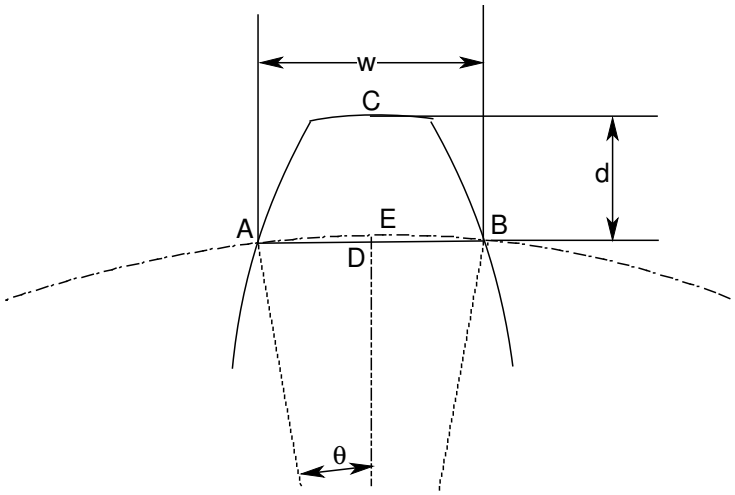
MEASURING CHORDAL THICKNESS USING GEAR TOOTH VERNIER

Principle:

The tooth thickness of a gear varies from the tip to the base circle. Therefore, in order to measure the tooth thickness, we need to fix the position of measurement and the convention is to measure along the pitch circle. The gear tooth vernier has such an arrangement: a scale to set the depth d from the top and a scale to measure the width w of the tooth. ADB is the chordal tooth thickness, while AEB is the arc tooth thickness measured along the pitch circle.



Procedure:

1. Let O denote the centre of the gear. Let the number of teeth be N and m the module. Then, the depth to the pitch circle d= OC-OD = OE + EC -OD. OE is the pitch circle radius $\frac{Nm}{2}$, while EC is the addendum = m. The angle θ is one-fourth the angle between two corresponding points on the teeth, $=\frac{360}{4N}=\frac{90}{N}$. Since OD= OAcosθ = $\frac{Nm}{2}\cos\frac{90}{N}$, the required depth $d=\frac{Nm}{2}\left[1+\frac{2}{N}-\cos\left(\frac{90}{N}\right)\right]$.

2. Set the depth d on the vertical scale of the vernier.

3. Keep the vernier on the tooth such that the tongue seats on the top of the tooth and measure the chordal tooth thickness.

4. Compare with the theoretical chordal tooth thickness w=AB = 2AD = 2*OA sinθ = $Nm\sin\left(\frac{90}{N}\right)$, excluding backlash allowance.