MANUFACTURING GUIDELINES FOR PRODUCT DESIGN

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PRE-REQUISITES : No-prerequisite, any student enrolled for a UG/PG/Ph.D. degree in any discipline of Mechanical Engineering and Production Engineering.

INDUSTRIES APPLICABLE TO : All the industries involved in product conceptualization, design and development

COURSE OUTLINE :

Competition in the key word in today's business environment. The major objective of the companies worldwide is to conceptualize, design and develop products that not only satisfy the customer's needs and wants but also are competitive from cost as well as quality point of view. But it has been observed that our product design and development cycle usually follows a traditional/conventional approach that leads to a lot of non-value added features in the product. Moreover, these features also increase the manufacturing cost of the product. Therefore, there is an imminent need to acquaint the engineers and managers with the concept of design thinking that involves an integrated approach of combining the functions of design and manufacturing (including assembly). The integrated approach will certainly help the product designers to come up with designs that satisfy the customer requirements, offer good quality in terms of service and maintenance and are easy to manufacture at reasonable cost. The course contents will certainly add value to the knowledge base of the product and process designers and will definitely orient their thought process in the direction of integrating the manufacturing function with the design stage of the product development cycle

ABOUT INSTRUCTOR :

Prof. Inderdeep Singh is currently working as Associate Professor in Department of Mechanical and Industrial Engineering at Indian Institute of Technology Roorkee. He has taught among others, the industrial engineering courses such as Production Planning and Control, Product Design and Development, Work System Design, Industrial Management and Quality Management. He has been actively involved in the National Mission Project on Education Through ICT (NME-ICT) of Government of India. He has completed three video and one web course under the National Programme on Technology Enhanced Learning (NPTEL). He has developed suitable pedagogical methods for two under-graduate courses of Mechanical Engineering.

COURSE PLAN :

Week 1: Product Design: Basics, Introduction of Manufacturing Processes, Manufacturing Processes : Advantages and Limitations-I, Manufacturing Processes : Advantages and Limitations-II, Process Capabilities: Basics.
Week 2 : Engineering Materials, Properties of Materials, Selection of Materials – I, Selection of Materials – II, Applications of Engineering Material.
Week 3 : Robust Design, Design for X, Product Design for Manual Assembly, DFMA Guidelines, Ergonomics in Product Design.
Week 4 : Selection of Processes-I, Selection of Processes-II, Process Capabilities, Design Guidelines for Sand Casting, Design Guidelines for Die Casting Process.
Week 5 : Product Design Guidelines: Compression Molding and Extrusion, Design Guidelines for Extrusion and Injection Molding, Design Guidelines for Sheet Metal Working, Design Guidelines for Machining, Design Guidelines for Powder Metal Processing.
Week 6 : Assembly Processes: Introduction, Adhesive Joining: Guidelines, Design Guidelines for Mechanical Fasteners, Design Guidelines for Welding, Design Guidelines: Brazing and Soldering.
Week 7 : Induction Welding: Plastics, Ultrasonic Welding: Plastics, Vibration and Spin Welding: Plastics, Microwave Joining, Hole Making : Guidelines.
Week 8 : Design for Environment, Design for Environment: Steps, Product Architecture, Rapid Prototyping, Product Design : Manufacturing Perspective.