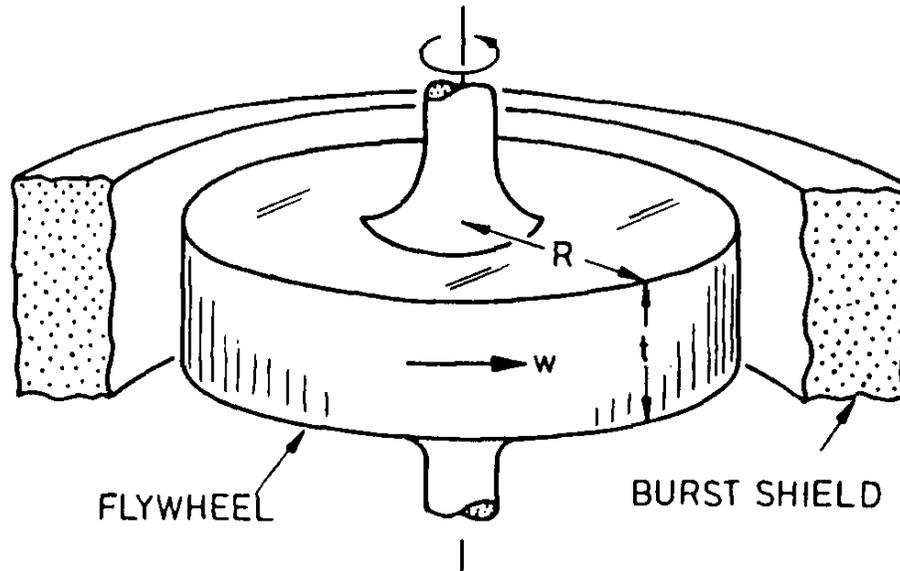


Materials for flywheels



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 $\sigma_{max} = \sigma_f$:

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

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3.11 Mechanics of Materials

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