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Study of Manufacturing of multi-saddle clamp

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Abstract – *Today's engineering world more competition of product produce in very less time, at the same time the products are becoming smaller but smarter more powerful and effective, so we can be designing multi saddle clamp die. Previously a single cavity die is used for manufacturing saddle clamp. In that die at time of a bending only one clamp is manufacture and another die the blanking operation are carried out at the blank sheet of a saddle clamp is produced and both end of these sheet having circular hole are formed with help of punch. But during this single cavity die the bending operation is performed at one clamp hence more time is required for manufacturing saddle clamp and for another die the blanking operation only one producing hole but as per requirement they require both circular and cylindrical holes in one die hence die is design in such a way that the both holes are produced in a blanking die. In another die the bending operation is carried out first or previously a single bending operation is performed then one saddle clamp is bending but the requirement is that in bending operation multi-saddle clamp is produced.*

***Key words*: Clamping, Manufacturing die, Bending, Blanking, Multi saddle clamp.**

1.1 INTRODUCTION

1.1.1. ROLE OF MANUFACTURING ENGINEER

It is the duty of manufacturing engineer to bring the ideas and design into reality by proper selection of material, machine and manufacturing process. Present day manufacturing demands high degree of accuracy for the part to work satisfactorily when assembled. Tolerance and surface finish desired demand great care in selection of manufacturing process, complete quality control and quality assurance programs, strict inspection at all stages.

1.1.2. ROLE OF MATERIAL

A large amount of materials is available today at the disposal of engineer. A proper selection has to be made to suit the requirements. A large variety of steels to suit any application, plastic to resist attack by acids and capability of fabrication into a variety of shapes, ceramics to withstand high temperatures, metals to stand up to the environment in a nuclear reactor, semi-conductors for use in computer circuits are available. Effective design in engineering calls for our ability to put them to the best use by selecting the right material for given job.

We have to understand why different material behave differently in service and the principle involved. By careful selection and treatment, it is possible to impart different properties. It is important for us to understand all these principles in order to be able to make best use of materials available to us. To achieve the optimum blend of properties, an engineer may have to make use of a variety of metals, organic material, ceramics.

The selection of material for a particular application involves consideration of factor like service requirement (strength, wear, corrosion résistance, electrical properties, aesthetic consideration etc.), manufacturing requirement's (ease of machining, finish desired, fabrication technique to be adopted, casting, moulding, welding etc., method of forming-hot or cold, method of joining various sub-assemblies, need of heat treatment to achieve), cost of raw material. More than obtained one may have two or three possible solutions in selection of an appropriate material. The final decision then should be best on preference and experience of designer and user and considerations like ease of repair on occurrence of faults, availability of repair facilities, skill of personal, use full life, etc.

1.1.3 WHAT IS A DIE?

A die is a specialized tool used in manufacturing industries to cut, shape and form a wide variety of products and components. Like moulds and templates, dies are generally customized and uniquely matched to the product they are used to create. Products made with dies range from simple paper clips to complex pieces used in advanced technology.

Die operations and types: Die operations are often named after the specific type of die that performs the operation. For example, a bending operation is performed by a bending die. Operations are not limited to one specific die as some dies may incorporate multiple operation types.

Bending: The bending operation is the act of bending blanks at a predetermined angle. An example would be an "L" bracket which is a straight piece of metal bent at a 90° angle. The main difference between a forming operation and a bending operation is the bending operation creates a straight-line bend as where a form operation may create a curved bend.

Fig.1.3 Press and Bending die

Blanking: A blanking die produces a flat piece of material by cutting the desired shape in one operation. The finish part is referred to as a blank. Generally, a blanking die may only cut the outside contour of a part, often used for parts with no internal features.

Compound die: A type of die that has the die block (matrix) mounted on a punch plate with perforators in the upper die with the inner punch mounted in the lower die set.

Drawing: The drawing operation is very similar to the forming operation except that the drawing operation undergoes severe plastic deformation and the material of the part extends around the sides. A metal cup with a detailed feature at the bottom is an example of the difference between formed and drawn.

Extruding: Extruding is the act of severely deforming blanks of metal called slugs into finished parts such as an aluminium I-beam. Extrusion dies use extremely high pressure from the punch to squeeze the metal out into the desired form.

Forming: Forming dies bend the blank along a curved surface. An example of a part that has been formed would be the positive end (+) of an AA battery.

Cold forming: Cold forming is similar to extruding in that it squeezes the blank material but cold forming uses the punch and the die to create the desired form, extruding does not.

Piercing: The piercing operation is used to pierce holes in stampings.

Progressive die: Progressive dies provide different stations for operations to be performed. A common practice is to move the material through the die so it is progressively modified at each station until the final operation ejects a finished part.

