

Design of Punch and Die Mechanism Operated By Sewing Machine

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Abstract:

It is a common and continuous practice that the existing machines or devices are being replaced by new and advanced ones. This kind of replacements leads to wastage of material as well as Technology. Sewing machines are the famous machines most widely used for stitching are also coming under this category. In this project, the existing sewing machine is to be modified to operate 'Punch and Die assembly. Small and medium capacity containers used for domestic purposes are manufactured easily by make use of punch and die assembly. A thin metal sheet is being introduced between the punch and die, which is pressed against the die by make use of reciprocating action applied through the punch. The required reciprocating motion for the assembly can be provided by sewing machine. A few modifications are going to be performed on the existing sewing machine to accommodate punch and die assembly. The same set up can also be used for piercing operation also. Finally a unit with lowest cost is to be developed which is economically feasible and easy to operate.

1.0 INTRODUCTION:

A sewing table or work table is a table or desk used for sewing. Generally it has large amounts of space and a full set of sewing tools. Nearby there will be a chair and a waste bin. A common attachment is a dropleaf to give expanded space. Other attachments can be a cloth bag for storing sewing materials, drawers, or shelves.

Now a days the usage of sewing machines is reduced as the new and advanced machines are available. Since the oscillating motion of the sewing machine is being converted into reciprocating motion it can be used for any application. With this an attempt has been made to operate punch and die assembly with the help of sewing machine. Mainly it comes under Mechanical punch press and it is of two types namely,

- FULL REVOLUTION TYPE
- PART REVOLUTION TYPE

These project comes under FULL REVOLUTION Type. Generally Older Presses are "FULL REVOLUTION PRESSES" that requires a full revolution of the crank shaft for them to come to a stop. A die is a specialized tool used in manufacturing industries to cut or shape material mostly using a press. Like moulds, dies are generally customized to the item they are used to create. Products made with dies range from simple paper clips to complex pieces used in advanced technology.

2.0 ASSEMBLING:

The cut wooden frame is attached to the lower structure by using nuts & bolts. Rope drive is linked to mega wheel and it is used to transfer power. Two simply supported stands are attached to the wooden frame with the help of nuts and bolts. Then a shaft passes through these simply supported stands.

Disc is connected to the shaft on one side while on the other side it is attached to a linkage mechanism. A portable punch is attached to the linkage mechanism through welding. A portable die is attached to the wooden frame.

3.0 WORKING:

The whole project consists of sewing machine table, head wheel, shaft, two supporting stands with bearings, disc, punch and die. The sewing machine table consists of pedal. When we apply some force on pedal then the pedal helps to rotate the wheel. Then rotary motion is developed and then it transferred into head wheel by using of rope. The head wheel consists of shaft, so it is also rotated. The other end of the shaft consists of one disc. The shaft is supported with two supported stands with the help of bearings. So it is also rotated with the help of shaft. The disc consists of one link and it provides Oscillating motion. Then oscillating motion is converted into reciprocating motion at Punch & Die. Providing these three mechanisms we can operate Punch & Die mechanism Operated by Sewing machine.

4.0 ADVANTAGES:

- I. **SPEED, SPEED, SPEED!** – Progressive die metal stamping is based on the continuous feed of material through the different die stations of a tool. The nature of the process allows you to create more parts in a shorter period of time when compared with traditional fabrication or machining. For high volume parts, progressive stamping provides the lowest cycle times per part.
- II. **Less Scrap Material** – Progressive stamping is a metalworking method that can encompass punching, coining, bending and several other ways of modifying metal to produce your desired end part shape. The vast majority of material is used, hence, less scrap is produced. Progressive Die Metal Stamping may provide the most cost effective material option for

manufacturing your parts.

- III. **Quicker Setup** – When compared to traditional fabrication or machining, the setup time may be much less for the Progressive Stamping process. What is achieved in multiple Setups and processes during traditional fabrication and machining, may be performed in one operation if Progressive Die Stamping is utilized. This reduction in Setup and processing will result in a more cost effective piece part.
- IV. **Create More Geometries with a Single Process** – Progressive Die Metal Stamping allows you to create parts with many geometries within a single tool. All required geometries of the part are achieved in one Progressive Die operation.
- V. **Longer Runs** – The continuous material feed used in the progressive die stamping process allows for long runs. Longer runs between material changes and tooling adjustments mean your parts can be produced in a much shorter time.
- VI. **High Repeatability** – The hard tooling die designs allow for high volume runs without die degradation. This means that part quality remains high and there are fewer failed parts.
- VII. **Lower Cost per Part** – All of the factors above contribute to reducing the overall cost of your part. Using progressive die stamping allows you to create robust parts in the most cost effective and expeditious manner.

5.0 Conclusion:

This project shall be greatly helpful for small & medium scale enterprises. It is far more cost effective than heavy size punching press. Contrary to its look it is cheaper in availability.

It can be used for small scale domestic purposes. This model does not requires any skilled personnel. It can be used by illiterate or physically challenged personnel's also. No requirement for electricity, it works on simple manual foot power.

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