



TO IMPROVE THE QUALITY OF HINGE PRODUCT AND REDUCE THE RATE OF REJECTION AND WASTAGE ON POWER PRESS MACHINE

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Abstract — we observed that at BINA STEEL INDUSTRIES at Surendranagar, to the rate of rejection of hinges product is about 1/8 in industry & the wastage of the raw material (steel 202) of hinge part are much more. This is a very small scale industry currently they not using very good machining process and they work as old type of technique. We are going to design and making a new die to reduce the wastage of raw material and reduce a processing & machining time to an improve the quality of hinge product.

Keywords-press tool, die, hinge, blanking, piercing

I. INTRODUCTION

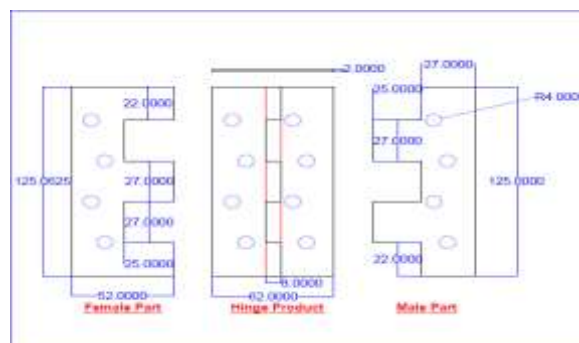
Press Tool is the process which is used to produce the sheet metal components. Operations like Blanking, piercing, bending, forming etc. can be performed using press tool process. The basic operation that is performed using press tool is blanking and piercing. Both blanking and piercing process includes in one die to make hinge. In this paper we restrict our study only regarding reduce wastage of raw material during blanking and piercing operation.

II. COMPONENT DETAIL

Name of the component: Door Hinge

Material: Stainless steel

Thickness: 2mm



III. CURRENT SYSTEM

I. INTRODUCTION ABOUT CURRENT DIE

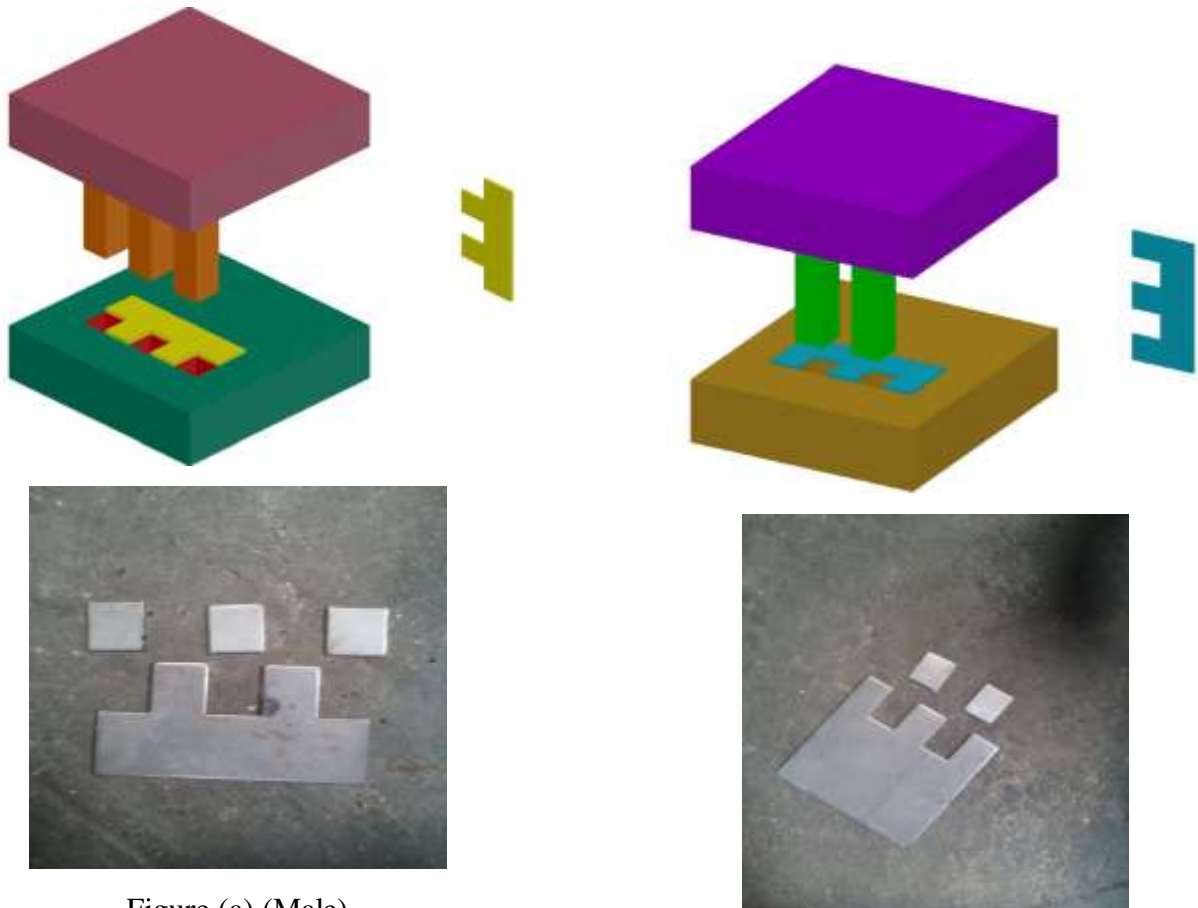


Figure (a) (Male)

