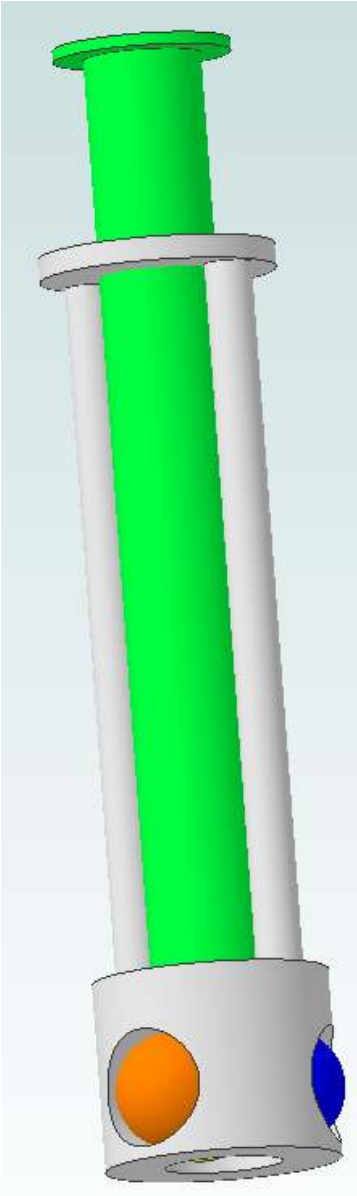
A Possible New Inside Diameter Gage, version 1

By R. G. Sparber



I have not built this prototype yet but thought I would throw the idea out to the community for comments and design suggestions.

The gage is similar to the high priced ID gages in that you can take a measurement down inside the hole. It also contacts the sides of the hole in 3 places.

The ½" diameter green rod is free to move up and down. As you push it down, it displaces the 3 balls in the 1" diameter cylinder at the bottom of the gage. The amount that the green rod moves down is equal to the amount the balls move out. So if you set a push rod Dial Test Indicator on the top of the green rod relative to the top disk, you could tell how much the hole's ***radius*** varied along its depth. Of course, this assumes that the hole is round.

Given that I use 0.500" diameter ball bearings, this gage should be able to measure hole radii from 0.5" up to .75". Larger holes can be measured by adding a ring around the lower end of the gage. The ring would have 3 holes that align with the 3 balls. Each hole would have a push rod. As long as the rods are the same length, you can measure changes in radius.

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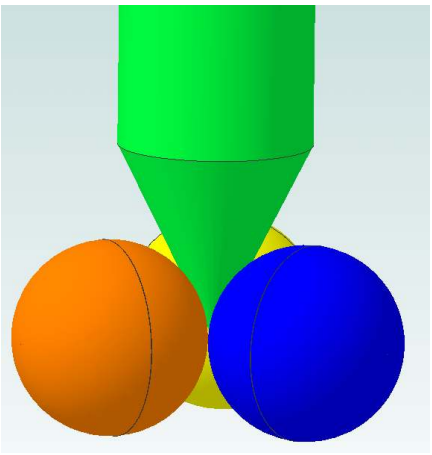
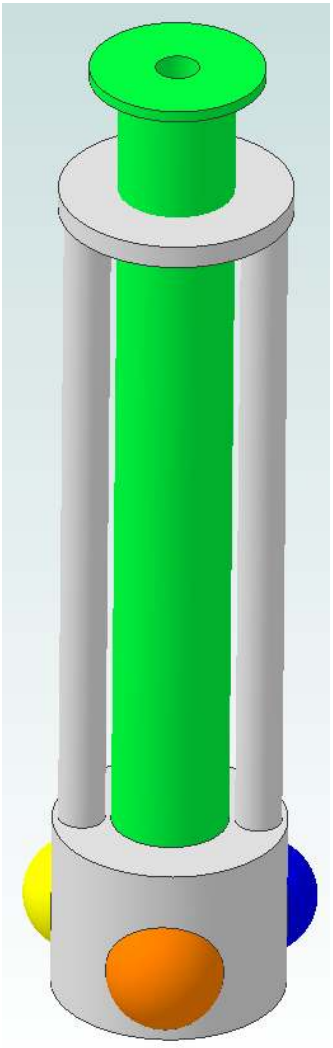
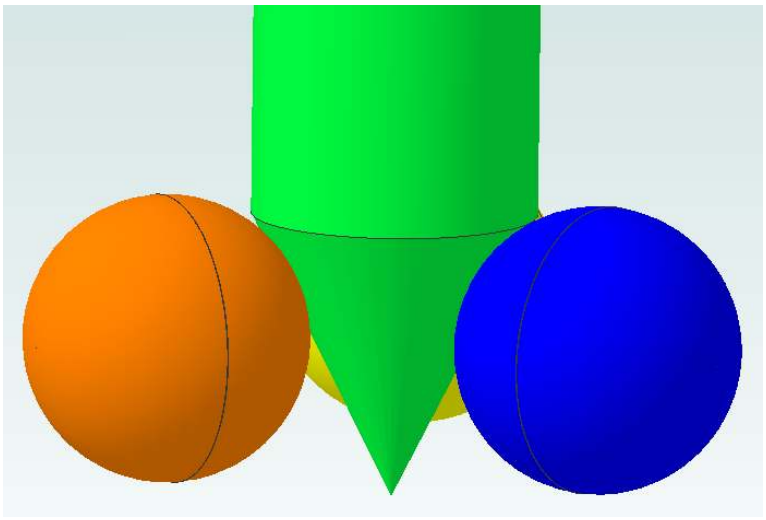
The key thing here is that you get a range of 0.25” on the radius regardless of hole size. That is similar to what the high priced gages can do.

