Make Geneva Wheels of Any Size in a Easier Way

by iGreeny

It's not so hard to find the formulas and diagrams if you want to design a Geneva wheel of your own, and you can do it following this article: Make Geneva wheels of any size and this video.

but I feel it's not very friendly to non-engineer readers - at least it took me quite a while to pull out the math and geometry I've learned back in high school. So i decided to translate the formulas into plain English and clearer steps. I also made 2 videos simply recording how I designed it in Fusion 360.

Variables you can decide freely (within a reasonable range)

- the quantity of the slots on the Geneva wheel;
- the radius of the drive pin;
- the Geneva wheel radius;
- drive pin clearance.

You and use any CAD software you feel comfortable with because we only need basic sketch functions for designing.

If you just want to make one without designing, goto the last step.

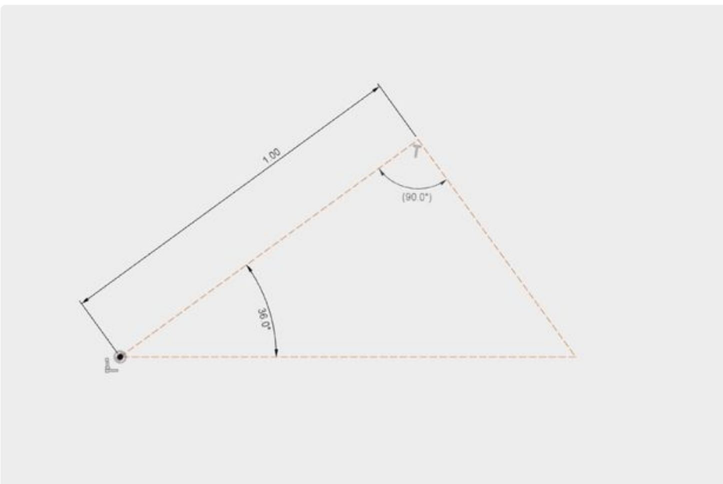
https://www.youtube.com/watch?v=OtfiVf5apn4&feature=youtu.be

Step 1: Start From a Triangle

A Geneva drive has 3 main components - Geneva wheel, drive wheel, and drive pin. The triangle is the linkage of the 3 parts.

I gonna design a Geneva wheel with the wheel diameter 1" and 5 slots.

You can always start with a right triangle with the right angle on the top.



the left angle =180º / the quantity of slots, for example, if I want to make 5 slots,

The angle = 180º/5 = 36º

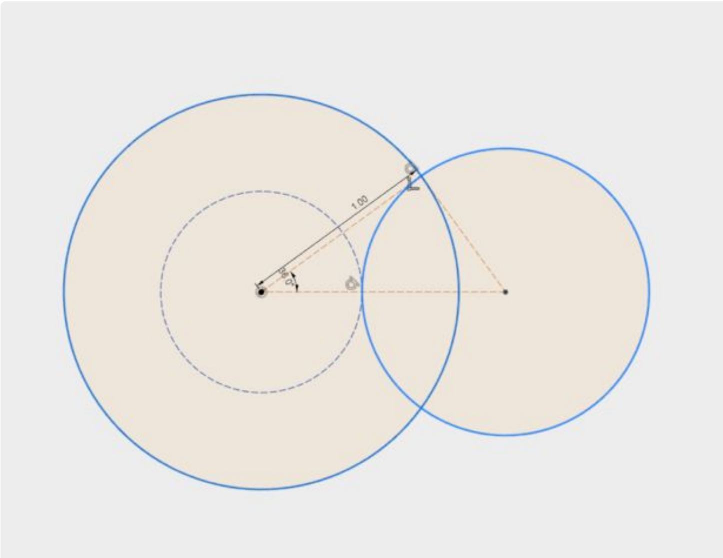
Don't worry, this is all the math we need in this design.

Step 2: Diameters of the Geneva Wheel and the Drive Wheel

On the right triangle, draw 2 circles centered at the 2 vertexes of sharp angles that tangent to both legs.

The circle centered at the 36º angle is the diameter of the Geneva wheel, and the other is the radius of the drive pin crank.

Draw another circle centered at the vertex of the 36º angle and tangent to the right circle. The tangent point is the maximum depth (how close to the center the slots need to be) of each slot.



