

Design And Fabrication Of Automated Sealing Machine

¹S.Jagadeesan, ²M.Ganesh, ³S.Karthik
¹Student, ²Professor, ³Student
 IFET College of Engineering

Abstract— Sealing is a most important step in approving a file, document. The sealing process is mostly used in the government offices like post office and other private industries. Most small scale industries have outsourced the end process of manufacturing due to high cost of using automated means of stamping cartons, papers and nylons. Small scale industries have been accustomed to manual methods of stamping with low machine efficiency, longer delivery time, high labour costs in a quest to meet customers' requirements. This current trend of stamping problems has made the small scale enterprises to lose large number of market share to the large scale manufacturing outfits. The need to make stamping process affordable, using easy to maintain machines and also complying to food regulatory bodies necessitated the need for this work. An Automated Stamping Machine driven by pneumatic systems that consists of air compressor, directional control valves, air service unit was designed, fabricated, tested and operated. The Fluid Sim software made by Festo didactic using the cascade method was adopted in the design and stimulation of the pneumatic circuit. Our idea is to make the process in mechanical and automatically.

Index Terms— Seal, scotch yoke mechanism, roller wheels, wiper motor and etc.

I. INTRODUCTION

Read the same way, and both matrix and impression are in relief. However engraved gems were often a seal is a device for making an impression in wax, clay, paper, or some other medium, including an embossment on paper, and is also the impression thus made. The original purpose was to authenticate a document, a wrapper for one such as a modern envelope, or the cover of a container or package holding valuables or other objects.

In most traditional forms of dry seal the design on the seal matrix is in intaglio (cut below the flat surface) and therefore the design on the impressions made is in relief (raised above the surface). The design on the impression will reverse (be a mirror-image of) that of the matrix, which is especially important when script is included in the design, as it very often is. This will not be the case if paper is embossed from behind, where the matrix and impression carved in relief, called cameo in this context, giving a "counter-relief" or intaglio impression when used as seals. The process is essentially that of a mould.

In the United States, the word "seal" is sometimes assigned to a facsimile of the seal design (in monochrome or color), which may be used in a variety of contexts including architectural settings, on flags, or on official letterheads. Thus, for example, the Great Seal of the United States, among other uses, appears on the reverse of the one-dollar bill; and several of the seals of the U.S. states appear on their respective state flags.

Sealing wax is a wax material of a seal which, after melting, hardens quickly (to paper, parchment, ribbons and wire, and other material) forming a bond that is difficult to separate without noticeable tampering. Wax is used to verify something such as a document is unopened, to verify the sender's identity, for example with a signet ring, and as decoration. Sealing wax can be used to take impressions of other seals. Wax was used to seal letters close and later, from about the 16th century, envelopes. Before sealing wax, the Romans used bitumen for this purpose.

Sealant is a substance used to block the passage of fluids through the surface or joints or openings in materials, a type of mechanical seal. In building construction sealant is sometimes synonymous with caulking and also serve the purposes of blocking dust, sound and heat transmission. Sealants may be weak or strong, flexible or rigid, permanent or temporary. Sealants are not adhesives but some have adhesive qualities and are called sealants. For the various purpose need of sealing process we think to atomizes it. So we introduce the machine called as "automatic sealing machine".

II. CONSTRUCTION

Motor

An electric motor is an electrical machine that converts electrical energy into mechanical energy. Most electric motors operate through the interaction between the motor's magnetic field and winding currents to generate force in the form of rotation. An electric generator is mechanically identical to an electric motor, but operates in the reverse direction, accepting mechanical energy (such as from flowing water) and converting this mechanical energy into electrical energy.

DC motor

A **DC motor** is any of a class of rotary electrical machines that converts direct current electrical energy into mechanical energy. The most common types rely on the forces produced by magnetic fields.

Wiper motor

The mechanism behind wipers is the windshield wiper motor, which provides the power the wipers need. A linkage converts

the rotational output of the windshield wiper motor into the back-and-forth motion of the wipers

A worm gear controls the force that the windshield wiper motor delivers to the drive arm by slowing down the speed of the electric motor by 50 times.

Clamp

A **clamp** is a fastening device used to hold or secure objects tightly together to prevent movement or separation through the application of inward pressure.

Battery

A battery is a device consisting of one or more electrochemical cells with external connections provided to power electrical devices such as flashlights, smart phones, and electric cars. When a battery is supplying electric power, its positive terminal is the cathode and its negative terminal is the anode.

Link (rod)

A **rod** is a rigid member which connects a seal to a crank in a reciprocating engine. Together with the crank, it forms a simple mechanism that converts reciprocating motion into rotating motion.

Roller wheels

A **caster** (also known as castor according to some dictionaries) is a wheeled device typically mounted to a larger object that enables relatively easy rolling movement of the object. Casters are essentially housings, that includes a wheel and a mounting to install the caster to objects (equipment, apparatus and more). Casters are found virtually everywhere, from office desk chairs to shipyards, and from **hospital beds** to automotive factories. They range in size from the very small furniture casters to massive industrial casters, and individual load capacities span 100 **pounds** (45 kg) or less to 100,000 pounds (45 t).

Wheel materials include castiron, plastic, rubber, polyurethane, polyolefin, nylon, thermoplastic rubber, forged steel, stainless steel, aluminium and more.

WORKING PRINCIPLE

The wiper motor (dc motor) which is use to rotate the crank which is fitted in the setup and the crank is from the mechanism of scotch yoke mechanism which gives us the ups and down motion. Due to the crank rotation makes the connecting rod to move up and down, at the one end of the connecting rod the seal is fixed. Another end is fixed in the crank. The sealing setup is made with the seal and ink box, at the time of pressing the seal touches the ink and return back to seal it. After sealing process the sheet is to be taken out, so using a another motor to rotate the roller wheels. These roller are use to move the sheet one by one.

III. DESIGN CALCULATION

SPEED =30RPM

VOLTAGE=12VOLT

WATTS =18WATT

Force calculation:

$W=1.54g$

$W=1.54 \times 10^{-3}Kg$

$F=0.00154 \times 9.81$

$F=0.015N$

Time calculation:

$A=wt$

$w=A/t$

where, $A = \pi r^2$

w- velocity

TORQUE CALCULATION:

$F=2\pi NT/60$

$0.015 = 2\pi NT/60$

$T = 0.015 \times 60 / 2\pi \times 30$

$T = 0.0047 N\cdot m$

ANGULAR VELOCITY:

$F = W \times T$

$W = F/T$

$W = 0.015 / 0.0047$

$W = 3.19 \text{ m/sec}$

DIAMETER CALCULATION:

$D = 3.19 \times 60 / \pi \times N$

$D = 2m$

RESULTS

The automated sealing machine found that with some more advantages and applications given below

ADVANTAGES

No need of man power

Simple mechanism

Time consumption is high

By using this machine we can reduce work and tension of office workers.

Easy to use.

APPLICATIONS

It is used in approving the document.

It is used in the post office approving letters.

It is used in medicals, banks and other private industries.

It can be used in school and colleges for stamping of college logo or signature purpose.

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.



Fig.a Design diagram



Fig.b Fabricated Diagram

CONCLUSION

After design work, the actual manufacturing of various parts is started. Number of various manufacturing process are used to give the final assembly. The major part of working is done using the mechanism called as scotch yoke mechanism. The fabrication of "AUTOMATIC SEALING MACHINE" for postcard consist of seal, electric motor, crank, roller wheels and this machine useful for both public and private industries.

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