

# Automatic Stamping Machine for Post Card to Over Come the Usage of Manual Repetitive Stamping Work

Mr. S. M. Pimpalgaonkar<sup>1</sup>, Mr. S. V. Kale<sup>2</sup>, Mr. S. G. Ghugal<sup>3</sup>, Mrs. S. V. Borkar<sup>4</sup>

<sup>1</sup>Mr. S. M. Pimpalgaonkar, Assistant Professor, Mechanical Engineering Department, Priyadarshini Bhagwati College of Engineering, Nagpur

<sup>2</sup>Mr. S. V. Kale, Assistant Professor, Mechanical Engineering Department, Priyadarshini Bhagwati College of Engineering, Nagpur

<sup>3</sup>Mr. S. G. Ghugal, Assistant Professor, Mechanical Engineering Department, Priyadarshini Bhagwati College of Engineering, Nagpur

<sup>4</sup>Mrs. S. V. Borkar, Assistant Professor, Mechanical Engineering Department, Priyadarshini Bhagwati College of Engineering, Nagpur

## ABSTRACT

From the ancient time stamping action is done manually. The project named titled as AUTOMATIC STAMPING MACHINE FOR POST CARD, the purpose of this project is not only to minimize the human effort but also to minimize the time required for this action with the help of conveyor belt and rack and pinion mechanism. This machine utilizes electricity and gives a last impression on card as an output. The design and fabrication of AUTOMATIC STAMPING MACHINE FOR POSTCARD consist of rack and pinion mechanism, conveyor belt, dc motor, shaft and bearing. When the current supply is given to system the dc motor start as well as it rotates the conveyor. Here we use the relay as a switch, when the card comes to the stamping arm, relay stop the dc motor and actuate the rack and pinion mechanism, as it moves in linear direction the card get stamp. This machine can be used in post office, school and colleges for stamping on ID card. It is also use in many industries. By changing the rubber stamp this machine can be used for giving the any shape and size of mark on card, like logos, signature, etc. the design provide comfort for the operator. This machine works efficiently and satisfactorily.

## 1. INTRODUCTION

In modern era, the world is developing rapidly in day to day life of the human machine; system is changing as becoming vast rapidly. For small things to big ones are becoming advance in our day to day life and taking it under consideration, but we looking till a day the stamping action is done manually. In this system it takes plenty of time to work and also energetic. In order to reduce such problems, taking time criteria under consideration, we thought to accept the challenge to make a machine which can stamp on cards automatically. Some of the functions we had successfully implemented on machine that it can auto stamp on cards by using conveyor belt and stamping machine. It consists of conveyor belt, electric motor, stamping arm. It leaves a lasting impression of any shape and size. To make it effective and

successful many mechanical application are used systematically. The system consumes electric supply as a source of energy. When the current supply ON the current goes to the system through step down transformer it converts the high power of energy into low power up to 12v. The current voltage goes to dc motor through capacitor to relay and motor get start, it convert electrical energy into rotational energy. This rotational energy transferred to the roller.

As conveyor belt mounted on roller it also rotated and the card placed on conveyor goes in the forward. When the card comes under the stamp arm presses the relay switch, at this situation the relay breaks the circuit from the dc motor as well as it actuates the rack and pinion. Because of linear motion of pinion the last impression gives on card. As dc motor has capacity of 65 rpm this process goes continue and the cards on conveyor belt get stamped.

## 2. HISTORY

Since when post offices were started from that day the stamping process is done manually. Day by day increasing population makes the more work load in the offices. In accordance with increase in migration of people also increases the works of the post office. By doing the manual work, the work became slower due to human effort which results into late delivery of the letters.

### Journey of Stamp in letters:

The processes a letter goes through before the recipient receives it are captured under the journey of letters. Letters move from the senders in the form of outgoing mails and are delivered to recipients in the form of incoming mails. Letters are qualified to go through the mail stream after the right amount of stamp has been purchased and put on them. The letters are then put into the post boxes. These letters are later brought to the stamping table where the stamps are defaced. Segregation of the letters into various towns is performed.

