Design & Development of Snip Tool

Mr. Yuvraj Ravsaheb Patil[1], Mr. Vaibhav Uday Patil[2], Mr. Niranjan Manoj Sathe[3], Mr. Jayesh Dipak Sutar[4], Ms. K. S.Latthe[5],
[1, 2, 3, 4] Dept of Mechanical Engineering
[5]Assistant Professor, Dept of Mechanical Engineering
[1, 2, 3, 4, 5] Sharad Institute of Technology Polytechnical Yadrav (Ichalkaranji)

Abstract- *Snip Tool is used to cutting a sheet metal . this snip tool is cutting a minimum thickness of sheet . Snips also known as shears are hand tools used to cut sheet metal and other tough webs , there are two extensive categories tinners snips which are similar to common scissors. They usually have extra wide jaws and are made of drop forged carbon steel Depending on the size of the blade tin snips can cut between 24 and 16 gauge cold rolled low-carbon tin. In the grinder , an angle grinder as well as a side grinder or disc grinder is a handheld power tool used for grinding and polishing*

I. INTRODUCTION

This Shearing machine is a combination of Snip tool & Grinder which is used as a multipurpose device for cutting thin alloys and, sheets, or any other material into desired sizes. The main purpose of shearing machine is to cut Sheet metal into desired shape

1.1Thinner Snip: -

This can be used by both professional metalworkers or by hobbyists at home. Tinsnips are often used by metalworkers to cut up sheet metal for car bodies. They are useful for DIY jobs around the house, such as cutting metal for furniture, fencing, roofing and guttering. Tinner's snips, also known as tinner snips or tin snips, are one of the most popular type of snips. They are defined by their long handles and short blades. They usually have extra wide jaws and are made of drop forged carbon steel. Depending on the size of the blade, tin snips can cut between 24 and 16 gauge cold rolled low-carbon tin. They can be ranged in length from 7 to 14 in (180 to 360 mm) long. There are two main types: straight-pattern and duckbill-pattern. Straight-pattern are best for straight cuts, but can handle gentle curves. Duckbill-pattern snips, also known as trojan-pattern snips, have blades that taper down from the pivot to the tip of the blades. The blade edges are also beveled to more easily cut curves and circles or shapes. They are a lighter duty snip that can only cut up to 25gauge mild steel Other common blade patterns include the circle pattern or curved pattern and the hawk's-bill pattern. Circle pattern snips have a curved blade and are used to cut circles. Hawk's-bill snips are used to cut small radii on the inside and outside of a circle. The shape of the blades allows for sharp turns without buckling the sheet metal. A common use is cutting holes in pipes.

Fig. 1.1Tin Snips

1.2 Grinding machine: -

A grinding machine, often shortened to grinder, is one of power tools or machine tools used for grinding, it is a type of machining using an abrasive wheel as the cutting tool. Each grain of abrasive on the wheel's surface cuts a small chip from the workpiece via shear deformation.

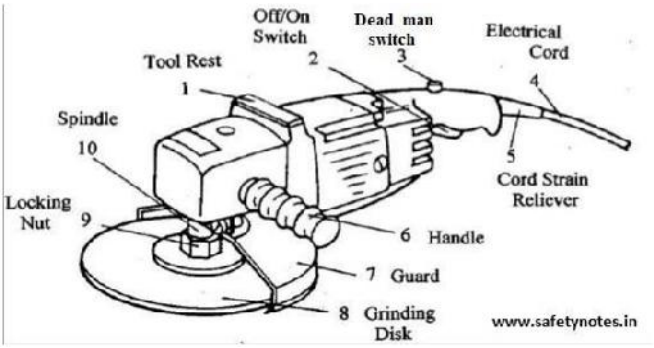

Fig. 1.2 Grinding machine

The Connecting link: -

The connecting link connects the Hand Grinder to the Snip Tool to transfer. Rotary motion into Reciprocating motion. In other words when Hand Grinder is started connecting link convert rotary motion of Hand Grinder into Reciprocating motion, one hand of snip tool is fixed & other hand is free to move this hand is connected to the connecting

link. As the one hand of snip tool reciprocate the Jaw of Snip Tool starts open & close.

