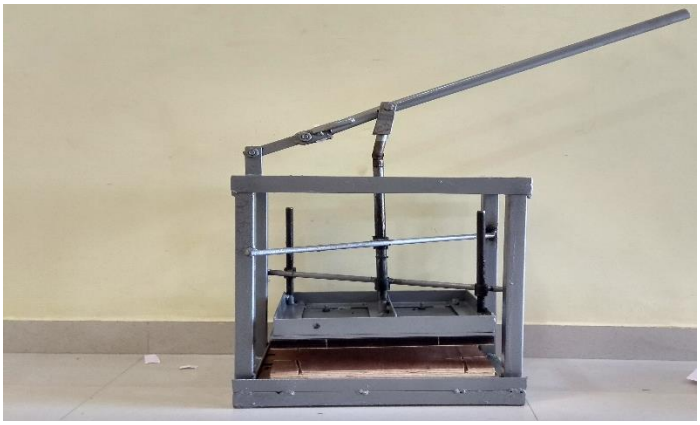
A PROJECT REPORT
ON
ENVELOPE CUTTING MACHINE

SUBMITTED TO
DEPARTMENT OF MECHANICAL ENGINEERING
OF
K.I.T's COLLEGE OF ENGINEERING, KOLHAPUR
AN AUTONOMOUS INSTITUTE



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UNDER THE MENTORSHIP OF:

Prof. N.V. Deshpande sir

YEAR 2018-2019

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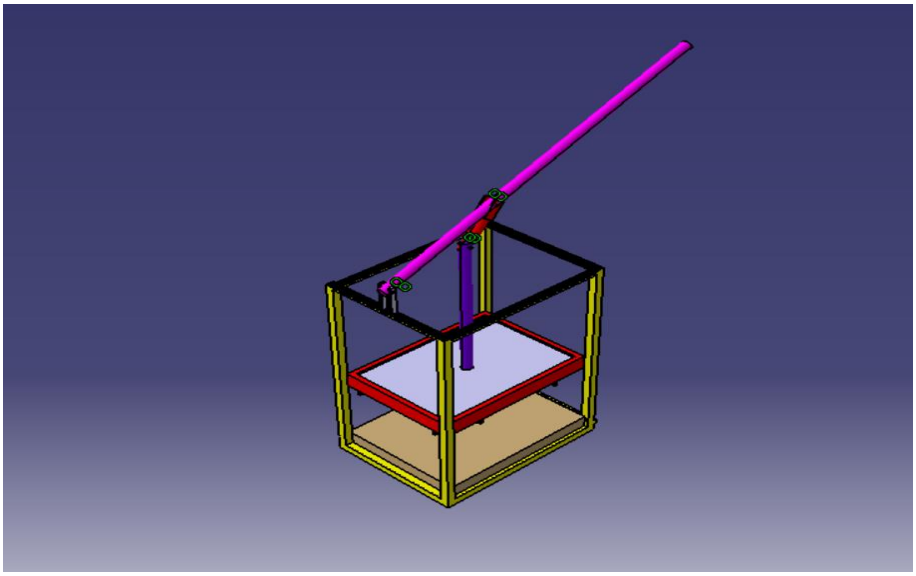
INTRODUCTION:

An envelope cutting machine is semi- automatic manual handling paper cutting machine used to cut paper in envelope pattern through a definite shape and size. It transmits a physical energy to pressure energy which leads to cut paper. Here worker doesn't need a specific skill for performing work.

This machine uses A4 size paper and cut into envelope pattern. Number of envelope formed is depends upon pressure applied and the thickness of paper. The machines don't need electric energy and other energy supply to power up. In a single punch it creates a whole pattern of envelope. This machine can be useful to start small scale industries or industries in rural areas.



BENEFITS:

- Efficient.
- Time saver.
- Simple and easy to use.
- Perfectness in pattern.
- Economical efficient.

Motivation:

In office works the envelope plays very important role. In cities it is available in easily in stores. But it is not easily available in villages because in cities there are various automatic machines which manufacture the envelope. The installation cost of the machines is very high and people in villages can't afford that much of cost. Also in villages there is huge problem of load shedding. So we thought to design semi- automatic envelope cutting machine that will be affordable to people and it will create employment opportunities.

Fig. automatic envelope

Problem Definition:

While manufacturing envelope manually, the main part is to cut the paper but there is some limitation such as human error, time, efforts, etc.

So, to design the semi-automatic paper cutting machine for envelope.

