Review on- Metal Sheet Clamping for Stamping Operation on Press Machine

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ABSTRACT

This paper contains the review study of camping and stamping operation discussed by various author. In paper the update methodology about stamping as well as clamping are discus for solving the problems occur at industries during production. Die set manufacturing for stamping operation is usually a rigid process. If one puts in little efforts it is easy even for a lay man to design a punch and die combination for a given product requirement. The problem creeps in when the product requirement changes frequently and the manufacturer is forced to manufacture multiple dies, there by incurring additional costs.

This project concerns with design, modification and optimization of camping for a sharing cum punching machine in industries.

Keyword: - *Clamping, Stamping, sheet metal, punching machine, Die, pressure pads*

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1. INTRODUCTION

Presses used for long runs are provided with automatic feed for the blanking strip. This consists of power-fed rolls driven from the crankshaft or slide-feed mechanism which advances the strip the exact amount each time the punches are clear. The strip is supplied in coils and the waste coiled up again after passing through the press. Stamping is defined as an operation in which a flat sheet metal is placed on die and punch to impress a desire shape using ma punch. The die over which the sheet metal is placed is design to replicate exact mirror image of the pattern which the manufacturer wants to produce. Stamping and compasses a wide range of sheet metal forming operation such as punching, embossing, coining, bending, flanging, lancing, notching, etc. Some of these operations use sharing as a medium of forming sheet metal. While some other require force to be form into require product. The above mention stamping operation is done on press machine. The most inessential part of press machine are the punch and die.

2. LITERATURE REVIEW

1. Mehmet Firat et al[1]. The continually decreasing lead-times for the design approval and the production of stamping dies enforce the stamping methods engineer to apply the finite element method more effectively in the industrial settings. The selection of a proper finite element plasticity model and the efficient utilization of the material formability data are main factors controlling the accuracy of the sheet metal deformation response prediction using a computer simulation code. Especially with the introduction of high strength sheet metals in to the stamping processes the capabilities and limitations of a plasticity model used in finite element process simulations should be reevaluated in order to have an accurate assessment of the part formability and spring back deformations.

2. R.Venkat Reddy[2]. study the appearance of dimensional deviations of shape and position, of the defects in the metal sheets that have been subjected to a cold plastic deformation process (deep- drawing), represents a critical problem for the specific industry, especially for the mass production, like the machine manufacturing industry. The aim of this publication is to present the principal aspects that effect of various factors like BHF, punch radius, die

edge radius, and coefficient of friction on the wrinkling of cylindrical parts in deep drawing process. The initiation and growth of wrinkles are influenced by many factors such as stress ratios, the mechanical properties of the sheet material, the geometry of the work piece, and contact condition. It is difficult to analyze wrinkling initiation and growth while considering all the factors because the effects of the factors are very complex and studies of wrinkling behavior may show a wide scattering of data even for small deviations in factors.
In the present study, the mechanism of wrinkling initiation and growth in the cylindrical cup deep drawing process is investigated in detail

3. H.L.Chan[3]. Application of implicit and explicit solvers has proven the usefulness of simulation to predict splits and wrinkles. The challenge now lies in extending the use of simulation to analyses aspects of panel quality. Chief amongst these are defects due to small deviations from the as-designed surface. These defects can be seen around formed areas within largely flat panels. The defects can be obvious to the naked eye even when less than 30µm deep; simulation involves the full sequence of forming operations including spring back. While these calculations can predict displacements, they cannot reveal the visual impact of the defect. This paper describes a method to visualize surface defects using a combination of LS-DYNA and LS-NIKE3D together with the ray-tracing code RADIANCE. Results from initial investigations are presented. Simulation of forming sheet metal panels has made great advances in recent years.

4. Z.Q.Sheng[4]. Fracture and wrinkling are two main failure modes in deep drawing of a coated metal sheet. With the development of damage mechanics and finite element modeling, it is possible to exactly predict the failure mode of a material during deep drawing. In this paper, a coated metal sheet during deep drawing is studied by finite element simulation and dimensional analysis. Based on a few dimensionless process parameters, a failure map is established, which can be divided into three regions including fracture, wrinkling, and success.

5. Tae-yeonkim[5]. Wrinkles are commonly observed in stretched thin sheets and membranes. This paper presents a numerical study on stretch-induced wrinkling of hyperplastic thin sheets based on nonlinear finite element analyses. The model problem is set up for uniaxial stretching of a rectangular sheet with two clamped ends and two free edges. A two-dimensional stress analysis is performed first under the plane-stress con- dition to determine stretch-induced stress distribution patterns in the elastic sheets, assuming no wrinkles. As a prerequisite for wrinkling, development of compressive stresses in the transverse direction is found to depend on both the length-to-width aspect ratio of the sheet and the applied tensile strain in the longitudinal direction.
The wrinkle wavelength decreases with increasing strain, in good agreement with the prediction by a scaling analysis. However, as the tensile strain increases, the wrinkle amplitude first increases and then decreases, eventually flattened beyond a moderately large critical strain, in contrast to the scaling analysis.

6. J.B.KIM[6]. Have suggested a numerical investigation on process parameters of hydro mechanical deep drawing with special attention to control of the blank holder force (BHF) is carried out. The effect of the counter pressure in the hydro mechanical deep drawing process is investigated in combination with different constant levels of the BHF. In this paper, attempts to improve partial quality by control the blank holder force according to the punch force have been explored.

