

Review of Tool and Die Design For Piercing Operation of Strip

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ABSTRACT

In today's practical and cost-conscious world, sheet-metal parts have already replaced many expensive cast, forged, and machined products. The reason is obviously the relative cheapness of stamped, or otherwise mass-produced parts, as well as greater control of their technical and aesthetic parameters. That the world slowly turned away from heavy, ornate, and complicated shapes, and replaced them with functional, simple, and logical forms only enhanced this tendency. Metal stampings, probably the most versatile products of modern technology, are used to replace parts previously welded together from several components. A well-designed sheet-metal stamping can sometimes eliminate the need for riveting or other fastening processes. In this work the detailed study of the review of research papers is done.

Keyword: - Press Tool, Punch, Die, Tool, Die Set

1. INTRODUCTION

In today's practical and cost-conscious world, sheet-metal parts have already replaced many expensive cast, forged, and machined products. The reason is obviously the relative cheapness of stamped, or otherwise mass-produced parts, as well as greater control of their technical and aesthetic parameters. That the world slowly turned away from heavy, ornate, and complicated shapes, and replaced them with functional, simple, and logical forms only enhanced this tendency. [6]

Metal stampings, probably the most versatile products of modern technology, are used to replace parts previously welded together from several components. A well-designed sheet-metal stamping can sometimes eliminate the need for riveting or other fastening processes. Stampings can be used to improve existing designs that often are costly and labor-intensive. Even products already improved upon, with their production expenses cut to the bone, can often be further improved, further innovated, and further decreased in cost. The metal stamping die is an ideal tool that can produce large quantities of parts that are consistent in appearance, quality, and dimensional accuracy. It is a press tool capable of cutting the metal, bending it, drawing its shape into considerable depths, embossing, coining, finishing the edges, curling, and otherwise altering the shape and the outline of the metal part to suit the wildest imaginable design concepts. The word "die" in itself means the complete press tool in its entirety, with all the punches, die buttons, ejectors, strippers, pads, and blocks, simply with all its components assembled together. [6]

Press working may be defined as a chip less manufacturing process by which various components are made from sheet metal. This process is also termed as cold stamping. The machine used for press working is called press. The main features of a press are a frame which supports a ram or a slide and a bed. A source of mechanism for operating the ram is in line with and normal to the bed. The ram is equipped with suitable punch/punches and a die block is attached to the bed. A stamping is produced by the downward stroke of the ram when the punch moves towards and into the die block. The punch and the die block assembly are generally termed as die set and press working operations are usually done at room temperature.[5]

2. LITRATURE REVIEW

Vyshakh et.al[1], in their research paper “**Design, Analysis of Punch and Die for Blanking, Piercing and Forming tools to Produce Chain Guide Mounting Bottom Bracket**”, in this paper Design and analysis procedure to develop Blanking, piercing and forming press tool for Chain guide mounting bottom bracket is discussed. Press tool is a device used for producing sheet metal components in large volume by applying an external force with the help of a machine tool called press. Press tool operations are divided in to cutting, non-cutting and hybrid press operation.. The components manufactured using this process and it gives high dimensional accuracy therefore automobile engineering and aircraft firm depend largely on press tools components. Chain guide mounting bottom bracket is a part which is used in brake assembly unit of automobiles. Sequence of operation is planned initially and then press tool is designed and analyzed. The purpose of carrying out analysis is to prevent the costly tryouts and thus optimize the quality and rate of production.

Vishwanath M.C. et.al [2], in their research paper “**Design of Progressive Draw Tool**”, design progressive draw tool. In this work authors have designed a progressive die which has two stages of operation. The former operation is piercing and is followed by blanking. In both operations a finite volume of metal is removed from the sheet metal. If the final product happens to be removed portion then the operation is blanking, on other hand if pierced sheet metal is the final product then the operation is piercing. Both the operations are performed simultaneously in a single stroke of press, thus enabling the user to obtain the final product in a single stroke. This design procedure can also be extended for manufacturing washers for M-series bolts by modifying the punch and die plate dimensions.