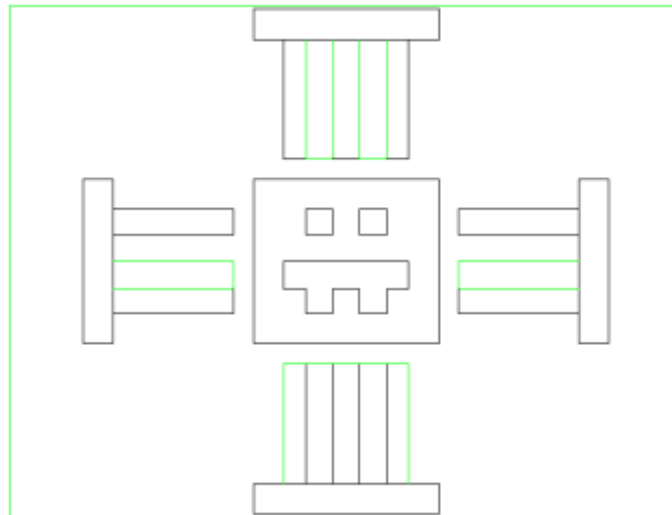
Figure (b) (Female)

II. DESCRIPTION

- In Industry there are more wastage of Raw material is high which we show in above figure
- This problem is produced because to design of die which are shows in figure
- In Industry the old days working Process and Machine are used. So, because of that this type of effect is introduced.
- This is very small scale of industry so this is very major problem which we will get try to solved in our project.

IV. PROBLEM SOLUTION

- The industry wants to reduce the wastage of raw material and increase the manufacturing time of hinges.
- Now a day's many good working and manufacturing machine are available, but they are very expensive. The industry is small scale so they don't buy a machine.
- Because of this we bring solution to design a new dies



V. TOOL DESIGN

Tool design is one of the most skill full job, because almost all the components which are produced using press tool will be demanded high dimensional accuracy therefore at most care should be taken will designing the press tool.

A. Important considerations in Press Tool Design

Several points have to be taken into considerations during press tool design process.

- All the parts that are designed should have the capability to bear the heavy forces.
- There should be safety and ease of both operator and setter.
- Sufficient space should be provided to load the stock.
- Die set should be made of proper material.

B. Selection of material

Along with the important design consideration one should also know about the proper material selection for components of a die set various types of tool steels with their suitability for components of die set. Material or selected tool steel should be very hard to resist wear and strong to bear load and at the same time die set components may have very complicated shape, design and need very accurate sizing. Most of them are manufactured by machining and then finishing operations.

Table no. I Chemical composition of material

Element	Fe	Cr	Mn	Ni	Si	N	C	P	S
Content (%)	68	17-19	7.50-10	4-6	1	≤0.25	≤0.15	≤0.060	≤0.030

Table no. II Mechanical properties of material

Properties	Mpa
Tensile Strength	515
Yield strength	275
Elastic modulus	207

A. Shear Force Calculation

$$\begin{aligned} \text{Shear Force} &= L \times T \times \tau \\ &= 354 \times 2 \times 26 \\ &= 18408 \text{ Kg} \end{aligned}$$

L= Length of Cut in mm
T= Thickness in mm
 τ = shear stress in kg/mm²

B. Stripping Force

$$\begin{aligned} \text{Stripping Force} &= 20\% \text{ of Total Shear Force} \\ &= (20/100) \times 18408 \\ &= 3681.6 \text{ kg} \end{aligned}$$

C. Press Force

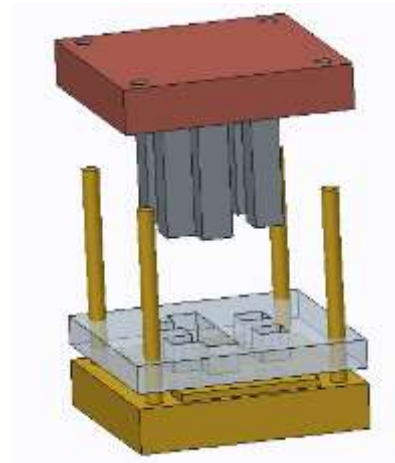
$$\begin{aligned} \text{Press force} &= \text{Total shear force} + \text{Stripping force} \\ &= 18408 + 3681.6 \\ &= 22089.6 \text{ kg} \\ &= 22.089 \text{ Tones} \end{aligned}$$

D. Press Tonnage

Press Capacity = (Total sum of shear force + Stripping force) / (70%)
 = (22.089) / (0.7)
 = 31.55 Tones

E. Clearance Calculation

Clearance = 0.075 x T
 = 0.075 x 2
 = 0.15 mm



OLD DIE	NEW DIE
<ul style="list-style-type: none"> • Two different die are used. 	<ul style="list-style-type: none"> • Only one die are use.
<ul style="list-style-type: none"> • Two dies are working turn by turn. 	<ul style="list-style-type: none"> • Die is working at a time.
<ul style="list-style-type: none"> • Wastage of the raw material is more 	<ul style="list-style-type: none"> • Wastage of raw material is less.
<ul style="list-style-type: none"> • Time required of manufacturing is more. 	<ul style="list-style-type: none"> • Time required of manufacturing is less
<ul style="list-style-type: none"> • Production rate is less 	<ul style="list-style-type: none"> • Production rate is more.
<ul style="list-style-type: none"> • Accuracy is poor 	<ul style="list-style-type: none"> • Accuracy is good
<ul style="list-style-type: none"> • Maintenance of machine tool is high 	<ul style="list-style-type: none"> • Maintenance of machine tool is reduce

VI. CONCLUTION

In this work some significant aspect of press tool design for hinge product is discussed and also detail study and design were carried out. The hinge product is firstly going in the long process of manufacturing because of the two different die using one by one to generate two parts of hinge (Male & Female) parts. But now because of new design and significant of the die design the manufacturing time is reduced and also the overall production time is optimized too. Because of this all things the overall benefits is gain to the industry.

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