II. LITERATURE REVIEW

Research paper on Reciprocating Shearing Machine by Pels Henry 1924: -

To all whom it may concern. Be it known that I, HENRY PELs, a citizen of the German Republic, residing at Berlin Charlottenburg, Prussia, German Republic, have invented certain new and useful I'm provident in Reciprocating Shearing Machines, of which the following is a specification. This invention relates to reciprocating shearing machines of the type known as crocodile shearing machines and in which a reciprocating upper knife cooperates with a stationary lower knife for cutting off any kind of scrap iron. The known machines of this type are, however, capable only of cutting section iron or flat iron of a breadth smaller than the frame of the machine and corresponding with the length of the knives so that their applicability is limited. This invention has for its object to do away with this disadvantage and to improve the construction of reciprocating shearing machines so that they can cut section irons and sheet iron plates of infinite length.With this object in view the upper knife is attached to a holder or lever at a suitable distance from its pivot axle which is jour nailed in the frame of the machine at a suit able distance above the lower holder, said holders being arranged with regard to the front parts of the U-shaped frame of the machine so that they project over one side of the frame. An embodiment of the invention is shown by way of example on the accompanying drawing, in which: - Fig. 1 shows the improved shearing ma chine in front elevation. Fig. 2 is an end view of the same. In the drawings the rocking lever is preferably a one-armed lever, although this is not essential. The shearing machine com prices a lower stationary holder 1 fixed on the machine frame. To this stationary holder 1 the lower knife 2 is fixed. The upper knife holder 4 consisting of a rocking lever is pivotally mounted on a pivot pin 3 and carries the upper knife 5. The knives extend beyond the one end of the machine frame and are of considerable length. The pivot pin 3 of the rocking knife holder 4 is, according to the invention, arranged above the lower knife holder 1 in such a manner that a free space 8 is formed between the fulcrum 6 of the rocking holder and the upper edge 7 of the lower stationary knife 2. The pivot pin 3 of the rocking holder 4 projects from the machine frame so that the cutting edge 9 of the upper knife 5, designed to move along the cutting edge 10 of the lower knife 2, stands in front of the machine frame. The machine frame 11 has a U-shaped mouth 12 open towards the knives.The rocking holder 4 is operated from an eccentric 14 through the interne diary of a pressure link 13; or in any other convenient manner. I claim:- In a pivoted shearing machine, the com bination of a machine frame having a U shaped mouth and having an upper and a lower arm, a lower holder fixedly attached to the lower arm of said frame, a pivot pin fixed on said upper arm and projecting over the outer face of the machine frame and standing at a suitable distance above said lower holder, an upper holder pivotably mounted on said pivot pin both holders projecting over the machine frame, and knives fixed on the holders so that their ends project also over the machine frame. In testimony whereof, I have signed my name to this specification at Berlin, Ger many, this 16th day of June, 1924. HENRY PELS.