SACHIN.G et.al [3], in their research paper “**Design Analysis and Overview of Press Tool With its Defects and Remedies**”, design press tool and study its defects & remedies. Tool making is one of the trades, which requires a detailed study, structural analysis and process planning before proceeding with any practical work. The success of any tool largely depends on the process analysis and design analysis of the tool. A systematic approach in tool making is therefore very essential. This project report mainly enlightens the various aspects of “Press Tool”. This report gives brief information about the design analysis and overview of a “PRESS TOOL” which serves the need for mass production of sheet metal component.

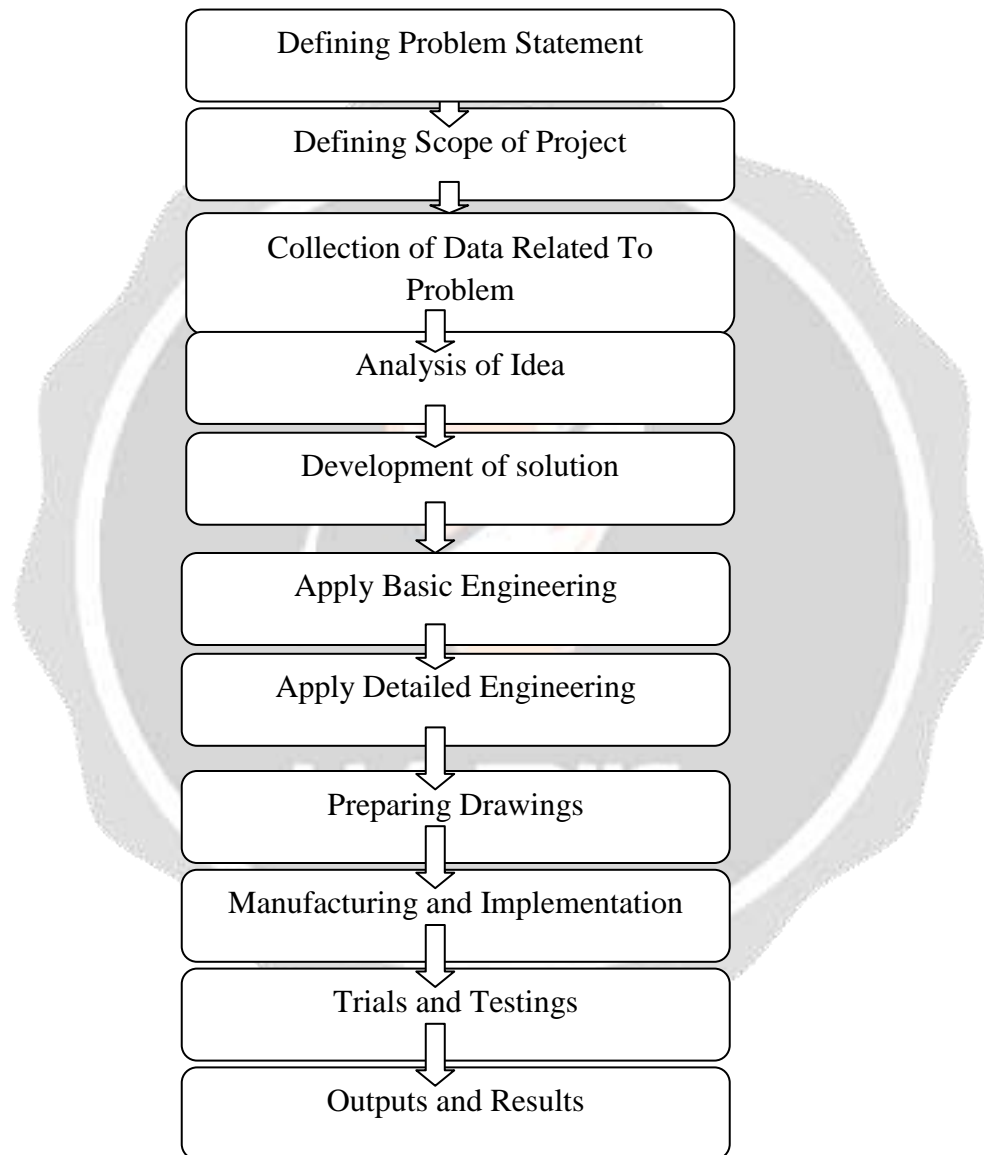
Subramanyam Pavuluri et.al [4], in their research paper “**Process of Press Tool Design and its Manufacturing for Blanking Operation**”, done the process of press tool design. Press tools are used to produce a particular component in large quantity, out of sheet metals where particular component achieved depends upon press tool construction and its configuration. The different types of press tool constructions leads to different operations namely blanking, bending, piercing, forming, drawing, cutting off, parting off, embossing, coining, notching, shaving, lancing, dinking, perforating, trimming, curling etc. Generally metals having thickness less than 6mm is considered as strip. Blanking is one of the sheet metal operations where we produce flat components of prerequisite shape. In Blanking the required shape periphery is cut and cut-out piece is called blank. The press tool used is for blanking operation is called as blanking tool, if piercing operation it is piercing tool and so on based on operation that we perform. The application of press operations are widely used in many industries like food processing, packing, defence, textile, automobile, aircraft and many apart from manufacturing industry. In this connection an attempt is made on to learn the press tool design, materials, manufacturing used for press tool and calculations involved in it. In this work, a real time design of a simple blanking press tool and manufacturing of a prototype is made along with analysis where the output is a circular piece having diameter of 20mm. The press machine is of mechanical type.

