

Reinventing The Wheel: How To Get Perfectly Round Shapes

From round tires to mirrors and wheels of cheese, round shapes are a major part of our society and culture. In fact, round shapes are so common, you may feel like there is no need whatsoever to “reinvent the wheel”.

What happens when society collapses and there are no means to run the computers and factories that generate all the round things we use today? Where will you get new tires, new steering wheels, and other round items?

If you do not know how to make perfectly round shaped templates and then fashion them into working items, it will be impossible to repair damaged devices and build new ones.

The Importance of a Durable and Reusable Template

Consider a situation where you need to make a new wheel for a wagon or some other device. At the beginning of your task, you may think that you are only going to make one wheel, and then not need to worry about producing another one for some time.

For the sake of speed and utility, you may think it is best to find some way to duplicate a round shape right on the material that you plan to work with.

To begin, if you do not have a template, you will not be able to start again as easily if the material in question falls apart or does not work for your application. At the very least, if you have a template, you can simply use it to mark another piece of material without having to go through the whole measurement process again.

If another round object of the same size breaks, you can simply use the template you have on hand and save yourself a few steps.

A good quality template can also expand your material choices and options for producing the wheel. Among other things, you can use it to help with making molds, or even creating round objects that are made from layers of different materials.

The template can also be used to guide tools and help ensure that the final product is the proper size for your application.

Don't forget to add extra material in case you need to add treads. Worst comes to worst, if the wheel is too big with the treads, you can simply sand or file it down to the right size. Just make sure that you also have a slightly smaller template to go by so that you don't wind up with an irregular shape.

During the process of choosing a template material, it is very important to know what kinds of materials and tools you will be working with. For example, if you are planning to cut a round object from wood, it may be best to have a metal template.

This is especially important if you are going to use the template as a guide for the tools. Just make sure that the metal in question will not be damaged by the tools you are planning to use.

If you are only going to use the template as a means to draw marking guides on the material, then you can use paper, cardboard, or hard plastic.

Remember, if you do not have enough hard plastic on hand, you can try ironing together [plastic bags](#) to make a durable sheet of thicker plastic.

The template should be easy to fold up or roll up so that it

does not take up much space. Just make sure that when you open the template back up, it does not have folds or creases in it that will cause spots to be less round than needed. The template should also lay perfectly flat and be easy to hold in place while you are working.

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Some Ways to Get a Perfectly Round Blueprint

When a wheel or another round object spins, any deviation on roundness or weight disbursement can cause wobbling, excess wear, and possible breakage of the item. While some of these problems can be compensated for with balancing weights, it is still very important to start off with the roundest shape possible.

Simply trying to trace a round object onto a piece of paper or other template material will never work because the object in question will have been worn down from being in use.

It is much better to use the following methods for creating a round template that can be used to shape other objects.

Use a Compass

Even though a drafting compass is not very large, it will give you a perfectly round circle. I tend to prefer all metal compasses that have one pointer leg and a second one to hold a pencil. There are also extendable drafting compasses that will work just as well.

Use a String and a Pencil

To use this form of makeshift compass, you will need to set the pencil (or other narrow cylindrical object) in the center of the material you are using for the template. It should not

bend in any direction or wobble.

Next, place the string around the pencil and measure a length that corresponds to where you want the outer edge of the circle to be. Use a pencil or something else that will make marks so that you have a more precise measure.

Hold the marking tool in place while you take the two ends of the string and tie them together. The marking tool should fit within the loop. You can make the loop as big or as small as you need to make a large enough round shape.

To use the compass, keep the string tight against the marking tool as you move it around the central pencil. When using this makeshift compass, make sure the string does not jump up and down on the central pencil.

You will also have to be very careful to make sure that the marking tool does not bend inward or outward, as this will throw off the roundness of the circle.

Use a Stick and a Central Pin

This method is very similar to the string and pencil compass, but it eliminates the problems associated with the string jumping and marking tool wobbling.

Basically, this makeshift compass looks a lot like an old fashioned stereo arm. Instead of the arm reaching in from outside the record, the holding place is located in the center of the circle.

You can use a stick of wood, or just about anything else as an arm. Just make sure that it can spin as freely as possible on the central holding point without wobbling or jumping up and down.

Next, drill or cut a hole in the arm that matches location that matches the edge of the circle you are planning to draw.

Set a pencil or other marking device into the hole so that it does not wobble, lean inward, or lean outward. Now all you have to do is push the marking tool so that the arm moves with it. As the arm moves around the central point, the marking tool will create a circle.

Video first seen on [Make Something](#).

Basics of Wheel Design

In a time of need, you may not be able to get the exact same materials that were used to create the device you are trying to repair. While you may be thinking that plastic or metal might have to be replaced with wood, there are many other options.

Since different materials have different strength levels and tendencies, you may need to change the internal shapes found in the wheel as well as its size and thickness.

Keep the following wheel design elements in mind as you study different materials. If you are building something completely new, you will also need to evaluate these elements in relation to the materials on hand and the application.

Even though you may be thinking mostly about vehicle wheels, there are many other places where these elements must work together for optimal performance.

If you are going to lift heavy objects with a simple machine, you will need to figure out the best ratio for pulley wheels. If you decide to advance into making gears, these elements are also very important to consider.

No matter whether you decide to create a pulley, a water wheel, or an automobile wheel, you will need to know how the following elements affect the performance of the wheel, and how that, in turn, affects the entire machine you are building.

or repairing.

Wheel Size

Since a wheel is designed to move in relation to a central axis, the diameter of the wheel is very important. A larger wheel will turn fewer times to cover longer distances, however, the engine or source of power will have to do more work to make the wheel turn. Smaller wheels will turn more times when compared to larger ones to cover the same distance, but it takes less work to turn the wheel.

Wheel Width

Thinner wheels can be useful for applications where you want less traction and resistance to travel. Thicker wheels are better for places where you want to reduce the risk of skidding while moving forward or making turns. Since thicker wheels also weight more, they will also absorb bumps better and with less loss of control.

Wheel Weight

More than a few people think that wheels should be as light as possible so that it takes less work to move them. On the other side of the equation, wheels need to have enough weight so that they will create enough drag as they move over surfaces beneath them.

If the wheel does not grip the surface properly, skidding will occur. Minor skidding can also be a problem because locked wheels are harder to turn than ones that grip surfaces properly.

Spokes vs Solid Construction

When you start making wheels big enough for a wagon or other vehicle, the weight of a solid wheel can cause a number of

problems. On the other hand, spokes or cutouts in the wheel can reduce the weight to acceptable levels. That being said, if you are working with a material that has very little durability, you may still need to revert back to more solid shaped wheels.

You can also try using fortifications such as an independent rim that will add strength while reducing the overall weight of the wheel.

Surfaces for Traction

Weight alone is not enough to ensure that a wheel will always maintain good traction. This is why patterns or “treads” are often cut into tires. When combined with the weight of the vehicle, these treads help to grip the road without adding to the weight of the tire.

If you are going to build a brand new wheel, do not forget to choose a tread pattern that matches your application. This includes making sure that you know which patterns will work best in the mud, snow, ice, or anything else that you might be driving on.

How to Cut Round Surfaces

Once you know how big and thick the wheel is going to be, the next step will be shaping it from the base material. Here are the basic steps for a situation where you are cutting the material from a block of solid wood, plastic, metal or some other material.

- Start off by making sure that the block is the right thickness or width for the wheel. Try to make the surface as smooth and even as possible.
- Next, use the template to draw the round object. Be sure to note where the axis will go as well as how big it will be.

- Use your cutting tools to take away the bulk of material from the edge of the wheel. Do not cut all the way down to the template lines. Leave at least 1/8" to 1/4" so that you have enough room to sand the edges as well to create the roundest shape possible.
- Once you have the basic wheel shape in place, go back and try to make it as even as possible all the way around before sanding. Do not cut to the point where you are at the template lines. At this stage, try to leave at least 1/16" all the way around the wheel.
- Get rid of any excess material by sanding it away.
- If needed, add any treads that you may need to complete the outer surface of the wheel.
- Go ahead and drill out the area where the axle will go.
- Complete the wheel by hollowing out any areas required to reduce overall weight.