Next, the letters are put into labeled bags and then into the mail van. When the mail van gets to its destination, the letters are debagged onto an open table. Primary sorting is done to rearrange the letters into frames. Secondary sorting is then performed to catalog the letters into letter boxes. Thus, the journey of a letter starts from the posting box and ends in the letter box.

### From the Past Analysis (Manually Operated)

1. No of stamp in 1hr= 400 – 500
2. Working hours in a day = 5 hrs.
3. Total stamping in a day = 2000 – 2500
4. One day labour cost = Rs. 250
5. Labour monthly cost = Rs. 7500
6. Yearly cost = Rs. 90000 – 100000

From the past analysis it has been determined that the whole process of post office is long lasting and time consuming. So to reduce the time and for better work it become necessary to reduce the manual work and have some automatic system. There should be proper sorting of the letters then fastest stamping should be there, so has to reduce the time consumption. Since we all want to contribute to have some easiest process into the post offices so we contributed by mechanical skills by making “Automatic Stamping Machine for Post Cards”.

## 3. DESIGN & SPECIFICATION

It is essential to decide objective for the design.

- A) The objective of design for automatic stamping machine for postcard as follow-

- To reduce the effort of human being to operate the machine.
- It should gain sufficient speed.
- It should require less time to operate it.
- It should have sufficient capacity.

### Specification

- Assumed Metal base length = 55cms.
- Length of conveyor = 123cms. = 1.23m.
- Diameter of roller

- On taking roller of Diameter 30mm

$$\text{Conveyor speed} = 3.14 * D * N$$

=

$$3.14 * 30 * 65$$

=

$$6.126 \text{m/min.}$$

- On taking roller of Diameter 50mm

$$\text{Conveyor speed} = 3.14 * D * N$$

=

$$3.14 * 50 * 65$$

=

$$10.2 \text{m/min.}$$

- On taking roller of Diameter 80mm

$$\text{Conveyor speed} = 3.14 * D * N$$

=

$$3.14 * 80 * 65$$

=

$$16.38 \text{m/min.}$$

The conveyor speed is found very slow on taking 30mm diameter roller and run very fast on taking 80mm diameter roller respectively.

There for through ergonomics study, we conclude to have roller diameter of 50mm.

- Length of roller = 8cms.
- Conveyor's cycle time = 7sec.
- Velocity of conveyor = (V=L/T)

$$= \frac{1.23 \text{m}}{7 \text{sec.}}$$

- = 0.175m/sec.
- = 10m/min.
- Speed of motor = N
- Velocity of conveyor =  $3.1416 \cdot D \cdot N$ 
  - $10.54\text{m/min} = 3.1416 \cdot 0.05 \cdot N$ 
    - N = 65 RPM.

Hence, speed of motor N = 65 RPM.

The design of automatic stamping machine for postcard is based on following main design aspects:-

Sr. No.	Particular	Specification	Material	Quantity
1.	Rack and Pinion	Pitch-2mm	Carbon Steel	1
2.	DC Motor		--	1
3.	Roller	Do-50mm Di-15mm	Synthetic material	2
4.	Shaft	D-15mm	Mild Steel	2
5.	Transformer	12v	--	1
6.	Body	L-550mm W-130mm T-2mm	Mild Steel	1
7.	Ball Bearing	D-6mm	Stainless Steel	2
8.	Split Pin	D-3mm	Mild Steel	1

#### 4.NOMENCLATURE

- D-Diameter
- Minute
- Do-Outer Diameter
- Di-Inner Diameter
- Rpm-Rotation
- W-Width
- L-Length
- T-Thick
- MS-Mild Steel

#### 5.CONSTRUCTION

After design work, the actual manufacturing of various parts is started. Numbers of various manufacturing processes are used to give the final assembly.