Mr. Anil Parmar et.al [5], in their research paper “**A Review on Process of Press Tool Design and its Manufacturing**”, did the survey on process of press tool design and find out that, the sheet metal working processes is predominantly used in various aspects not only for industrial purposes and also utilized for commercial purposes as well. For that many people are engaged in developing the trends by their innovative ideas. Especially in die design, they made different die set for different functionality such as compound die, progressive die, steel-rule die, modular die, sectional die, transfer die, etc. These die are functioned with their own perspective criteria. The parts of the die sets, punch and die are designed in the solid works and assembled with the mounting hardware. The Finite element analysis of each part of the die sets are done with the simulationpress tool.

3. METHODOLOGY

This project covers the details explanation of methodology that is being used to make the project. The method is used to achieve the objective of the project that will accomplish a perfect result. In order to evaluate this project, the methodology based on System Development Life Cycle (SDLC), generally three major steps, this is:

- Planning
- Analysis
- Design
- Implementation



3. CONCLUSIONS

From the above research papers it is concluded that when we need to produce the parts in large quantity with minimum adjustment it is best suitable to go with the tool and die with using appropriate machine. Die design should be done according to function and operation required. The calculations involved in die design are studied from above research papers.

4. REFERENCES

- [1]. Vyshakh, Sannamani L G & Dr Ramegowda D, Design, Analysis of Punch and Die for Blanking, Piercing and Forming tools to Produce Chain Guide Mounting Bottom Bracket, International Journal for Ignited Minds (IJIMINDS), Volume: 03 Issue: 08, Aug-2016
- [2]. Vishwanath M.C. 1 , Dr. Ramni 2 , Sampath Kumar L 3, International Journal of Scientific and Research Publications, ISSN 2250-3153, Volume 3, Issue 8, August 2013
- [3]. Sachin.G, Yathish.G, Amar, Design Analysis and Overview of Press Tool With its Defects and Remedies, International Journal of Engineering Technology, Management and Applied Sciences, ISSN 2349-4476, Volume 3, March 2015
- [4]. Subramanyam Pavuluri 1 , B.Rajashekar 2 , B.Damodhar 3, Process of Press Tool Design and its Manufacturing for Blanking Operation, International Journal of Innovative Research in Science, Engineering and Technology, ISSN 2347-6710, Vol. 5, Issue 5, May 2016
- [5]. Raveendra, Ch. Nagaraju, Design and Analysis of Press Tool Assembly, International Journal & Magazine of Engineering, Technology, Management and Research, ISSN 2348-4845, Vol-4, Issue-1, January 2017
- [6]. Ivana Suchy, Hand Book of Die Design, McGraw-Hill Publishing Company, 2006, 1998 by Ivana Suchy, pp 1
- [7]. Mr. Anil Parmar 1 , Darshit Patel 2 , Kalp Patel 3 , Badal Patel 4 , Maulik Patel 5, A Review on Process of Press Tool Design and its Manufacturing, Imperial Journal of Interdisciplinary Research (IJIR), ISSN 2454-1362, Vol-3, Issue-3, 2017