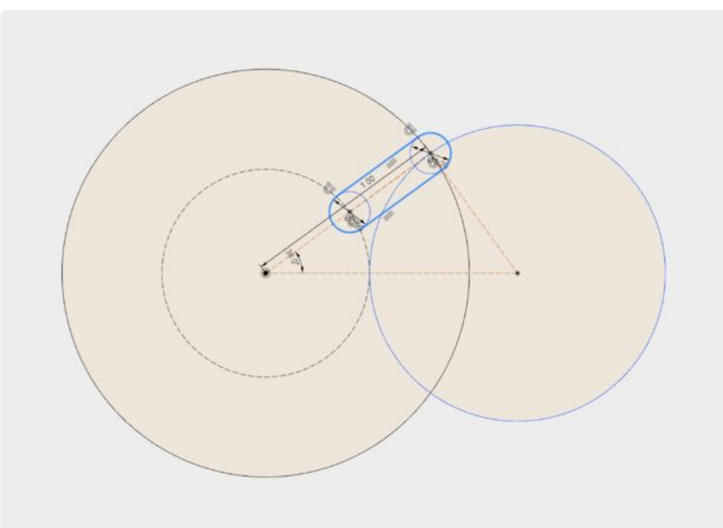
Step 3: Locate the Slots and Drive Pin

Decide the drive pin dimeter.

I use 3/16" (0.1875 in") wood dowel as the drive pin, so it's safe to use 0.2" in the slots design for some clearance.

Draw 2 circles centered at both Intersections of the left leg and the left 2 circles. The one closer to the center is the end of the slot, and the farther one is the where the drive pin should be.

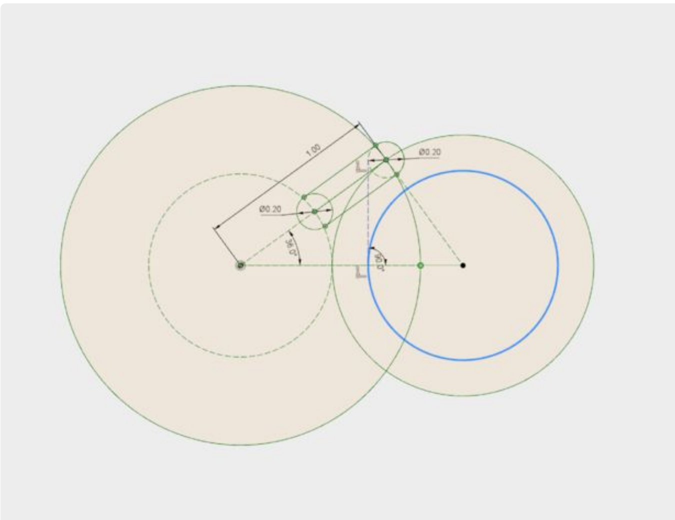
Draw a center to center slot.

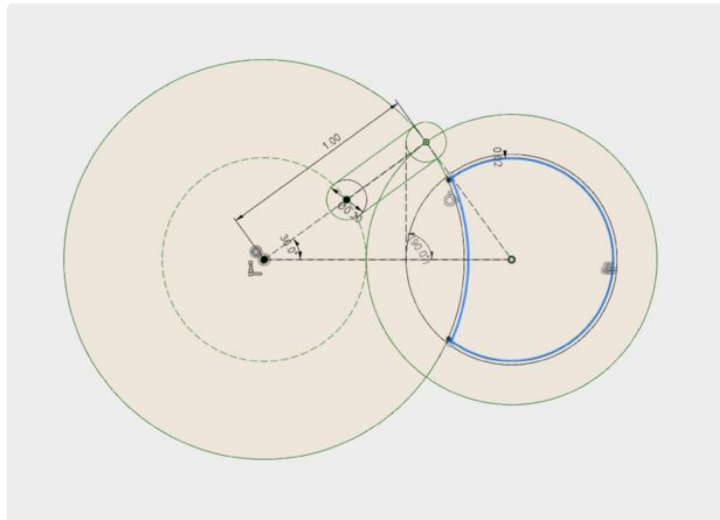


Step 4: The Drive Wheel

Draw a line tangent to the left side of drive pin and perpendicular to the linkage of the 2 big circles (the cathetus of the triangle,) then draw a circle centered at the right vertex and tangent to the line. This circle minus the intersection area with the Geneva wheel is the the drive wheel.

Use offset tool to make a little clearance to the drive wheel.

