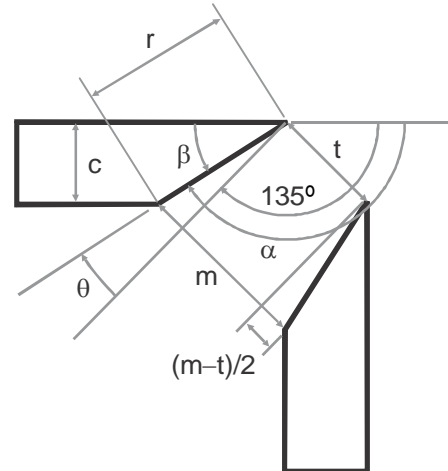
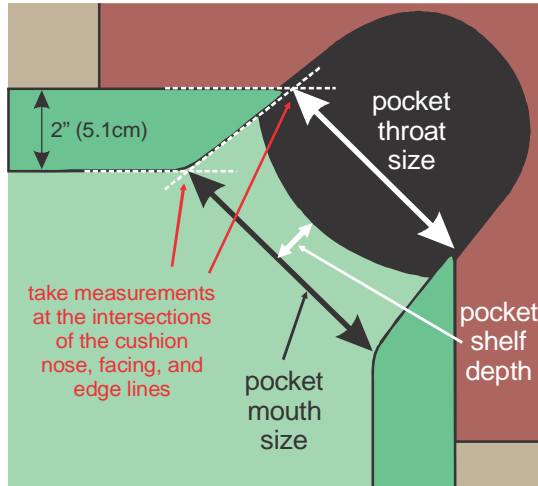


TPB.15 Pocket geometry calculations

supporting:
 “The Illustrated Principles of Pool and Billiards”
<http://billiards.colostate.edu>
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The pocket facing angle is usually specified as angle α .

The wedge angle of the cushion is given by:

$$\beta = 180\text{-deg} - \alpha \tag{1}$$

The angle of the facing relative to the pocket centerline is:

$$\theta = \alpha - 135\text{-deg} \tag{2}$$

These angles are also related by:

$$\beta = 45\text{-deg} - \theta \tag{3}$$

From the triangle formed by angle θ , the length of the pocket facing is:

$$r = \frac{c}{\sin(\beta)} \tag{4}$$

and the mouth-throat difference is related to this length according to:

$$\frac{(m - t)}{2} = r \cdot \sin(\theta) \tag{5}$$

Substituting Equation 4 into Equation 5, gives:

$$\frac{(m - t)}{2 \cdot c} \cdot \sin(\beta) = \sin(\theta) \tag{6}$$

But from Equation 3 and the angle-difference trig identity,

$$\sin(\beta) = \sin(45\text{-deg} - \theta) = \sin(45\text{-deg}) \cos(\theta) - \cos(45\text{-deg}) \sin(\theta) = \frac{1}{\sqrt{2}} \cdot (\cos(\theta) - \sin(\theta)) \tag{7}$$

Using Equation 7 in Equation 6 gives:

$$\frac{(m - t)}{2 \cdot \sqrt{2} \cdot c} \cdot (\cos(\theta) - \sin(\theta)) = \sin(\theta) \quad (8)$$

Rearranging gives:

$$\tan(\theta) = \frac{\sin(\theta)}{\cos(\theta)} = \frac{1}{\left[1 + \frac{2 \cdot \sqrt{2} \cdot c}{(m - t)}\right]} \quad (9)$$

Therefore, from Equation 2 and 9, the facing angle can be found from the mouth-throat difference with:

$$\alpha = 135 \cdot \text{deg} + \text{atan} \left[\frac{1}{\left[1 + \frac{2 \cdot \sqrt{2} \cdot c}{(m - t)}\right]} \right] \quad (10)$$

Here is an example of using Equation 10 to calculate the pocketing facing angle from pocket measurements:

$$\overset{\text{mm}}{m} := 4.5 \cdot \text{in} \quad t := 3.75 \cdot \text{in} \quad m - t = 0.75 \text{ in} \quad \overset{\text{mm}}{c} := 2 \cdot \text{in}$$

$$\alpha := 135 \cdot \text{deg} + \text{atan} \left[\frac{1}{\left[1 + \frac{2 \cdot \sqrt{2} \cdot c}{(m - t)}\right]} \right]$$

For a given pocket facing angle, the mouth-throat difference (mt) can be found using Equations 1, 2, 4 and 5:

$$\overset{\text{mm}}{\alpha} := 142 \cdot \text{deg} \quad \overset{\text{mm}}{c} := 2 \cdot \text{in}$$

$$mt := 2 \frac{c}{\sin(180 \cdot \text{deg} - \alpha)} \cdot \sin(\alpha - 135 \cdot \text{deg})$$