Video first seen on [bobdutica](#).

Shaping Wood and Other Semi-Pliable Materials

Have you ever looked at wooden arched doorways and wondered how they could be made from just a single piece of wood. Surprisingly enough, this task isn't as hard as it looks. By the same token, you can also bend metal and other materials into wheel shapes with relative ease. In order to do so you will need a solid wheel form that can be used to support the new form.

If you are planning to [shape wood into a wheel](#), start off with a thin board that has the same width as what you need for the finished wheel. Next, you will have to soak the wood to soften it a bit.

Apply weights to the wood so that it "warps" a little, and then

it it slowly dry up again. You will need to repeat this process several times to complete the wheel shape.

Once you complete a wooden wheel, do not forget that thin wood will require some form of support. You can use metal or plastic rims, as long as they are durable enough and can easily be bolted to the wood.

After you complete the outer rim of the wheel, you will need to complete the spokes and the hub. These can be fairly involved processes. As you put the spokes and hub into place, do not forget that the wheel must balance properly while in motion. If you notice that it wobbles you can attach weights on the inner surface of the wheel rim to improve balance.

In some ways, shaping metal can be a good bit easier. You can heat and hammer wood into thin enough strips that can be bent with relative ease with your hands or pliers. Just make sure that the underlying form can withstand the heat from hot metal if you decide to work with metal when is softer and more pliable.

Overall, you will find plastic one of the easiest materials to make wheels from. If you are working with a hard plastic, just apply some heat and let the plastic rest on the underlying form. Make sure that you also have the form covered with something that the plastic will not adhere to. Make sure that you can break the underlying form apart if needed.

Casting Wheels

Throughout time, many people have found out it is easier to produce consistent wheels by making a reusable mold first. Molds also open up the number of materials that you can use to make wheels.

For example, [if the wheel isn't going to be used in heavy stress](#) and strain applications, you may even be able to get

away with using glass. Wheels made from plastic, metal, or even clay are easily made when you cast them using a mold. Here is the basic process:

- You will need to start off with an exact model of the round shape. It should match your needs in terms of width, circumference, hub design, and spokes. You can use any material that you want as long as it won't collapse or warp while you are making the mold.
- Next, choose the material that you will use to create the mold. The material should be heavy enough to withstand pulling and pushing without warping. It should also be strong enough so that it won't break or be damaged by the material used to make the final shape.
- When creating the mold, you will need to account for a place to pour in the material used to make the wheel. You will also need to decide how and in what places the mold will be opened in order to remove the finished wheel. Depending on the wheel design, you may be able to get away with a 2 part mold. If the spokes or internal shapes are more complicated, you may need a 4 part mold.
- After you remove the model (it's OK if it is destroyed as you won't need it any further), go ahead and clean up the mold.
- Put the mold back together and secure it with rope or something else that will keep the pieces all together. Try to make sure the pieces fit together as tightly and as perfectly as possible so that the material used to make the wheel won't leak through.
- Next, go ahead and fill the mold.
- Once the material used to fill the mold is fully cured, go ahead and open the mold up. If you did everything right, you should have a fairly close duplicate of the original model wheel. You may need to remove mold seams and other imperfections, but the basic round shape should be just fine.

Right now, it is fair to say that most people take wheels for granted. At the same time, if we lose factories during a major social collapse, wheels, gears, pulleys, and other round objects will be very hard to produce.

Knowing how to “reinvent” a wheel may not seem very useful until you are in a situation where you must do so or face serious problems.

From bugging out to keeping your homestead running in good order, being able to make new wheels and design them from scratch is a very important, but overlooked skill.

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*This article has been written by **Carmela Tyrell** for Survivopedia.*