



Mechanics of Materials II:

Thin-Walled Pressure Vessels and Torsion

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Module 7 Learning Outcome

- Solve a thin-walled pressure vessel problem

Thin-Walled Pressure Vessels

Worksheet 1:

A steel cylindrical pressure vessel 2.5 inches in diameter and has a wall thickness of $\frac{1}{16}$ of an inch. The maximum internal pressure is expected to be 200 psi. Find the factor of safety with respect to yielding.

Typical Values for the Factor of Safety (FoS)

In General:

Buildings $FoS \geq 2$

Use higher FoS for brittle materials (to avoid catastrophic failure)

Automobiles $FoS \geq 3$

Use lower FoS when using materials for which the material properties are very well known

Aircraft/Spacecraft $FoS \geq 1.2 \text{ to } 2.5$

Use higher FoS for uncertain environments/stresses

Boilers/Pressure Vessels $FoS \geq 8.5$

Lifting Equipment/Hooks $FoS \geq 8 \text{ to } 9$

Bolts $FoS \geq 8.5$