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Progressive Press Tool for Cabinet Plate

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Abstract:- In this project, we are designing progressive press tool of cabinet back plate, for which we have under gone through various types of press tools starting from conceptual design. Our conceptual design is approved by the client as it is fulfilling its requirement which depends on the costing, geometry of tool, press machine specification. There are several elements of press tools which have very critical geometry and needs higher accuracy to be maintained, these elements are Punches, Pilots Stripper plate, Dies, Guide pillar, Guide Bush etc. These critical elements need higher end CNC machines for the manufacturing process. For machining these elements program is generated using available CAM (Computer Aided Manufacturing) software and imported to machine. Wire cut machine is the basic need for the die manufacturing and for the rest elements CNC Lathe, CNC milling and grinding machine is required. All the analysis job work is done before manufacturing. After satisfactory results all the manufacturing process will be completed and tool elements are set for the assembly process, after which trial is carried out. Design optimization and analysis is done using Auto cad, Solid works and Analysis software.

Keywords: *Pilots Stripper plate, Progressive tool, U-Bracket, Scrap material, Raw material, Press capacity punching stripper, die sets Autocad CNC, press tools.*

I. INTRODUCTION

Tool Design is the process of designing and developing the tools, methods and techniques necessary to improve manufacturing efficiency and productivity. It gives industry the machine and special tooling needed for today high speed, high volume production. It does this at a level of quality and economy that will ensure that the cost of the product is competitive. Since no single tool or process can serve all the forms of manufacturing, tool designs an ever changing, growing process of creative problem solving.

Press tool form a vital and an integral part of our modern production houses. These tool act as the backbone for the production of stampings which range from the most general items like your wrist watch parts to the most sophisticated and complex items like the Skelton of automobiles, streamlined trains, aircraft, missiles etc.

A great knowledge in the theory of design of press tools helps to have a better scientific background instead of using thumb rule method. The designs should be feasible for manufacturing with the available machinery and the equipment. Standardization of tooling element reduces the time and the cost of manufacturing, follow up the action of every stage of manufacturing and working of the tool helps the tool designers considering to arrangement his knowledge and development of skills.

II. LITERATURE REVIEW

A literature review within a specific field of interest of research is one of the most essential activities in the process of research. This section acts as a platform for the whole research to support and define each action performed during analysis and experiment. Different books, research papers were studied to collect the basic information and design procedures according to standards.

- S.B. Gaikwad discussed in their paper “Design and Development of compound die” (2019) that the project mainly focuses on compound die design for existing operations to replace the current progressive die wherein the die contributed to increasing in the production rate,
- reduction of production cost and the time cycle from 30 to 40 sec using suitable design being done in Solid works and Analysis of the press tool being done in Analysis
- Pawan Kumar Rai “Causes & Prevention of Defects (Burr) In Sheet Metal Component” (2013) has discussed the imperfections that are common in the sheet metal industry which after a specified limit it takes the form of defect. Also different Chances of failure in Manufacturing & Assembly of Tool, need of material hardness, clearances and alignment of components are discussed.
- Gaurav C. Rathod in “Study and Analysis of Press Tool Design” develop a press tool for Piercing and notching made for sheet metal component. It shows a study of force reduction method used while designing the die and to ensure
- excellent geometrical compatibility of the mechanical press and the designed combined press tool. They also discuss a detailed study of various materials to be used for different components of the die, depending upon their importance, the efficiency of the die and the various factors affecting them.
- M Subramanian “Design and Analysis of Press Tool to Produce Radiator Stay Bracket” (2016) mostly focus on the designing of press tool to be used in the production of the stay bracket, also modelling of all the components, and analyzing the stress and deflection on the components.
- In “The design and fabrication of a compound die to make hexagonal washer”
- The authors N. Jyothirmayi presented the design and fabrication of a compound die that combines blanking and piercing operations. Detailed calculations for Press

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capacity, plate thickness, Punching, and blanking forces as well as spring calculations were shown. The successfully designed die is being currently used in the Metal Forming Lab of Chaitanya Bharathi Institute of Technology, Hyderabad.