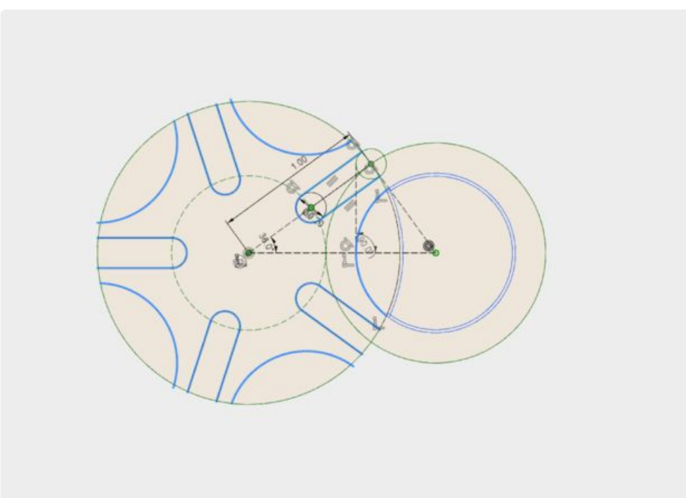


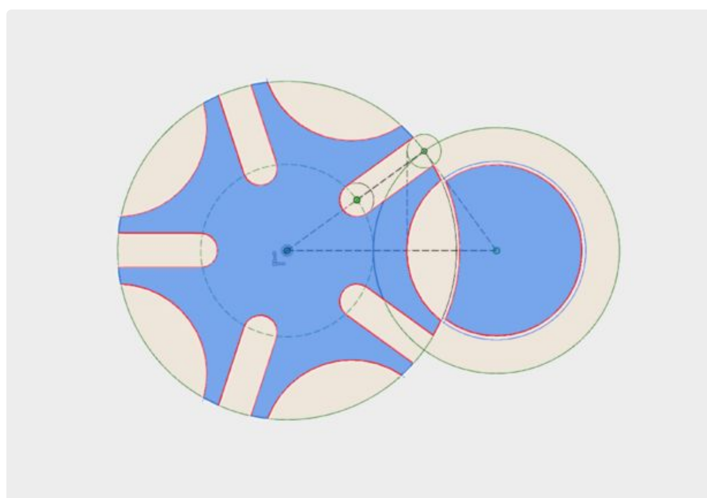


Step 5: Finish the Geneva Wheel

select the slot and the unwanted arc of the drive wheel, use circular pattern tool to copy 5 at the left vertex.

Till now all the tricky parts are done.

