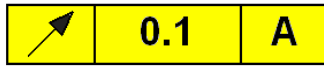


# August 2009 Tip-of-the-Month

(in accordance with the ASME Y14.5-2009 standard)

## Does Runout Equal Concentricity?—Sort Of.



Circular Runout

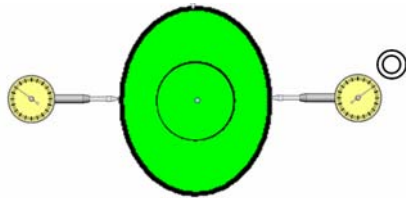


Total Runout



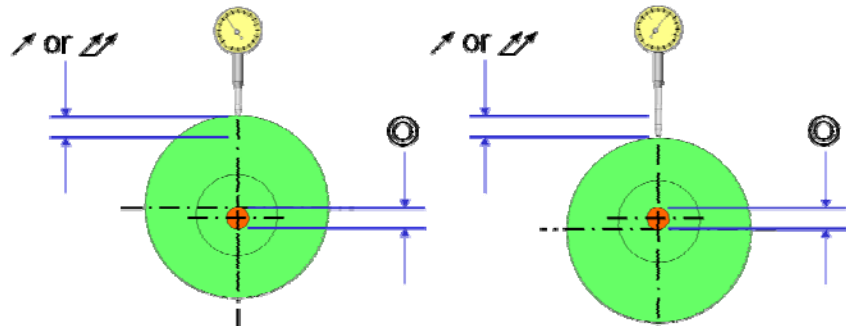
Concentricity

People often ask if when they measure runout on a cylindrical feature that is coaxial to a datum axis are they also reading the concentricity error. Or, should they take the runout measurement and double it or cut it in half to determine the concentricity error. Well, usually, *what you see is what you get*. In other words, the concentricity error cannot be greater than the measured runout. First, runout tolerances and concentricity require that a datum axis be



established. In these figures, consider the smaller diameter as the datum feature. Concentricity requires deriving the median points of the feature. So, the concentricity tolerance zone is cylindrical and controls the center of the feature. That is why a diameter symbol precedes the tolerance. One way to inspect concentricity is with two opposed indicators, as shown. This can be very time consuming.

Runout is usually inspected with a single indicator because it is a surface control. Total runout is a composite of coaxiality (for all practical purposes, concentricity) and cylindricity. (You might want to check out previous Tips for a further explanation of runout and the difference between circular and total runout.) If the feature is perfectly cylindrical, concentricity error will account for all of the runout variation. **You do not double it or cut it in half.** Depending on the type of out-of-roundness, the more out of cylindrical the feature is, the better the concentricity may have to be.



Concentricity is on the diameter. Eccentricity (which we do not have a symbol for) is on the radius. People often confuse the two. Runout is almost always easier to measure and controls the form of the feature as well as the concentricity. Concentricity ignores any form error. So, runout is almost always a better choice. **“When in Doubt—Use Runout”.**

Go to <http://www.tec-ease.com/tips/Aug-09.htm> to view a video clip of Don Day explaining this Tip.

Please email us any suggestions or topics that you would like to see covered in our Tip-of-the-Month series.

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