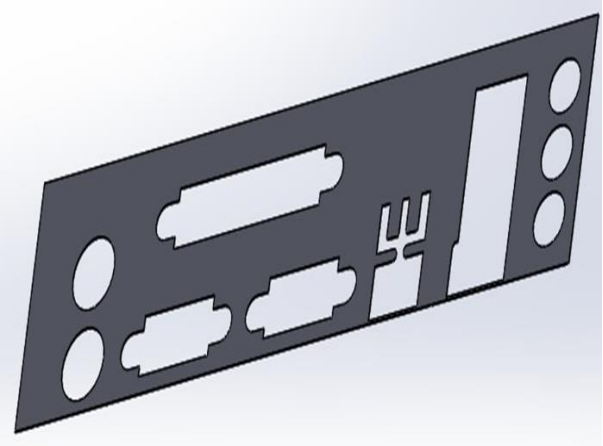

Fig 1Cabinet Plate 3D Components

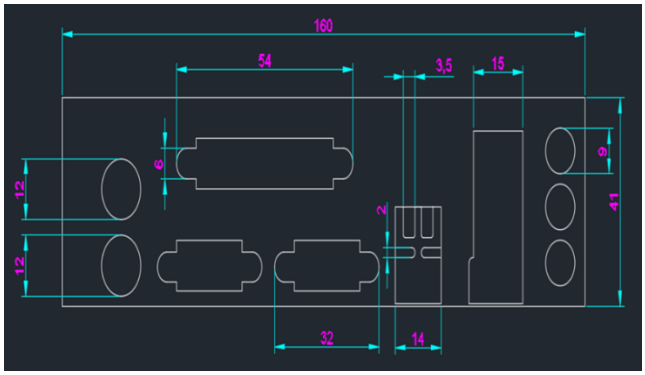

Fig 2 Cabinet Plate 2D Components

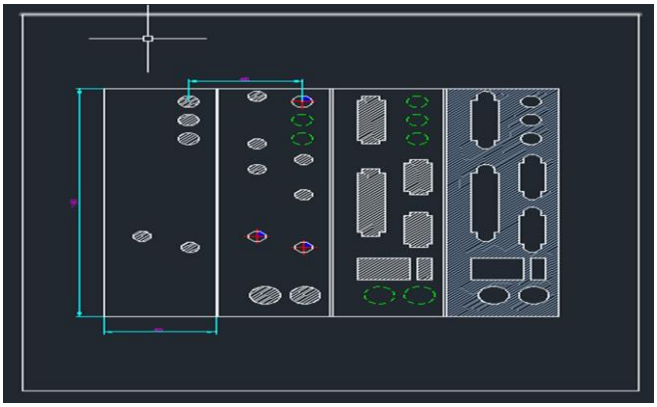

Fig 3 STRIP LAYOUT

III. OBJECTIVES

- Preparing 2d drawing of component.
- Strip layout and design calculation.
- Punch and die design
- Static analysis of punches and Die.
- Solid modelling of tool
- Drafting as per the manufacturing design.

IV. METHODOLOGY

The complete study of Design optimization and Analysis of Progressive Press Tool is carried out on Auto CAD, Solid works & Analysis Software.

- Calculation of cutting forces, Land Bridge ets as per the given machine specification.
- Static Analysis of die to with stand the cutting forces.
- Selection of Guide Pillar, Guide bush using standard designs available.
- Selection of use of stripper plate (Fixed / Floating stripper)
- Modelling of elements of Press tools
- Release of production drawing of tool elements
- Assembly of Press tools elements.

V. SCOPE OF WORK

- Component Drawing and modelling of component in Auto CAD and Solid works software.
- Study of component drawing for producing strip layout to calculate economy factor.
- Deciding location of punches and pilots as per the strip layout

VI. CONCLUSION

In conclusion, the progressive press tool for cabinet plates offers significant advantages in terms of manufacturing efficiency, productivity, and product quality. The integration of multiple operations into a single press stroke streamlines the manufacturing process, reduces production time, and enhances overall efficiency

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