

## **32072 – PRESS TOOLS**

### DETAILED SYLLABUS

#### **UNIT- I PRESS WORKING FUNDAMENTALS, OPERATIONS, AND MACHINERY**

Shearing Theory-Critical stages of shearing, Features of a punched hole, features of the slug, burr. Clearance - Effects of Optimum, Excessive and Insufficient clearances, Clearance for blanking and Piercing, Land and Angular Clearance. Cutting Force – Methods to reduce cutting force, stripping force. Press working operations - Blanking, Piercing, Cutting off, Parting off, perforating, embossing, coining, bending, forming, drawing, curling, bulging, extrusion, swaging, trimming, and shaving. Safety in press working. Presses - Common types of Presses, Main parts of a typical power press, OBI Press, Specification of presses, Comparison of Mechanical, hydraulic and Pneumatic presses. Single action, double action and triple action presses. Press operating parameters – Tonnage, shut height, stroke, shut height adjustment, strokes per minute, die space. Special purpose presses – Press brake, transfer press, multi slide machine.

#### **UNIT- II PRESS & PRESS TOOL ACCESSORIES AND CUTTING DIES**

Press Feeding Mechanisms - Uncoilers, Straighteners and recoilers, Hand feed, hitch/grip feed, Roll feed, Hopper feeds, dial feeds, chutes, slides, magazine feeds. Ejection mechanism – Ejection by Gravity, air ejection, mechanical ejection, semi automatic and automatic ejection, Mechanical hands, ejection by next part. Parts and functions of a press tool - Punches, Dies, Stoppers, Trigger stops, Strippers – Fixed and Travelling, Gauges, Pilots-Methods of piloting, shanks -Strip layout, Economy factor. Cutting Dies - Construction and working of Blanking tool, Piercing tool, Progressive tool, Compound tool. Commercially available die components – Die sets, die set attachment devices, punches, die buttons, retainers, springs, fluid springs, die cushion and its types.

#### **UNIT- III BENDING AND FORMING DIES**

Bending of sheet metal – Bending theory, neutral axis, metal movement, spring back, methods of overcoming spring back. Bending Operations – Bending, flanging, hemming, curling, seaming, and corrugating. Types of Bending dies (construction and working principle) – V bending and its types, edge bending, U bending. Bending operations done using press brake. Forming dies – Construction and working principle of solid form dies, pad form dies, curling dies, embossing dies, coining dies, swaging dies, bulging dies, crimping, tube forming. Assembly dies - Riveting, tab stake, upset stake, crimping.

#### **UNIT- IV DRAWING DIES AND DIES FOR SECONDARY OPERATIONS**

Drawing operations – Shallow drawing, deep drawing. Analysis of cup drawing - Stages of drawing. Variables of drawing - Bending and straightening variables, friction variables, compression variables, stretch forming variables, analysis of draw speed. Draw dies & its construction and working principle – Conventional draw die, inverted draw die, redrawing and reverse drawing dies, drawing of square or rectangular shapes. Blank holders, blank holding pressure and its importance, air vents, drawing inserts, draw beads. Drawing with flexible tooling – Marform process, Hydro form process. Drawing defects, causes and remedies. Dies for secondary operations - Construction and working principle of Semi piercing dies, shear form dies, dies for formed contours, notching die, shaving die, side piercing die.

#### **UNIT- V FINE BLANKING TOOL AND SPECIALISED PRESS TOOL APPLICATIONS**

Fine blanking - Definition and Applications of fine blanking, Working principle of fine blanking tool, V Ring, function of V ring. Comparison of fine blanking with blanking. Clearance and press force calculations. Fine Blanking Machines - Working principle, Ram movement, Mechanical drives, hydraulic drives, Machine force, Ring indenter force, counter force. Fine blanking tools - Compound die tooling system with sliding punch, compound die tooling with fixed punch. Specialized Press Tool Applications - Construction, advantage and applications of advanced multistage tooling, unit tooling, angular piercing tools, CNC turret press. Principle of Quick Die Change (QDC) – need and advantages. Single Minute Exchange of Dies (SMED) – concept need and advantages. Factors Affecting Tool Service Life - Introduction, Elements of Tool performance, Procedure for investigation of tool failure, Trouble shooting in press tools, effect of heat treatment on service life of tools.

#### **Text Books**

- 1) Donald F. Eary. & Edward A. Reed, “Techniques of Press working sheet metal”, Prentice-Hall, Inc.,
- 2) Donaldson, “Tool Design”, Tata McGraw-hill Book Company.
- 3) Eugene ostergaard.D, “Advanced die making”, McGraw-Hill Book Company.

#### **Reference Books**

- 1) Dr. John G.Nee, “Fundamentals of Tool Design”, Society of Manufacturing Engineers.
- 2) ASTME, “Tool Engineers Hand Book”, McGraw-hill Book Company.
- 3) Paquin.J.R, “Die design fundamentals”, Industrial Press Inc.,
- 4) Eugene ostergaard.D, “Basic die making”, McGraw-hill Book company,.
- 5) Ivana Suchy, “Hand book of Die Design”, McGraw-Hill Book company.
- 6) American Society of Metals – Hand book – Volume 4 (Forming)