1.2 METHODOLOGY

Proposed work started with the problem identification in industrial process of manufacturing of different type of saddle clamp. By collecting available information and specification further solution finding approached. It is found that Quality and productivity play important role in today's manufacturing market. multi-saddle clamp is the cheapest and most efficient way to improve the productivity.

FLOW DIAGRAM OF METHODOLOGY

Methodology used for whole processing Design And manufacturing of multi saddle clamp die is given below; this methodology gives way about how work is to be carried out in systematic way. It is standard process of describing process, how it is done in simplest manner.

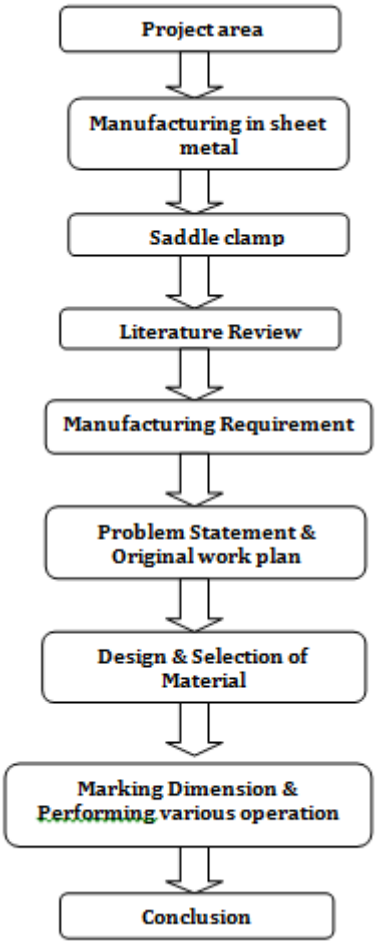

Fig.1.2. Methodology flow diagram

1.3. FUNDAMENTAL REQUERMENT OF DIE DESIGN

1. QUALITY PRODUCT:

Product should get manufacture within given base dimension & tolerance.

Productivity should maintain within 95%rejection of parts should not more than

1% product time should not exceed than 8 second per product.

2. EASE OF DIE HANDLING:

Die should not get damage while loading and unloading from press machine. Handling fixture is to be inbuilt.

3. EASE OF DIE SETTING:

Die setting time should not more than 15 minutes. Die setting tools to be provided with tool.

4. EASE OF DIE MAINTENANCE:

Die should produce 2-lack unit without any minor maintenance.

5.REDUCTION OF MANUFACTURING COST:

Manufacturing cost should be reduced by 50% than existing process.

6. REDUCTION OF SCRAP MATERIAL:

Material scrap should not more than 10%

1.4 PERFORMING THE VARIOUS OPERATONS

1. Surface Grinding:

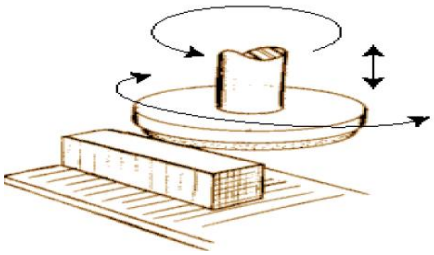

Fig.1.4.1 Surface Grinding

Surface grinding is one of the most common types of grinding operations, and it is performed on a surface grinding machine. Although surface grinding is normally used to grind flat surfaces, shapes or grooves may be produced on otherwise flat pieces by using a formed grinding wheel.

2. Drilling

Drilling is a process of producing round holes in a solid material or enlarging existing holes with the use of multi tooth cutting tools called drills or drill bits.

Fig.1.4.2 Upright drill press

3.Wire drawing

Wire-drawing is a commonly used process in manufacturing since it allows to improve the mechanical strength of wires, drastically reducing the diameter through a set of different dies.

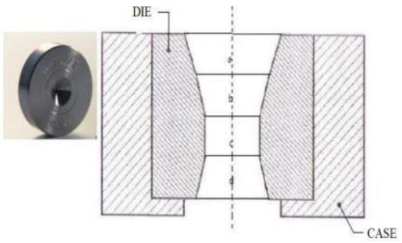

Fig.1.4.3 Section of drawing die

4.TAPPING

Taps and dies are used to cut threads in metal, plastics or hard rubber. The taps are used for cutting internal threads, and the dies are used to cut external threads. Taps are made of hardened steel and have the following parts: a square end, a round shank, a body (threaded) section and a chamfer.

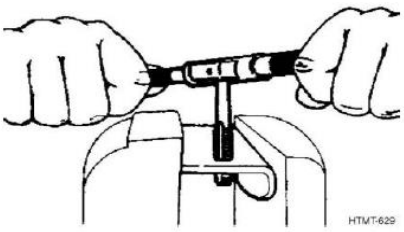

Fig.1.4.4 Hand Tapping

1.5 CONCLUSION

We are manufacturing the multi- saddle clamp by which mass production rate will be increased and it should reduce the total cost by 50%. Hence time required for manufacturing multiple saddle clamp is reduces by three times.

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