

METAL FORMING TECHNOLOGY

Unit-I: STRESS AND STRAIN FOR ELASTIC BEHAVIOR

Description of stress at a point. State of stress in two dimensions. Mohrs circle of stress in two dimensions, state of stress in three dimensions. Mohrs circle of stress in three dimensions. Description of strain at point

Unit-II: PLASTICITY

The flow curve. True stress and true strain. Von Mises distortion energy criterion, maximum shear stress or Tresca criterion. Octahedral shear stress and shear strain. Basics of the theories of plasticity

Unit-III: FORGING

Classification of forging processes, forging equipment. Forging in plane strain. Open-die forging, closed-die forging, Forging of a cylinder in plane-strain. Forging defects, powder metallurgy forging

Unit-IV: ROLLING

Classification of rolling process, rolling mills. Hot rolling, cold rolling, rolling of bars and shapes, forging and geometrical relationships in rolling. Simplified analysis of rolling load, rolling variables, problems and defects in rolled products. Theories of hot rolling ,torque and horsepower, theories of cold rolling, torque and horsepower.

Unit-V: EXTRUSION

Classification of extrusion processes, extrusion equipment. Hot extrusion. Deformation and defects in extrusion. Analysis of the extrusion process. Cold extrusion. Extrusion of tubing and production of seamless pipe and tubing.

Unit-VI: DRAWING

Rod and wire drawing, tube drawing processes, deep drawing, residual stresses in rod, wire and tubes

REFERENCE BOOKS:

1. Dieter G E, “Mechanical Metallurgy”, McGraw Hill Co., 2001
2. W. F. Hosford and R. M. Caddell, “Metal Forming: Mechanics and Metallurgy”, Cambridge University Press, 2007
3. K. Lange, “Handbook of Metal Forming”, SME, 1985
4. Surender Kumar “Technology of metal forming processes” PHI Learning, 2008.