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High speed flywheel - mechanical storage of energy

A discussion of dependence of energy storage in high speed flywheels on configuration and material is presented. It is shown that, in order to maximise "relative energy stored per unit weight" and "relative energy stored per swept volume", materials with the highest specific tensile strength should be used. These requirements are best met by high-strength fibers (glass, boron, carbon, PRD-49, silica). Some possible designs are presented - rod, thin and thick rim, concentric ring flywheel (loaded and unloaded).

It is shown that the above requirements are best fulfilled by the loaded concentric ring flywheel. The obtained relative energies stored per unit weight are approximately (in watt-hours per kilogram) 400 for silica, 110 for carbon and 100 for glass fibres. Some of the useful applications of the high speed flywheel are peak-power units and vehicle propulsion.