ribbed pattern.

Lobe Settings

- **Lobe Depth Diameter**

- This diameter is where the lobe peaks come to. A typical pattern would make this diameter value slightly less than the Knob Diameter (perhaps Edge Chamfer).

- **Lobe Diameter**

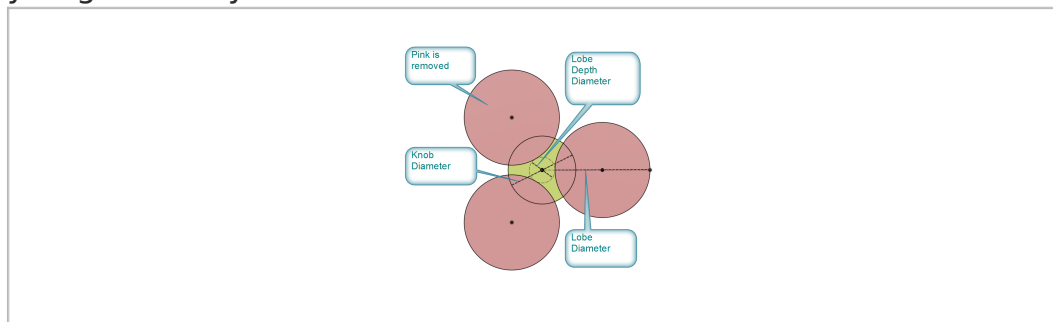
- The diameter of each individual lobe to cut.

- **Lobe Count**

- The number of lobe cylinders to remove.
- A large amount could make a ribbed pattern.
- Use smaller Lobe Count with larger Lobe Diameter (for example: to make 3 or 4).

- **Note**

- You can make several patterns; including: Star, Fluted, Prong.
- Don't be alarmed by the bizarre patterns you can create as some look like a bug in the program. Just keep moving the sliders until you get what you want.



T Handle Settings

- **T Handle Length**

- The total length of the handle (including both arms).

- **T Handle Width**

- The width of the handle arms.

- **Note**

- Knob Diameter is used for the central hub.

Display Options

These options are for display only. All except Show Color must be UNCHECKED for rendering - as what you see is what you will get for an STL.

- **Show Color**

- This is used to display the screw in a different color.

- **Show Cutaway**

- This hides a quarter of the knob so you can see the inside.

- **Show Screw**

- This displays the screw for you to visualize. {This is the only place Thread Length is used.}

- **Show Nut**

- This displays the nut for you to visualize.

Printing

Any material is OK. I used PLA @ .20, but other sizes should also work.

No support needed. {Since the knob is printed with the screw head side down, a screw head with a flat underside would cause an overhang. I tried printing with and without support - both made a mess that was tedious to clean up. So I removed the overhang by angling it up 45° (like countersunk). This cuts slightly into the Shaft Height section and theoretically allows the screw to go slightly deeper into the knob. In reality, it does not seem to be a problem.}

Other Sizes

All of the included STL files are for M3 screws as that seems to be the most commonly used in the 3D printing world.

I am including this chart of some other common sizes. The numbers are mostly from online sources. I have not tested any of them, so can't guarantee how good they will be. So, I recommend you get out your micrometer and measure what you plan to use.

Parameter	Metric	Metric	Metric	Inch (converted)	Inch (converted)
Screw Size	M3	M4	M5	#10	1/4"
Thread Diameter	3.0	4.0	5.0	4.8	6.35
Head Diameter	5.6	7.1	8.6	10.4	12.8
Hex Head Across Flats	5.5	7.0	8.0	9.5	11.1
Head Height	3.0	4.0	5.0	3.2	4.2

Nut Diameter	6.4	8.1	9.2	11.4	12.7
Nut Across Flats	5.5	7.0	8.0	9.5	11.1
Nut Height	2.5	3.2	4.0	3.3	5.6

Using OpenSCAD and the Customizer

If you are new to using OpenSCAD and changing parameters, I've included my tutorial that may help.

Please note that you do not need to know anything about programming. All you need to do is move some sliders on the screen.

Note: Use [OpenSCAD version 2021.01](#) for full Customizer compatibility.

Note about JSON file

I've included my settings so you can see examples. If you want to use it, here's the steps:

- The settings file is a ".json" file (as required by OpenSCAD).
- Prusa does not allow this type of file to be uploaded.
- I have added ".txt" to the end to make it a text file for upload.
- You need to rename it by deleting ".txt" from the end.
 - You need to show file name extensions.
 - You safely may ignore any warning about making the file unusable.
 - Place it in the same folder that you put the main .scad file.
 - The base part of the names must also be the same.
 - For example: "Universal Screw Knob Maker.scad" and "Universal Screw Knob Maker.json"

Model files



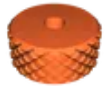
m3-3-lobe.stl



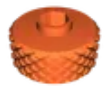
m3-4-lobe.stl



m3-countersunk-square-nut.stl



m3-insert-3x6x5.stl



m3-knurl.stl



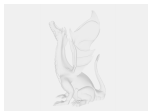
m3-ribbed.stl



m3-t-handle.stl

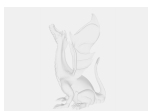


m3-tall.stl



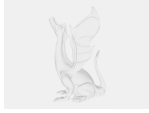
universal-screw-knob.scad

Other files



quick-start-guide-openscad.pdf

☐ optional tutorial, helpful if you are new to OpenSCAD



universal-screw-knobjson.txt

☐ rename to remove ".txt"

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