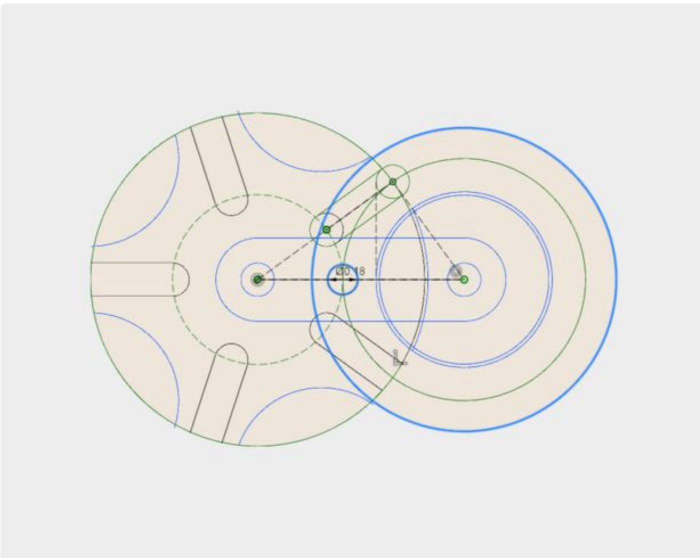


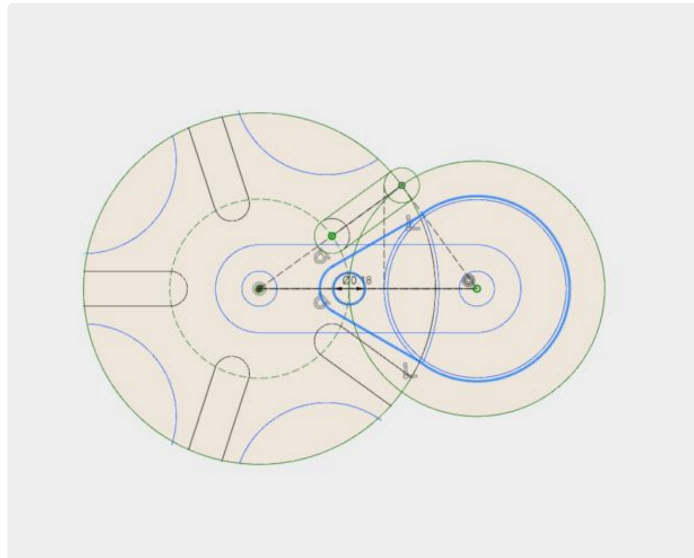


Step 6: Make the Drive Crank

On the interaction of drive pin radius and cathetus, draw another circle same diameter as the drive pin.

To connect the pin the the drive wheel, you can make a bigger wheel that concentric to the drive wheel, or simply connect them with a crank. Anyway the left end of the crank shouldn't be too close to the left vertex (unless you don't want to make it in the real world.)





Step 7: The Linkage

The linkage is used to connect the shafts of the 2 wheels.

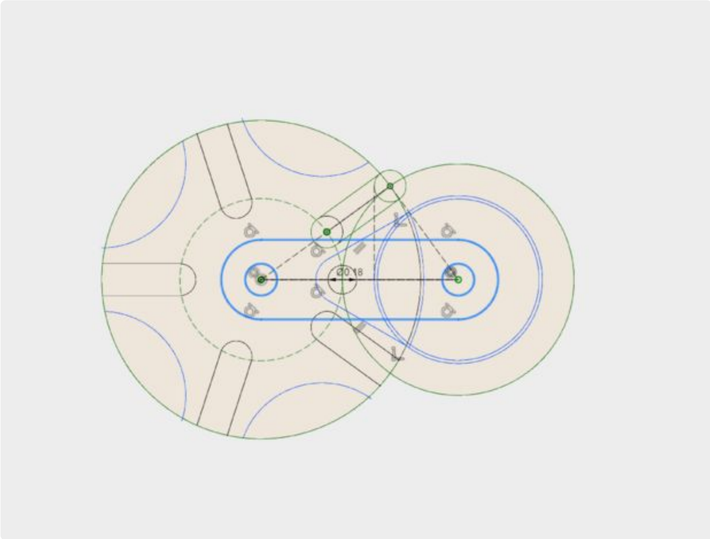
Before drawing the linkage, you need to decide what to use as the shaft. In this design I will use 3/16 as well.

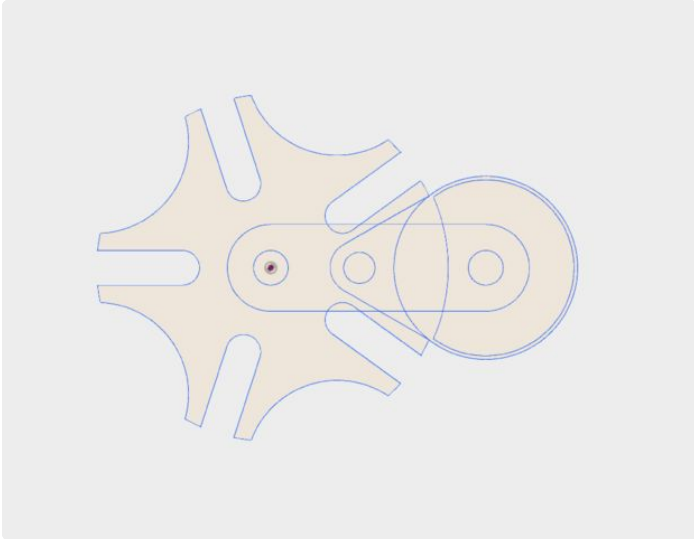
draw 2 circles at both center, this time the circles should be slightly smaller than 3/16 to hold all pieces together.

Draw a center to center slot as the linkage. Actually you can draw any shape as long as you have the 2 centers.

Clean up the construction lines and the design is finished.

Hope it does make things easier.





