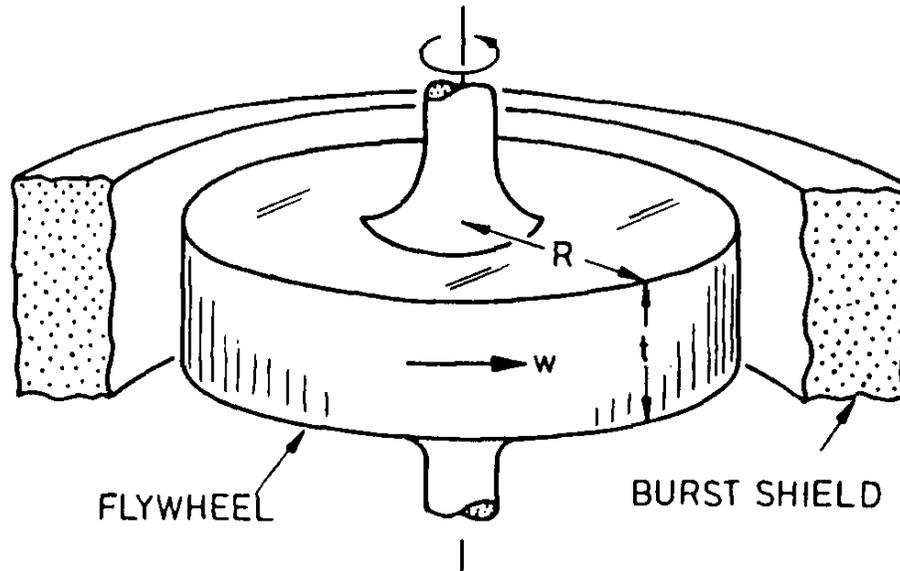# Materials for flywheels

FLYWHEEL

BURST SHIELD

Energy stored in flywheel: $E = J\omega^2/2$, $J = \pi \rho R^4/t$

Mass of flywheel: $M = \rho (\pi R^2) t$

Kinetic energy per unit mass: $M_m = (R\omega)^2/4$

Maximum principal stress: $\sigma_{max} = (3+\nu)\rho (R\omega)^2/8$

Eliminating $R\omega$ and setting $\sigma_{max} = \sigma_f$:

$$M_m = [2/(3+\nu)](\sigma_f / \rho)$$

3.11 Mechanics of Materials
Fall 1999