GEAR MEASUREMENT OVER ROLLERS

Principle: If a roller is placed in the space between a pair of gear teeth, it will come to rest at a position depending on its diameter and the tooth spacing. If this diameter is chosen so that the centre of the roller lies on the pitch circle, this will simplify calculations. For gears with even number of teeth, the distance over two rollers in exactly opposite tooth spaces can be measured and compared with the theoretical value.

Procedure: Choose a roller of diameter $\frac{\pi m \cos \phi}{2}$, where m is the module and ϕ the pressure angle. Then the theoretical diameter over rollers $M = m\left[N + \frac{\pi}{2}\cos\phi\right]$, where N is the number of teeth.

If a roller of different diameter is used, $M = \frac{mN\cos\phi}{\cos\phi_m} + d$, where d is the diameter of the roller, and ϕ_m the pressure angle at the centre of the roller which is given by the relation $inv\phi_m = inv\phi + \frac{d}{mN\cos\phi} - \frac{\pi}{2N}$; where $inv\phi = \tan\phi - \phi$ (ϕ in radians).

This can be compared with the obtained measured value, the permissible error depending on accuracy class of the gear.

For the case of odd teeth, a radial measurement with the gear between centres can be carried out or the angle subtended between rollers.

Similar equations are available for the measurement of helical gear over wires / balls.