PRINCIPLES OF METAL FORMING TECHNOLOGY

PROF. PRADEEP KUMAR JHA
Department of Mechanical and Industrial Engineering
IIT Roorkee

INTENDED AUDIENCE : Any interested Learners
PRE-REQUISITES : Introduction to manufacturing technology or manufacturing processes.
INDUSTRIES APPLICABLE TO : Manufacturing Industries where forming takes place, for example SAIL, BHEL, Foundry and Forge industries like HEC, Bharat Forge etc.

COURSE OUTLINE :

The course focuses on understanding the science and technology of different forming processes. Most of the metallic objects undergo at least one of the metal forming operations, except the cast ones. Understanding basic principles of metal forming and further being applied by engineers and metallurgists directly contribute towards improvement in production in the industries. The concept of stress, deformation and failure, mechanics of metalworking and analysis of different metal working processes will be covered during the whole course. Introduction and working principle of powder metallurgy forging will be presented in the end. The course will enable the students be conversant with working principles so that they can use the knowledge gained towards increasing the productivity of manufacturing industries in the long run.

ABOUT INSTRUCTOR :

Prof Pradeep K. Jha is presently working as Associate Professor in the Department of Mechanical & Industrial Engineering at IIT Roorkee. He has been teaching the courses related to manufacturing technology and theory of production processes to undergraduate and postgraduate students for more than 12 years. He is actively involved in research work related to production processes, tundish steelmaking process, mold solidification in continuous casting etc.

COURSE PLAN :

Week 01 : Introduction and classification of metalworking processes, Behavior of materials
Week 02 : Concept of stress and strain, Hydrostatic and deviatoric stresses
Week 03 : Flow curve Yield criteria for ductile materials, plastic stress strain relationships
Week 04 : Yielding and ductility during instability, Effect of strain rate and temperature on flow properties
Week 05 : mechanics of metalworking, Analysis methods, Hot and cold working
Week 06 : Introduction, classification and analysis of forging and rolling operations
Week 07 : Defects in rolled and forged components, Analysis of extrusion process
Week 08 : Classification and analysis of wire and tube drawing and sheetmetal working, Powder metallurgy forming