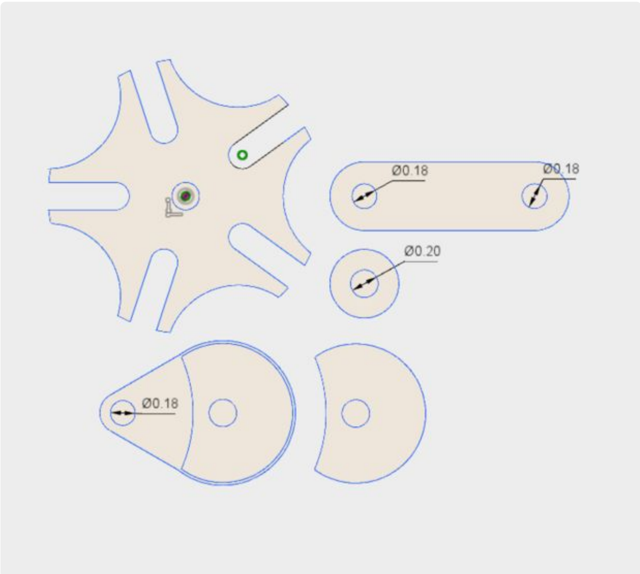
Step 8: Modify for the Real World

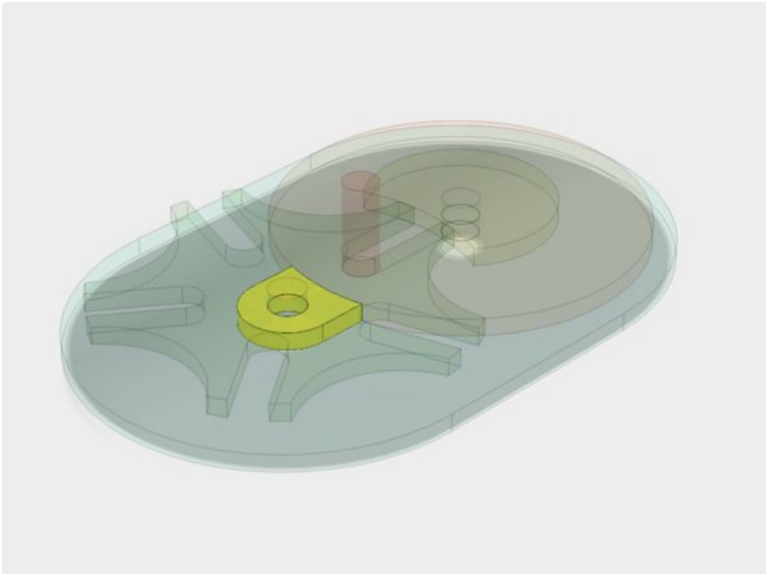
If you want to 3D print, you can start modeling from the sketch, I made a video of it.

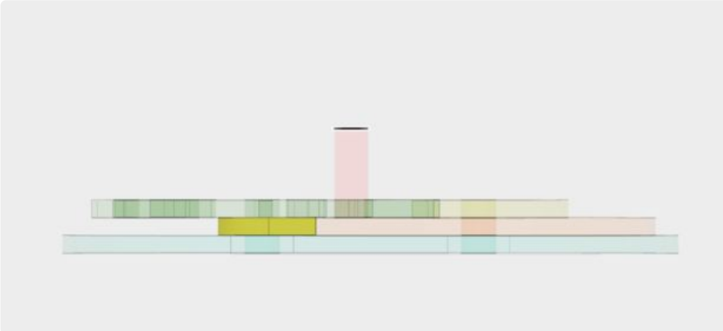
For laser cutting, the next step is separate the parts.

No matter what, you need an extra piece to raise the Geneva wheel so the drive crank can go under it.

