MOMENT OF INERTIA

What is moment of inertia?

The inertia of a particle/body is a measure of its reluctance to move

Consider a lamina rotating about a fixed axis which passes through O and perpendicular to the plane of the lamina, consists of particles, P1, P2, ….Pn of masses m1, m2, …….mn rotating at same angular speed ,

Pi

O

Linear speed, v = r

KE of lamina = ½ m v2 = ½ m r2 2

= ½ 2 ( mi ri 2 )

= ½ 2 ∑ ( mi ri 2 )

The quantity m1r12 , m2r22, ……. mnrn2  depends only on how the mass of the lamina is distributed relative to axis of rotation. It is known as the moment of inertia of the lamina about this axis.

I = ∑ ( mi ri 2 ) ------ units in kgm2

The moment of inertia of a body about a given axis is a measure of its reluctance to turn about that axis.

The larger the MI, the harder it is to change the angular speed of the body.