ADVANCED TOOL DESIGN

Subject Code: 13ME2105

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Prerequisites: Machine tools

Course Educational Objectives:

To make the student understand

1. advanced methods for tool design and manufacture
2. various tooling materials and their classification
3. concepts of jigs and fixtures
4. fundamentals of die and mould design

Course Outcomes:

The student will be able to

1. explain existing methods of tool design
2. select suitable tool materials for a given application
3. design simple jigs and fixtures
4. select appropriate moulds and dies in a given situation

UNIT-I

Tool design methods: Introduction, design procedure, statement of the problem, needs analysis – tentative design solutions, finished design, drafting and design techniques in tooling drawings, punch and die manufacturing techniques

UNIT- II

Tooling materials: Introduction, properties of tool materials, metal cutting tools, single point cutting tools, milling cutters, drills and drilling, reamer classification, taps, tap classification, the selection of carbide cutting tools, various heat treatments

Gages and gage design**:** Fixed gages, gage tolerances, the selection of material for gages.

UNIT- III

Design of jigs: Principles of clamping, drill jigs, chip formation in drilling, general considerations in the design of drill jigs, drill jigs and modern manufacturing, computer aided jig design

UNIT- IV

Design of fixtures: Types of fixtures, vice fixtures, milling fixtures, boring fixtures, broaching fixtures, lathe fixtures, grinding fixtures, computer aided fixture design, welding fixtures, fixture design for NC machine tools, cutting tools for numerical control, tool holding methods for numerical control.

UNIT- V

Design of dies and moulds: Die-design fundamentals, blanking and piercing die construction, pilots, strippers and pressure pads, presswork materials, bending dies, forming dies, drawing operations

Mould design: Splits in mould, split locking, two-cavity and multi-cavity moulds, design details of injection moulds

TEXT BOOK:

1. Donaldson Cyrll, George H.LeCain and Goold V.C., "*Tool Design*", TMH, 36th Reprint, 2006.

REFERENCES:

1. Wilson F.W., "*Fundamentals of Tool Design*", ASTME, Prentice Hall, India, 2010.

2. G.C. Sen and A. Bhattacharya, "*Principles of Machine Tools*", New Central Book Agency, Kolkata, 2009.