https://www.youtube.com/watch?v=9Fz3TOxTgqo&feature=youtu.be







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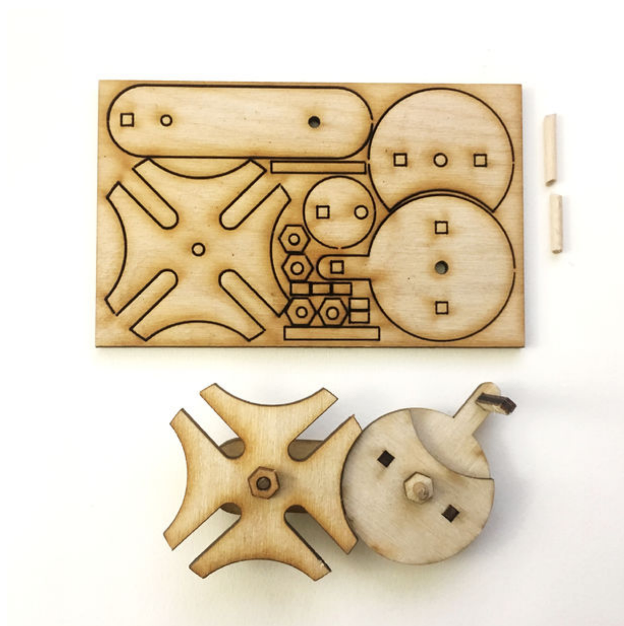
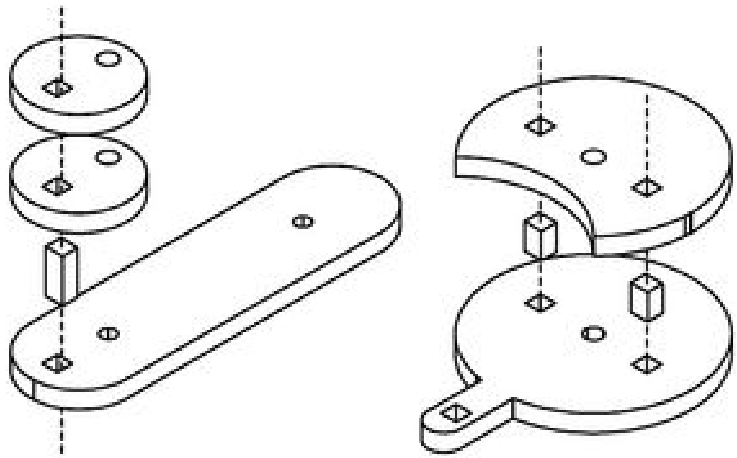
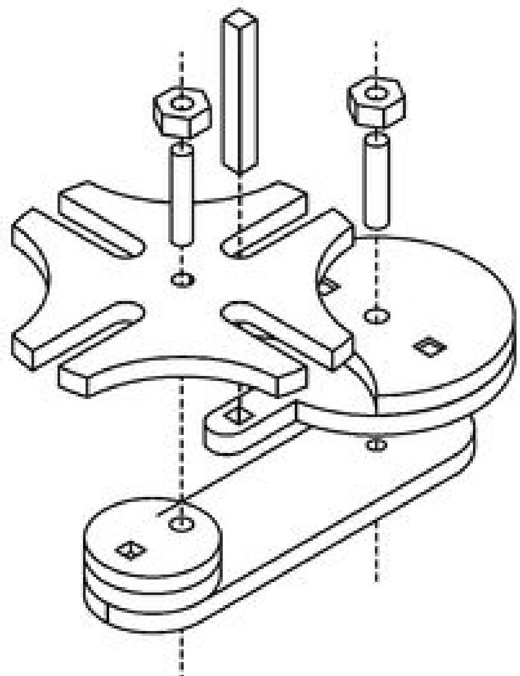
Step 9: A Laser Cut Flat Pack Version

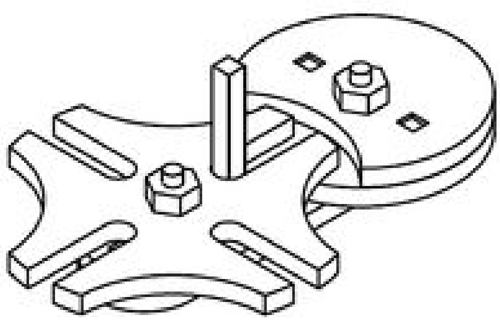
The initial motivation of this instructable is to make some playful giveaways for Maker Nexus at maker faire. I designed a very compact sheet cut from 1/8" plywood and replaced the drive pin by a square bar (and it works just well), so only 2 short pieces of 1/8" dowels are needed.

Instead of using glue to attach the drive wheel to the crank, the square pins and hexagon i don't know how to call them worked well too. There are some extra pieces of slightly different size for a better fit, and in case you lost some.









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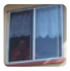
https://youtu.be/tju7pLETqDg

This explanation is the best I've seen and I'd like to think I've looked at every option available. The timing was perfect...I need to make a Geneva wheel now for a project I'm working on. I am addicted to Sketchup and this project techniques should transfer easily. Thanks for posting it.



Can You explain what this wheel does?

https://www.robives.com/blog/geneva-drive-mechanism/

Pretty nifty and actually exactly what I need