7. Pedro G.Coelho[7]. study a model of the bending process in Press Brakes is established using Timoshenko beam theory. Expressions for the workpiece bending error are derived that explicitly consider the influence of shape, dimensions and initial deformation of the machine structural components on its bending accuracy. The minimization of the bending error is formulated in terms of optimisation problems that are solved numerically using a genetic algorithm. The methodology presented in this paper permits the analysis of existing Press Brake design solutions, the optimisation of their performance and the development of new solutions.

8 Koyama Hiroshi[8]. Studied the A concept of design architecture with a database for an intelligent sheet metal forming system was proposed to enable designing of a process control system without experts who are skilled and experienced in the forming process. In this study, the proposed architecture was applied to the variable blank holding force control technique for circular-cup deep-drawing.

3. COMPONENTS OF MACHINE

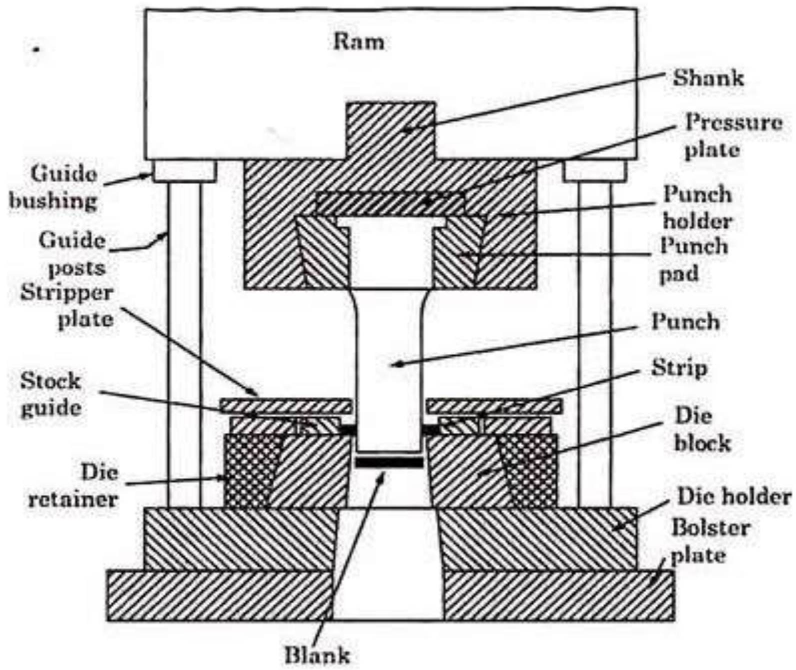

Fig -1: Power Press

3.1 Component # 1. Punch:

The punch is the member which forces the sheet strip down and may pierce it or draw it. It takes assistance of die to do this. It should be made of a hard, wear resistant metal and finally ground to a predetermined size providing just optimum clearance between die and punch. It should be made as small as possible consistent with required strength and rigidity and is secured by punch holder.

The punch and die are generally made of cast steel hardened and tempered or of one of the alloy steels recommended for the purpose. The advantages of alloy steel are that the risk of distortion or cracking in hardening is minimized, and the working edges of the tools are less likely to chip or crumble.

3.2 Component # 2. Punch Retainer of Punch Pad:

Its purpose is to hold the punch in its proper relative position. It may be a solid body around the body of the punch and is itself bolted to the punch holder. Generally between the top of the punch and the punch holder a pressure plate is also introduced to provide some cushioning effect.

3.3 Component # 3. Punch Holder:

On its top, it ends in a shank which is anchored to the press ram and it exactly fits into the ram opening for proper positioning and aligning of the punch.

3.4 Component # 4. Pressure Plate:

It is introduced between the back of the punch and punch holder in order to distribute the pressure over a wide area and thus reduces the intensity of pressure on the punch holder and ultimately avoids any possibility of its getting crushed under heavy loads.

3.5 Component # 5. Die:

It is also made of a hard, wear resistant metal and is finish ground to predetermined size and tolerance. In size, it is made as small as possible consistent with the required strength. It is a good fit and is nicely bedded in the slot which accommodates it, in order to avoid the heavy stresses and also to eliminate slackness developing with the shock conditions of service.

3.6 Component # 6. Die Retainer:

It holds the die block at proper position with respect to punch and is itself mounted in the die shoe or holder which in turn is bolted or clamped to the bolster plate.

3.7 Component # 7. Stripper:

These are of many designs. When the punch has completed its downward movement and starts returning, it has the tendency to carry the material with it. The stripper plate prevents this upward movement of the scrap strip and frees the punch of this for next stroke.

Suitable guide plates are also provided for locating the strip as well as a stop to control the amount by which the strip must be pushed forward for each blank. The stop controls this by contacting the farther side of the hole left by the previous blank.

3.8 Component # 8. Guide Posts and Bearings:

The punch and die members once properly located and aligned, are held in alignment by means of guide posts and bushings which resists movement or deflection of die members as operating pressures increase.

4. CONCLUSIONS

This research review's purpose is to help the reader understand different aspects posed by the research on the clamping stamping and wrinkling on the working sheet metal. This is significant because many hearing people have a different approach to solve the problems occur during the pressing and stamping when clam is fixed to hold the plate. The purpose of this review was to view the trends in composition studies within the past years

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