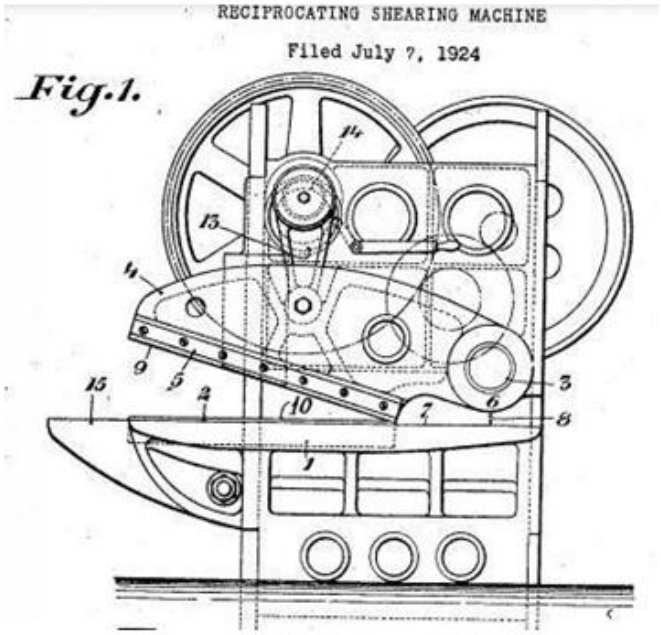

Fig.2.1.: -Reciprocation Shearing Machine.

Research paper on shearing machine by K.Krantikumar, K.V.S.S.Saikiran,

Jakkoju Sathish, MTechIn shearing or cutting operation as or blade descends upon the metal, the pressure exerted by the blade first cause the plastic deformation of the metal. Since the clearance between the two blades is very small, the plastic deformation takes place in a localized area and the metal adjacent to the cutting edges of the blade edges becomes highly stressed, which causes the fracture to start on both sides of the sheet as the deformation progresses and the sheet is sheared. In dentistry applications, pneumatic drills are lighter, faster and simpler than an electric drill of the same power rating, because the prime mover, the compressor, is separate from the drill and pumped air is capable of rotating the drill bit at extremely high rpm. Pneumatic transfer systems are employed in many industries to move powders and pellets.

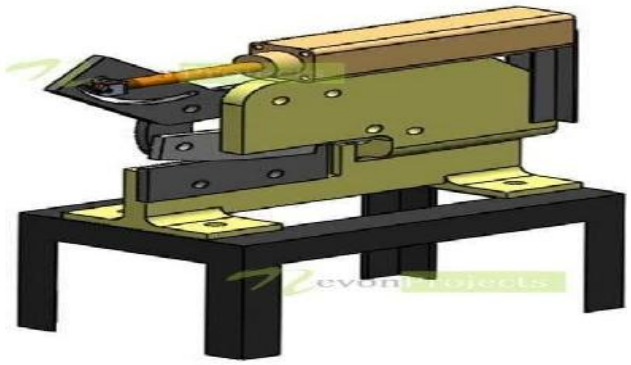

Fig.2.2. Pneumatic Shearing machine.

III. PROPOSED WORK

The manual sheet metal cutting process is taking too much time for cutting sheet metal. So, to reduce this load on worker, here simple modification is done as shown in fig.4.1. by the combination of this components snip tool, Hand grinder, connecting link. We had developed the snip tool as a shearing machine.The working of snip tool is simple, when hand grinder starts rotating then the rotary motion from hand grinder is transferred to connecting link whereas the connecting link converts the rotary motion into reciprocating motion. Thus, this reciprocating motion is transferred to moving handle of snip tool, & another handle of snip tool is fixed. Therefore, when the reciprocating motion is transferred to moving handle of snip tool the jaw of snip tool starts open & close. As the sheet metal is passed through the snip tool the as a result the sheet metal gets cut. We cannot pass the direct power of hand grinder to the assembly therefore, to overcome this problem we had connected one port which will control the speed of hand grinder or we should purchase the hand grinder with adjustable speed.