Fabrication of: - AUTOMATIC STAMPING MACHINE FOR POSTCARD consist of following

- It consists of conveyor belt, electric motor, stamping arm and rack & pinion gear mechanism.
- It leaves a lasting impression of any shape and size.
- First of we connect the wire with power supply board to transformer.

- This transformer is Step Down type of transformer.This converts the high power of current into low power.
- The output connection of transformer is connected to capacitor filter.The output of capacitor filter is connected to the relay.
- The main function of relay is as amplifying a digital signal, switching a large amount of power with a small operating power.
- It gives output supply to the both of machines.
- The first connection goes to the dc motor & other goes to the stamping machine.
- The electrical dc motor is connected to the drive roller with 65rpm.
- It gives the motion to the roller in clockwise direction.The roller is fixed on metal rod between two end corners of metal body.
- The rod is fixed in the small ball bearing for reducing the friction & provides smoothness to the operation.
- The cotter pin is provided for stable the rod to their places.Both rollers are connected with conveyor belt for travelling of component from one place to another. The rack & pinion mechanism used for stamping on the letter. It placed at the vertical position on the top of the track of the metal body.

#### 6.WORKING

It works on the principle of utilizing electric energy to mechanical energy for stamping on post card.

It is possible by rack & pinion mechanism.

The following steps give details about working of AUTOMATIC STAMPING MACHINE FOR POSTCARD:-

- It consists of conveyor belt, electric motor and rack & pinion gear mechanism.
- In this system we use the electric supply as a source of energy.
- When the current supply ON the current goes to the system through step down transformer, it converts the high power of current into low power up to 12 volt.
- The current voltage goes to dc motor through capacitor filter to relay and the motor get starts, it converts electrical energy into rotational energy.
- This rotational energy is transferred to the roller.

- As the conveyor belt mounted on roller is also rotated and the card placed on conveyor goes in forward.
- When the cards comes under the stamp arm, press the relay switch, at this situation the relay breaks the circuit from the dc motor as well as it actuates the rack & pinion.

- Because of the linear motion of the pinion the last impression gives on card.
- As dc motor has capacity of 65rpm this process goes continue and the cards on conveyor belt get stamped.

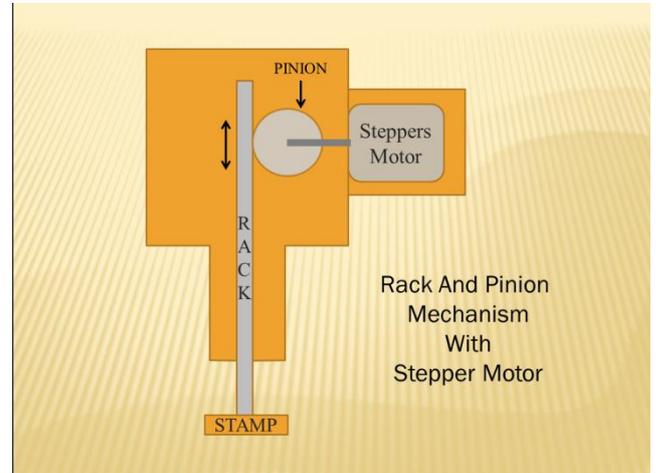
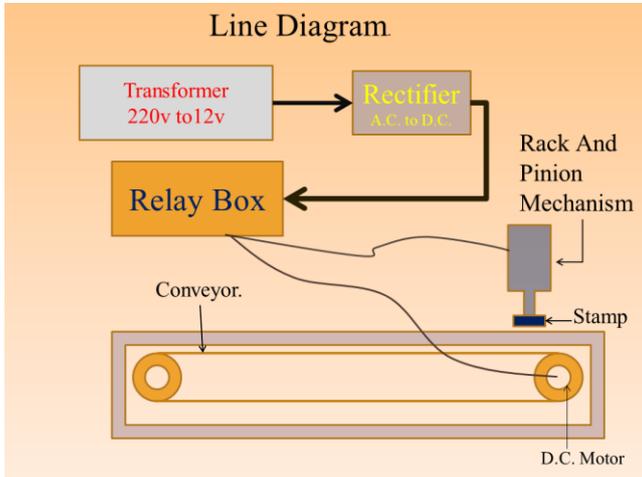


Fig – Line Diagram.

