Design of Machine Elements

Chapter 1: Steady Stresses and Variable Stresses in Machine Members

1.1 Introduction to the Design Process
1.2 Factors Influencing / General Consideration in Machine Design
1.3 Selection of Materials Based on Mechanical Properties
1.4 Preferred Numbers, Fits and Tolerances
1.5 Direct, Bending and Torsional Stress Equations
1.6 Impact and Shock Loading
1.7 Calculation of Principal Stresses for Various Load Combinations
1.8 Eccentric Loading
1.9 Curved Beams – Crane Hook and 'C' Frame
1.10 Factor of Safety (FOS)
1.11 Theories of Failure
1.12 Design Based on Strength and Stiffness
1.13 Stress Concentration

Chapter 2: Shafts and Couplings

2.1 Design of Solid and Hollow Shafts Based on Strength, Rigidity and Critical Speed
2.2 Keys and Keyways
2.3 Splines
2.4 Couplings
2.5 Rigid Couplings
2.6 Bushed-Pin Type Flexible Coupling

Chapter 3: Temporary and Permanent Joints

3.1 Threaded Fasteners
3.2 Eccentrically Loaded Bolted Joint
3.3 Knuckle Joint
3.4 Cotter Joint
3.5 Welded Joints
3.6 Riveted Joints for Structures
3.7 Theory of Bonded Joints

Chapter 4: Energy Storing Elements and Engine Components

4.1 Various Types of Springs
4.2 Optimization of Helical Springs
4.3 Shot Peening in Springs
4.4 Flywheels Considering Stresses in Rims and Arms for Engines and Punching Machines
4.5 Connecting Rod
4.6 Crankshaft
4.7 Piston

Chapter 5: Bearings

5.1 Sliding Contact Bearings
5.2 Rolling Contact Bearings
5.3 Hydrodynamic Journal Bearings
5.4 Sommerfield Number, Raimondi and Boyd Graphs
5.5 Selection of Rolling Contact Bearings