Design

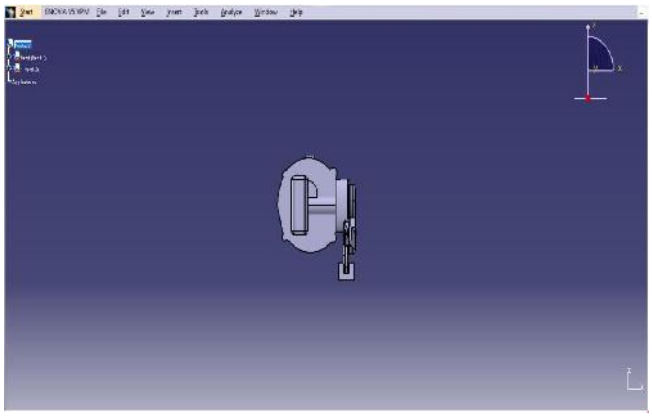

Fig.3.1 Left hand view

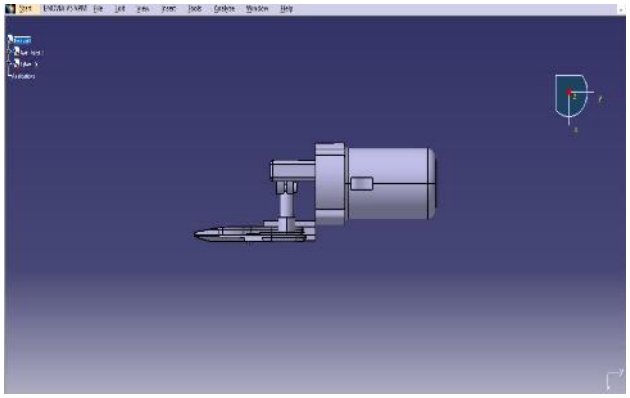

Fig.3.2 Top View

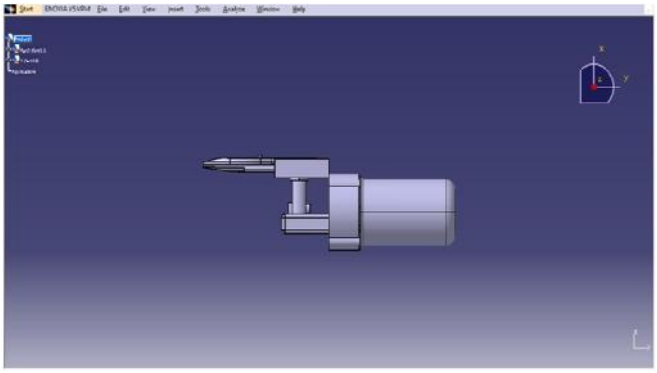

Fig.3.3 Bottom View

Fig 3.4 Development of snip tool

Methodology

1. Recognition of need & purpose for development of snip tool (Model).
2. Material selection.
3. Dimension design of components for model.
4. Modification according to need.
5. Detail drawing and assembly drawing.
6. Manufacturing or fabrication.
7. Fixing and testing of model.

Calculation:

How to choose proper grinder for model??

A force of 5 Kg is required to cut a metal sheet. A shears used for cutting the metal sheet has its blades 5 cm long, while its handle are 10 cm long. What effort is needed in watt/sec to cut the sheet??

Solution

Step 1

Given that,
Load resistance L=5 kg
Load arm (L.A) = 5 cm
Effort arm (E.A) = 10 cm
If, the effort E is
By principle of lever,
L * (L.A)=E*(E.A)E

$$E = \frac{L \times (L.A)}{(E.A)}$$

$$E = \frac{5 \times 5 \times 10 - 2}{10 \times 10 - 2}$$

E = 2.5kg
Hence, the effort is needed to cut the sheet is 2.5 kg.

Step 2

Now here we need power in watt so,
1 kilogram [kg] = 5.60958616721986E+35 electron-volt [eV]
2.5 kilogram = 2.24688794695 x 10^{+17}watt-second

Step 3

Hence 2.468x 10^{+17} watt-second So,
600W-750W grinder is sufficient to produce power, for to carry assembly thus to produce output.

Facilities available:-

The following facilities are available to carryout Project work at Sharad Institute Of Technology Polytechnic, Yadrav (Ichalkaranji)

- Library facility at Sharad Institute Of Technology Polytechnic, Yadrav
- Adequate workshop, laboratory and computing facilities at Sharad Institute Of Technology Polytechnic, Yadrav.
- Software packages available at Sharad Institute Of Technology Polytechnic, Yadrav

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