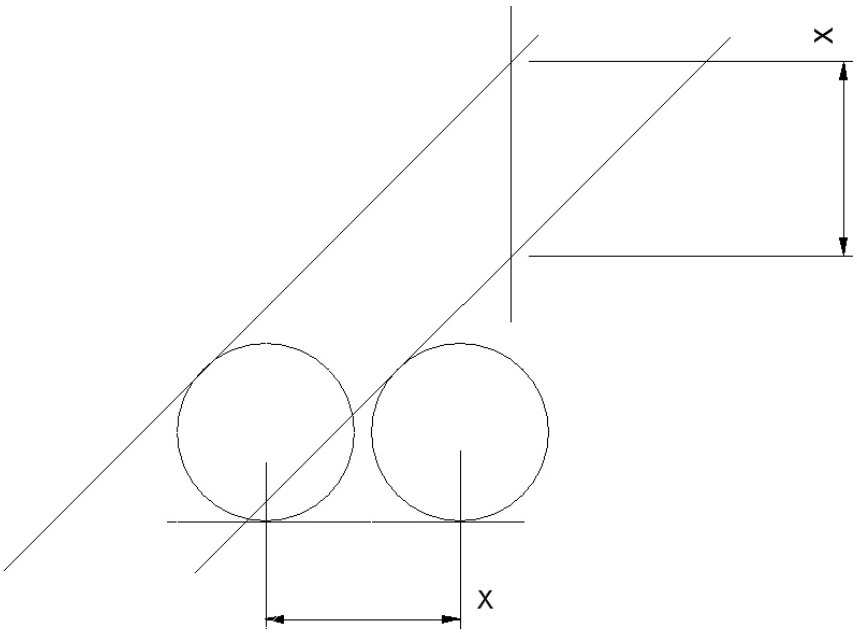


Looking just at the push rod and 3 balls, you can see the key to the gage’s operation. The rod has a 45° taper on the end that contacts the 3 balls. The balls are steel and precision ground. The tip is precision cut, hardened, and ground to this taper plus is magnetic enough to hold the balls to it. I realize the magnetic field can cause problems attracting swarf but until I build it, I won’t know how weak a magnet I can use nor how much the ball’s surface will be magnetic. At the very least, the gage can be used around aluminum.



The above picture is with the balls retracted. Here you see them almost all the way out.





The reason I think this works is because the balls will all move out from the center of the gage the same amount as the push rod moves down. You can see here how the 45° line moves down a distance "x" and the ball moves over by the same distance.

I realize this diagram doesn't constitute a rigorous proof but hopefully will convince you it might be true.

With a different taper, I believe I can get the downward motion of the rod to reflect the diameter, rather than the radius, of the hole.

I welcome your comments and questions.

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