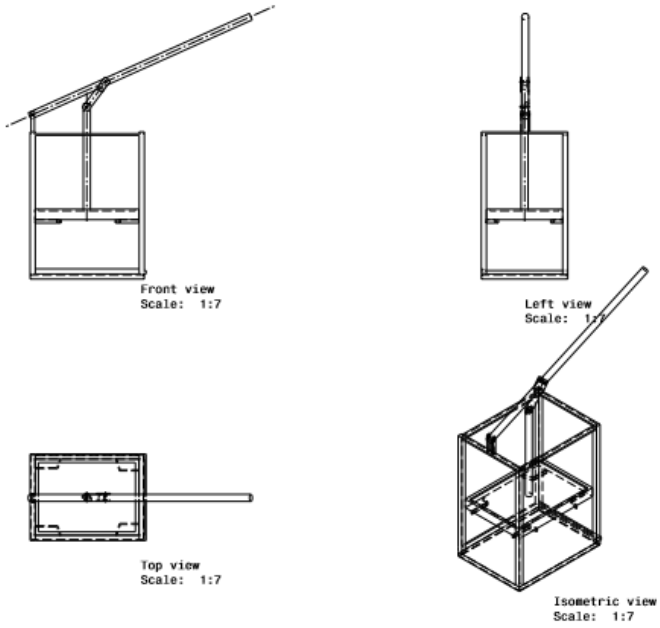


Fig. drafting of model

Objectives:

1. To make semi-automatic paper cutting machine for envelope
2. To reduce human efforts, time and errors
3. To reduce labor cost
4. To make affordable machine.
5. To study various mechanisms using Kinematics of Machine

Literature Review:

While visiting various paper factories/industries we found that there are only automatic paper cutting machines.

After deep survey we found that there is only one envelope manufacturing factory in our area which is totally automatic. But for automatic machines the installation cost, floor area, electricity consumption is high, so we want to design semi-automatic envelope cutting machine.

In our college batch 2015-2016 one group had studied on the topic envelope manufacturing machine

Methodology:

- We done survey on paper cutting machine then we decided the topic envelope cutting machine.
- We have drawn rough sketch of model.
- We prepared CATIA model with proper dimensions and simulation.
- We collected all required raw materials.
- We selected proper material from above.
- We did fabrication work.
- We have assembled all parts and test them.
- We are modifying as per requirement.

Fig. welding

Fig. cutting

Facilities available at the institute/industry:

At institute:

- Guidance: it is given by Prof. N.V. Deshpande and Prof. J.S. Bhat
- Some raw materials such as square pipes and angles.
- Simulation of CATIA model.

At industry:

- Raw materials like cutter
- Fabrication work such as cutting, welding, etc.

Fig. Angles

Fig. pipe

Fig. Paper

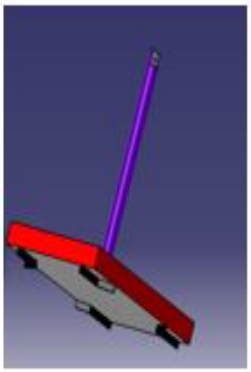
Fig. Square pipe

Raw material

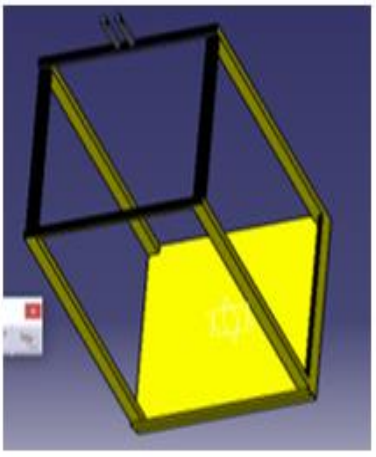
- Paper :290mm*224mm
- spring steel :(360mm*23.8mm*0.8mm)
- L shape angle :(2200mm*23mm*23mm)
- Pipe : 750mm
- Sheet metal : 294mm*228mm
- Square pipes :(2080mm*25mm)
- rod :(400mm* D.10mm)
- Metal plate :290mm*224mm
- Rivet
- Plywood : (300mm*235mm*25.4mm)*2
- Nut & bolt

Design:

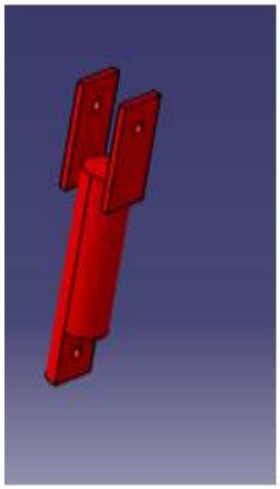
Parts



cutter



frame



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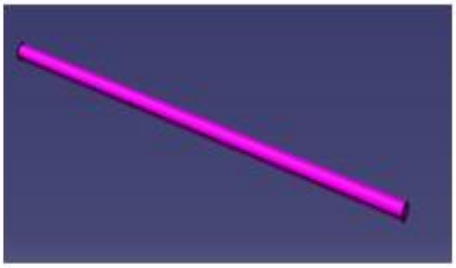
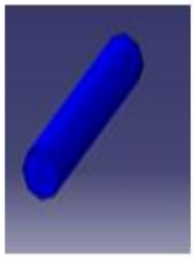
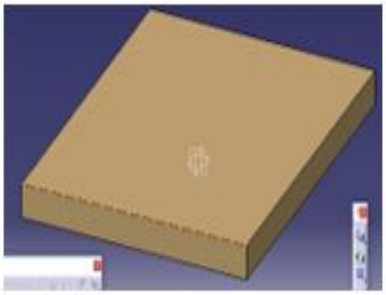