Fig – Rack & Pinion Line Diagram.

**ADVANTAGES**

The advantages of AUTOMATIC STAMPING MACHINE FOR POST CARD are as follows:-

- It minimizes the human effort which required for stamping.
- It reduces the human mistakes which occurred on work of stamping.
- It minimizes time as compare to human working conditions.
- It is easy to operate.
- It require semi-skilled person for operation.
- It doesn't create any kind of noise.
- It is of multi-purpose use.
- Applicable for mass stamping.

<ul style="list-style-type: none"> <li>• No of stamp in 1h = 400 – 500</li> <li>• Working hours in a day = 5 hrs.</li> <li>• Total stamping in a day = 2000 – 2500</li> <li>• One day labour cost = Rs 250</li> <li>• Labour monthly cost = Rs 7500</li> <li>• Yearly cost = Rs 90000 - 100000</li> </ul>	<ul style="list-style-type: none"> <li>• No of stamp in 1h = 1200 – 2000</li> <li>• Working hours in a day = complete working 8 hrs.</li> <li>• Total stamping in a day = 9000 -15000</li> <li>• One time machine establishment cost = Rs 20000 – 22000</li> <li>• Yearly cost including maintenance = 250000 - 300000</li> </ul>
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Thus the manual stamping cost is much higher than the automatic stamping cost, and takes less time to stamp maximum without any fatigue.

**APPLICATIONS**

The applications of AUTOMATIC STAMPING MACHINE FOR POST CARD are as follows:-

- It can be used in post office for stamping on letters.
- It can be used in school and colleges for stamping of college logo or signature purpose.

**Preference over Ancient Manual Stamping**

<b>Ancient manual stamping</b>	<b>Automatic stamping</b>
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- It is useful in many offices and press mills.
- It is also useful in industry.
- It can be used for stamping on I-Cards.
- It can be used to give any shape of impression on cards.
- It can be used for mass stamping.

## 7.FUTURE ASPECT

In future, modifying the model of AUTOMATIC STAMPING MACHINE FOR POST CARD by mechanical arrangement i.e. hydraulic system or pneumatic system to adjust the height of rack & pinion and use of sensor for sensing the paper, it will increase efficiency of machine.

By applying these modifications, the machine can be applicable for:-

- This machine can be used in courier offices.
- It leaves an impression on all types of packaging material of different shape and sizes.
- It can be used as punch and die arrangement.
- It can be used in press industry.
- It can be used for mass stamping.

## 8.CONCLUSION

From the ancient time stamping action is done manually. The purpose of this project is not only to minimize the human effort but also to minimize the time required for this action with the help of conveyor belt and rack & pinion mechanism. This machine utilizes electricity and gives a last impression on the card as a output.

This machine can be used in post office, school and colleges for stamping on post cards, identity cards etc. By changing the rubber stamp this machine can be used for giving any shape and size of mark on the card like logo, signature etc. The design provides comfort for operator and the operation is efficient and satisfactory.

If this machine is further modified and being used for large scale. Then it can be use fully automatic. The modification like

at first sorting machine should be attached in the post office so that it can sort out the letters then further process is on the automatic stamping machine. In this, this machine should have the sensors through which machine will arrange the stamp and the letter for the accurate stamp so that it will stamp on accurate position. No doubt that this machine will work faster than human being and very efficiently.

Finally, we conclude that automatic stamping machine is very efficient and can work faster than human work. Today in day-to-day life many posts are pending and cannot reach at accurate time due to which lot many things happens with costumers. Since using this machine for post cards faster work can be done at post offices and efficient work can be performed at post offices.

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