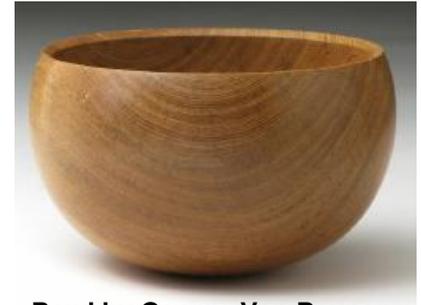


Stability of round-bottom bowls

Most of us typically put a foot of some sort on our bowls and other forms in order to hold them stable on a flat surface. Utilitarian pieces generally have a wider foot, for increased stability, than art pieces that just need to sit there and look nice. There is a school of thought in some circles that promotes a vessel design with a fully and truly round bottom, with no defined foot whatsoever – not even a subtle flat spot. For some applications, a round bottom can be quite utilitarian (holding popcorn, candy, etc.).



**Bowl by George Van Beynen
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It's clear that some round-bottomed forms, when disturbed, will rock gently and return to their original stable positions. That's part of their attractiveness. There are other forms that will not stand up in the first place or, if they do, will fall over at the slightest touch. If we are going to create a round-bottomed form, we will usually want to make the stable form.

The question is, what do we have to do to design and create a stable form? How can we know in advance what's going to happen? The answer is "simple physics". There are two elementary concepts that need to be understood. These are 1) the center of rotation (the center point of the circle that defines the shape of the round bottom) and 2) the "center of mass" (aka the "center of gravity"). The former is obvious. On the other hand, the calculation of the center of mass of a complex, three-dimensional shape is difficult and beyond the scope of this article. I think you probably have a "feeling" for what it means, and can make an appropriate estimate. If interested further, you can do the research.

The point of this article is describe how to predict and achieve stability. Stability is defined as follows: With the body in it's upright position, if the center of mass is located physically below the center of rotation, the state is called a stable equilibrium, because a motion to either side would cause the center of mass to rise (which requires an input of external energy). Such a form, when disturbed, will rock (charmingly) and will return to its original state. On the other hand, if the form is such that it's center of mass is above the center of rotation, the state is called an unstable equilibrium because a slight motion to either side would cause the center of gravity to descend (giving up energy, which it will gladly do), and the body will tip over.

Thus, the answer is: The design of a stable, round-bottomed form simply comes down to putting the center of mass below the center of rotation. Give it a try. Make a rocking bowl. They're fun, and they'll gladly hold candy, pocket change, etc. The added mass will typically lower the center of mass and make the bowl even more stable. If you want to do a relatively tall one, you can do it with thin walls and a heavier bottom.

Always use common sense. Things that work in one situation may not work in another.

Follow all Safety Rules. If it feels wrong, it probably is; stop and rethink.

Your Mileage May Vary