Mechanics of Materials II:

Thin-Walled Pressure Vessels and Torsion

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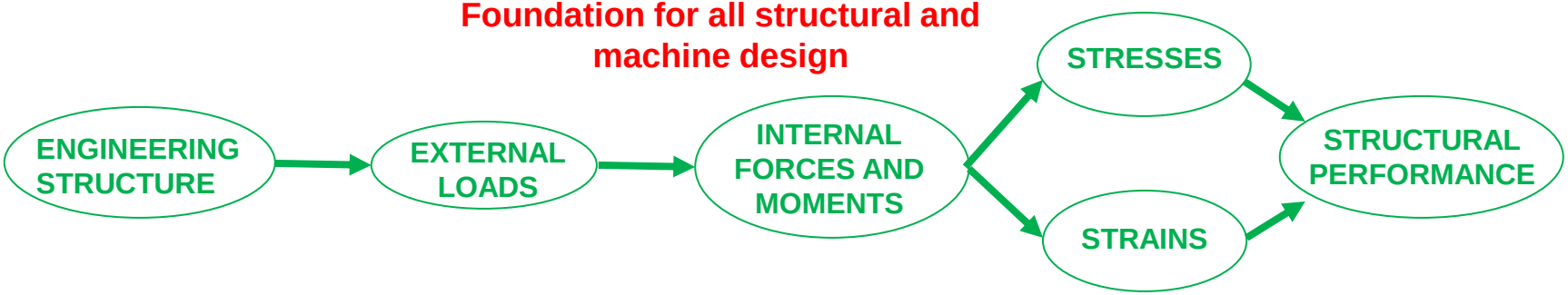
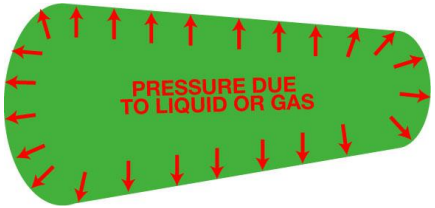
Module 3 Learning Outcome

- Develop an expression for longitudinal stress for a thin-walled pressure vessel in terms of the pressure and the dimensions of the vessel

Mechanics of Materials

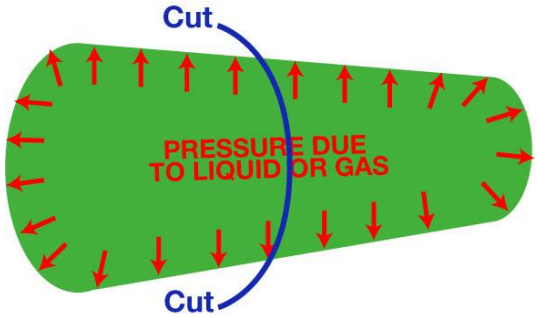
Foundation for all structural and machine design



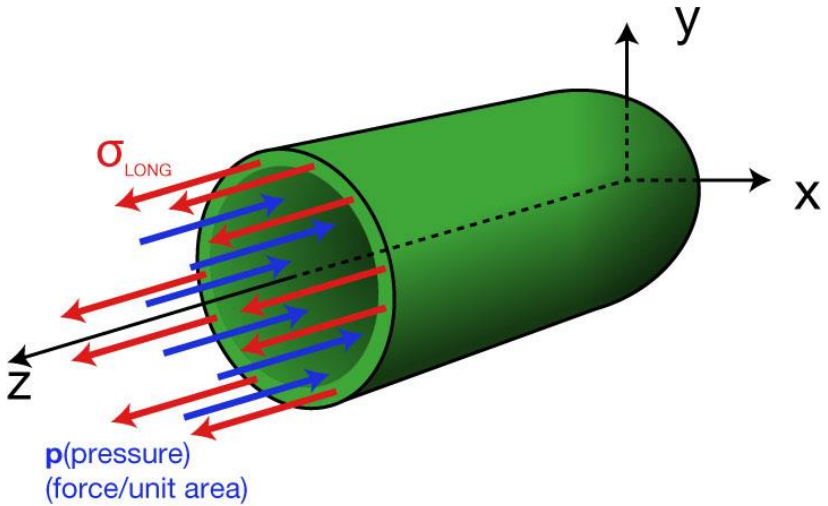


Thin-Walled Pressure Vessels

Let's again look at a section cut



We will neglect the weight of the contents and the weight of the structure itself. These forces are generally many orders of magnitude less than the forces due to the internal pressure and the forces from the resulting stresses in the cross-section.



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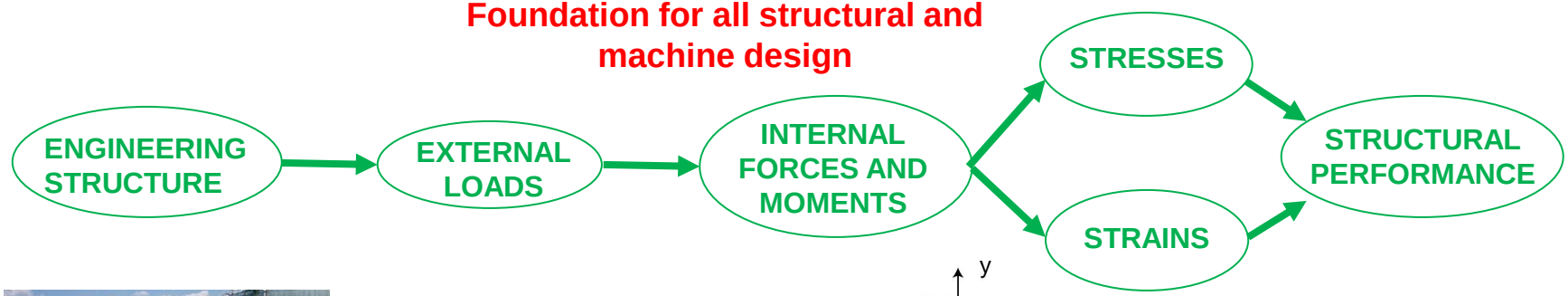

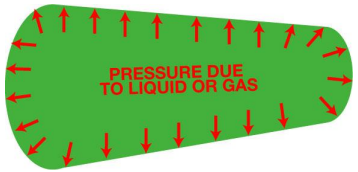

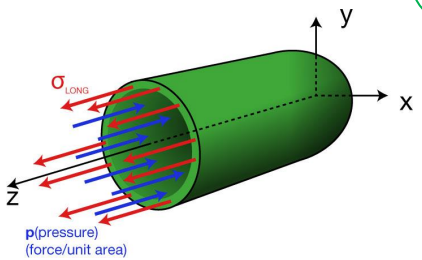

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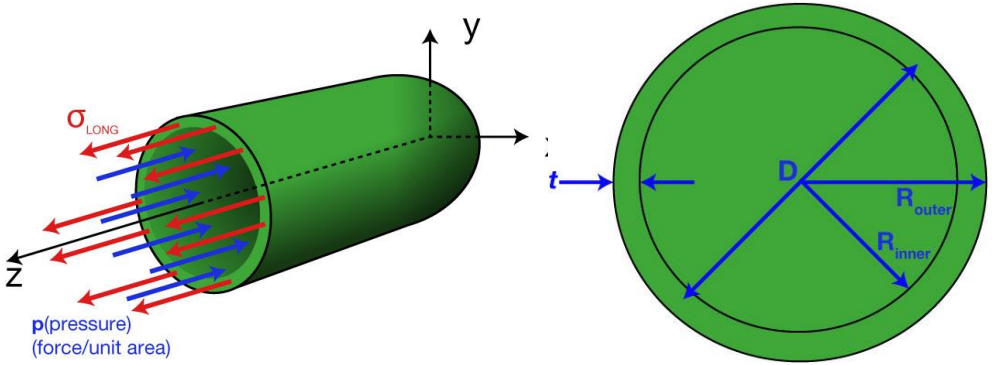
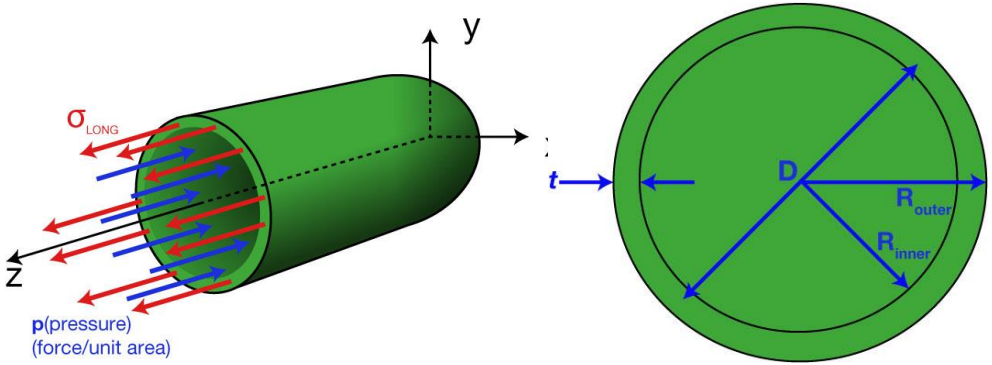


Thin-Walled Pressure Vessels



Longitudinal Stress:

$$\sigma_{LONG} = \frac{pD}{4t}$$