lever

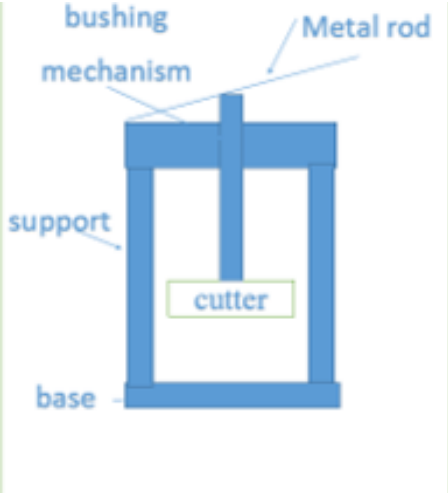


pin

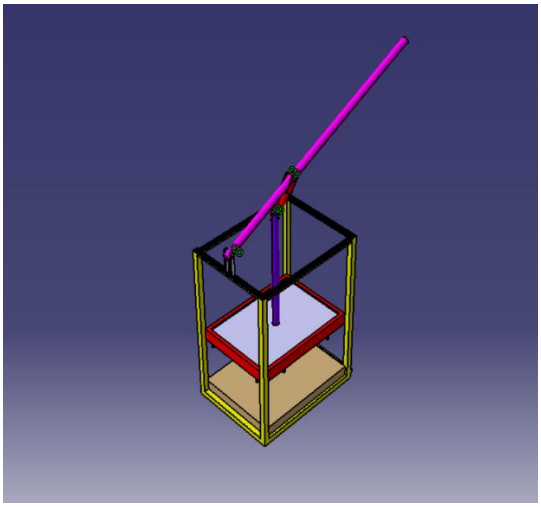


plywood

Construction



Block Diagram.



Model

1. Base: It consist of metal sheet. Used for placing the papers and supporting the mechanism.
2. Support columns: It is made of square pipes(MS). It supports cutter and metal rod.
3. Metal Rod: It is a hollow cylindrical pipe used as a lever.
4. Cutter: Spring steel blades in shape of envelope corners are inserted in the plywood. Metal plate is placed above the plywood to support the blades.
5. Mechanism: It has two rods connected by rivet and bolt.
   It converts oscillatory motion of lever into reciprocating motion of cutter.

Manufacturing of machine:

- We collected raw materials.
- Square pipes were cut into 4 pieces of length 400mm
    - sheet metal was cut with dimensions 400mm*235mm,
    - L-shape angles are fabricated in 4 pieces of 400mm*2 & 215mm*2
- Then all parts were welded
- Metal rod was cut into 2 pieces of length 100mm and 340mm, then those rods were joined by rivet
- Lever having length 650mm was cut and fasten to rod with the help of nut & bolt.
- With blade frame having dimensions 300mm*235mm was welded to metal rad
- Slotted plywood was fixed with base.
- At last coloring was took.

Cost of the project

1.	Paper	₹ 120
2.	Fabrication	₹ 1400
3.	Cutting blade	₹ 1050
4.	Plywood	₹ 100
5.	Steel plate	₹ 500
6.	Gum	₹ 50
7.	Color	₹ 250

Total Cost: ₹ 3470

Advantages and limitations

Advantages

- Cost (about 2500₹ only)
- Simple mechanism
- Same mechanism can be used for envelop cutting, paper bag cutting, medical bag cutting, etc.
- Semi-skilled operator is required
- Maintenance cost is less

Limitations

- Number of papers, that can cut in single time are less.

Applications

- ✓ To cut envelope of all shapes
- ✓ To cut paper bags
- ✓ To cut medical bags
- ✓ To cut paper boxes

Conclusion

As we know automatic machines are very costly and those are not affordable to small scale industry, requires much power and dies of those machines are costly. Hence our envelope cutting machine very useful and pocket friendly.

Future scope

- ✓ Paper holding mechanism

  While cutting papers are folding instead of cutting, if we hold papers tightly then this limitation can be overcome.
- ✓ Cutter design

  Various dies with plywood can be used to cut various designs
- ✓ Hydraulic system

  The main problem is cut only minimum papers so we can use hydraulic mechanism for cutting.

References

- "Design of machine elements", by V.B.Bhandari
- "Design of machine elements", by R.B.Patil
- "Theory of Machines", by Khurmi
- "Envelope maker for small scale industries" by Batch 2013 group