



# Strength of Materials: A Course for Students

*Peter Black*

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## **Strength of Materials: A Course for Students** Peter Black

Strength of Materials: A Course for Students deals with theories of stress analysis. The book describes simple stress, strain, and strain energy and defines, with appropriate formulas, commonly used terms such as load, elasticity, tensile test, and temperature stresses. The text then analyzes the moment when an applied force bends a subject beam under different load conditions. The formula for the first and second moments of area and the formula for the first and second moments of mass are explained.

The book also describes the unstrained or neutral plane when a bending moment acting on a particular beam results in tensile and compressive strains. The author also explains bending with direct stress, torsion, and the types of complex stresses. The theories of elastic failure are then discussed: the Maximum Principal Stress Theory (Rankine) for brittle materials, as well as the Maximum Shear Stress Theory (Coulomb, Tresca, and Guest) and the Maximum Strain Energy Theory (Haigh), which both concern ductile materials. The text also addresses the stress that can occur in both thick and thin cylinders, and then shows the appropriate computations to determine the downward forces as well as Lamé's Formulas, which are used to find the radial and hoop stresses acting on the cylinder.

This textbook is useful for students of civil, structural, and mechanical engineering. Designers and technicians of industrial machinery will also greatly profit from reading this book.

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