

TP A.26

The amount of English required for "gearing" outside English

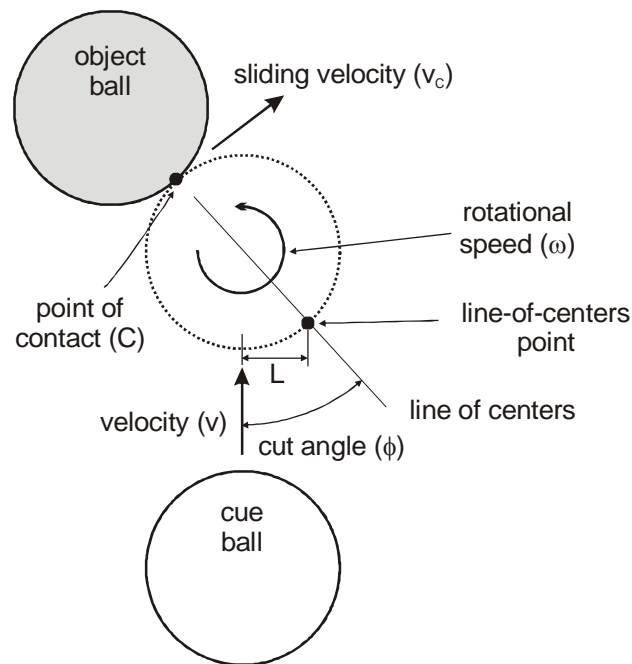
supporting:

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For "gearing" outside English, the sliding velocity of the point of contact between the cue ball and object ball must be 0, so:

$$v_C = v \cdot \sin(\phi) - \omega \cdot R = 0 \tag{1}$$

where R is the radius of the cue ball. So, using the definition of spin-rate factor (SRF) from TP A.12,

$$SRF = \frac{\omega}{\left(\frac{v}{R}\right)} = \sin(\phi) \tag{2}$$

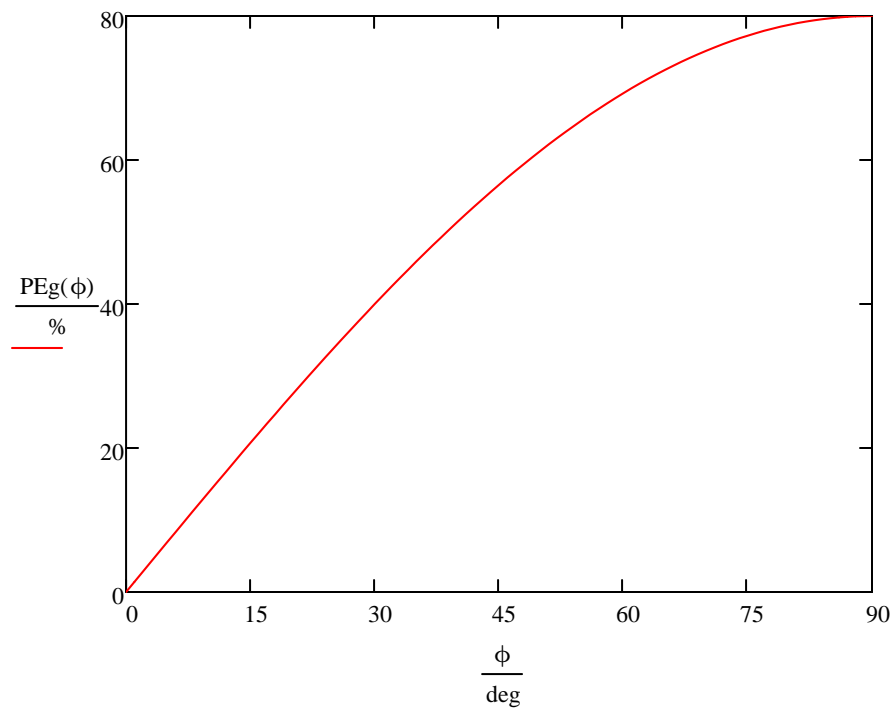
From TP A.25, the percent English required to achieve this SRF is:

$$PE = \frac{4}{5} \cdot SRF \cdot 100\% = \frac{4}{5} \cdot \sin(\phi) \cdot 100\% \quad (3)$$

The following plot summarizes how much English is required for "gearing" outside English for various cut angles:

$$\phi := 0\text{-deg}, 1\text{-deg}.. 90\text{-deg}$$

$$PEg(\phi) := \frac{4}{5} \cdot \sin(\phi) \cdot 100\%$$



For a half-ball hit:

$$\phi := 30\text{-deg} \quad PEg(\phi) = 40\%$$

So, with a half-ball hit, anything less than 40% English will be less than "gearing" and will throw the OB to the right, and anything more than 40% English will result in excess outside English, causing throw to the left.

It is easy to visualize the amount of tip offset needed to create gearing outside English for any cut angle using the technique described and illustrated below.

From Equation 3 in TP A.12, and Equation 2 above, the tip offset (x) required for gearing outside English is:

$$x = \frac{2}{5} \cdot R \cdot \text{SPF} = \frac{2}{5} R \cdot \sin(\phi) = \frac{2}{5} \cdot R \cdot \left(\frac{L}{R} \right) = \frac{2}{5} \cdot L$$

where L is the distance between the line of aim and the line-of-centers point (see the diagram at the top of this document and the diagram below). Therefore, the required tip offset is 40% (2/5) of the distance from the aiming line to the line-of-centers point on the front of the CB. The following diagram illustrates how this technique is applied at the table:

