



e-ISSN: 2319-8753 | p-ISSN: 2347-6710

IJRSET

International Journal of Innovative Research in
SCIENCE | ENGINEERING | TECHNOLOGY



INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

IN SCIENCE | ENGINEERING | TECHNOLOGY

Volume 13, Issue 5, May 2024

ISSN INTERNATIONAL
STANDARD
SERIAL
NUMBER
INDIA

Impact Factor: 8.423

 9940 572 462

 6381 907 438

 ijirset@gmail.com

 www.ijirset.com

Design and Development of Pen & Pencil Manufacturing Machine Using Waste Paper

Afra Anjum, Bharath.S.P, B.Srikanth, Nagesh.M, Shiva Kumar.S.Y

UG Student, Department of Mechanical Engineering, BITM, Ballari, Karnataka, India

UG Student, Department of Mechanical Engineering, BITM, Ballari, Karnataka, India

UG Student, Department of Mechanical Engineering, BITM, Ballari, Karnataka, India

UG Student, Department of Mechanical Engineering, BITM, Ballari, Karnataka, India

Assistant Professor, Department of Mechanical Engineering, BITM, Ballari, Karnataka, India

ABSTRACT: The present invention relates to the paper pen and pencil manufacturing technology, is a kind of machine of paper roll-type pencil. Adopt the present invention to produce paper pencil, can make lead for retractable pencil pursue root at interval by certain hour, coating coupling agent simultaneously drops down onto on the paper that enters synchronously again, enter transfer roller wheel is wrapped in the front end of paper with lead for retractable pencil after, what enter that the cylinder of the trough of belt of rotation and gluing and flexible material make fixedly rubs volume with the hands again between the FE Tiler, can make paper pencil. Thereby realize the suitability for industrialized production of paper pencil, save a large amount of special-purpose timber. The present invention is novel, designs ingeniously, and volume is little, in light weight, and the pencil manufacturer that is fit to various scales uses.

I. INTRODUCTION

Paper pencils are manufactured by waste papers like newspapers, magazines, waste scraps, etc. This highly reduces the production of wooden pencils. Even though the need for pencils is increasing day by day it requires a lot of wood to produce normal wooden pencils. Considering this downside there is no option other than finding an alternative (Paper Pencils). Even though this concept of making paper pencils are spoken about a long time ago. It still does not get familiar with production because of the high expense in machinery. To solve this compact and low-cost machinery is made to produce these paper pencils. Which contains a normal conveyor belt process, motor.

From the beginning of the human civilization, people used various methods of waste disposal to get rid of unwanted material. Sometimes it was buried in the land, thrown in the sea, fed to the animal or burnt. Getting rid of unwanted material is always a major concern for the modern society. Trash has played a tremendous role in history. The Subsonic Plague, cholera and typhoid fever, to mention a few, were diseases that altered the populations of Europe and influenced monarchies. They were perpetuated by filth that harbored rats, and contaminated water supply. When wastes are not properly managed then it may cause serious hazard, as seen in 1350. "Black plague" erupted and more than 25 million people from all over Europe fall victim to it in just five years. There is an increasing rate of waste generation in India and at present, it is about 1, 00,000 metric tons per day.

II. PROPOSED METHODOLOGY

- STUDY OF MACHINES
- STUDY OF MECHANICAL & ELECTRICAL DRIVES
- SELECTION OF MATERIALS
- DESIGN AND DEVELOPMENT OF FRAMES
- MANUFACTURING OF MODEL
- ASSEMBLY OF MODEL

- TESTING OF MODEL

III. DESIGN VIEWS

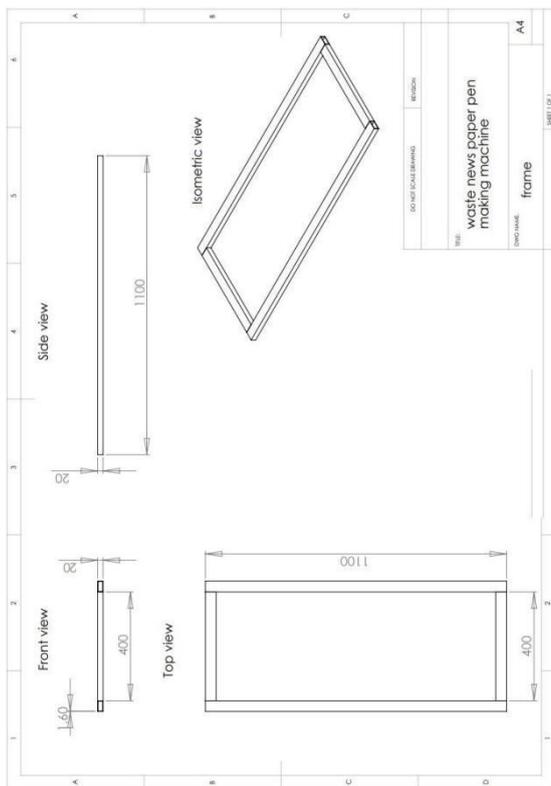


Fig 2.1 Frame

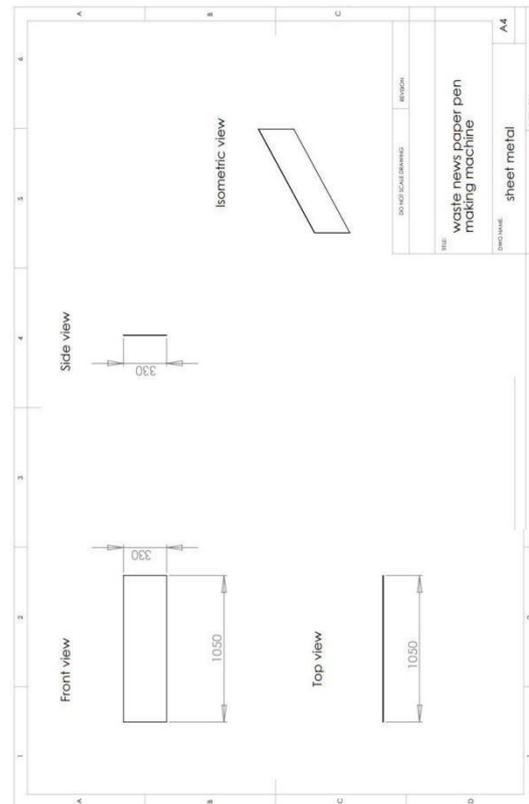


Fig 2.2 Sheet metal

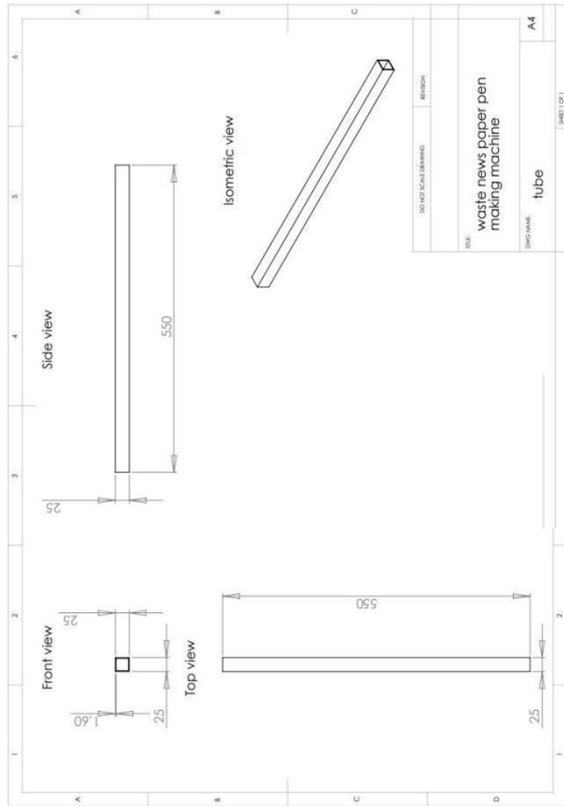


Fig 2.3 Tube

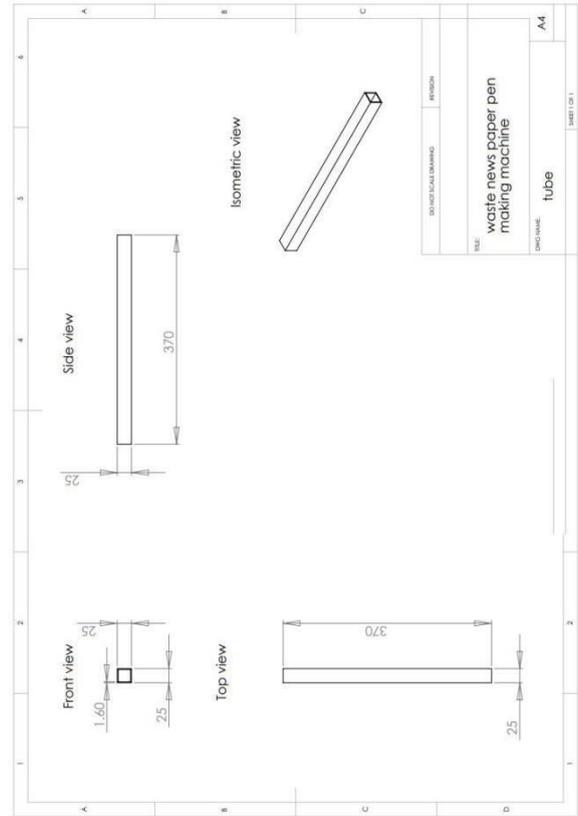


Fig 2.4 Tube

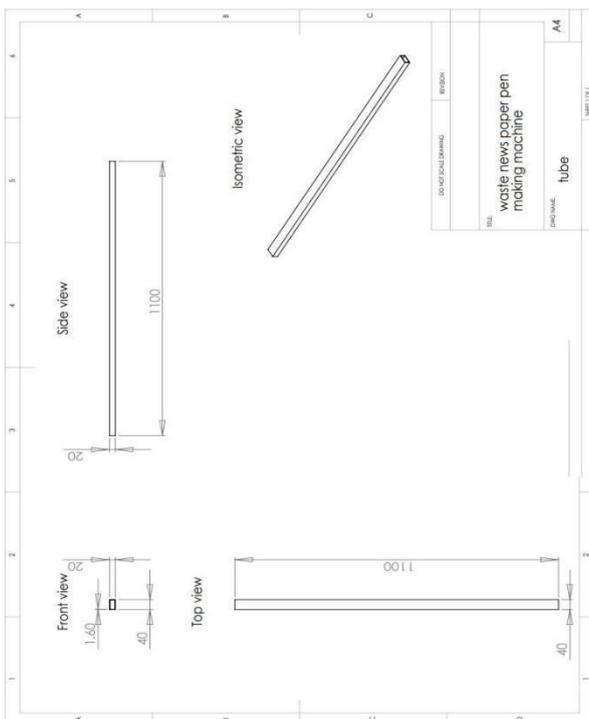


Fig 2.5 Tube

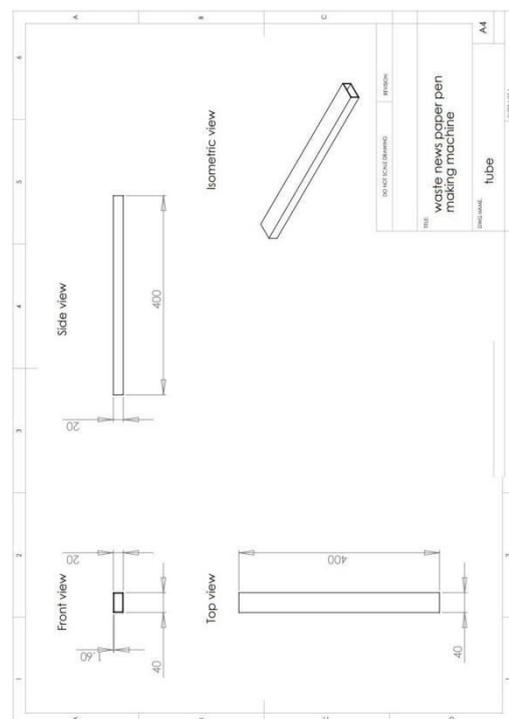


Fig 2.6 Tube

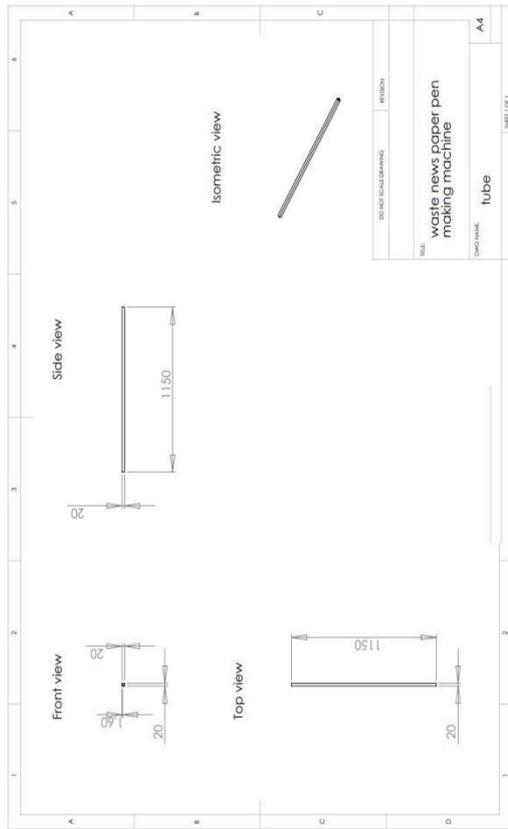


Fig 2.7 Tube

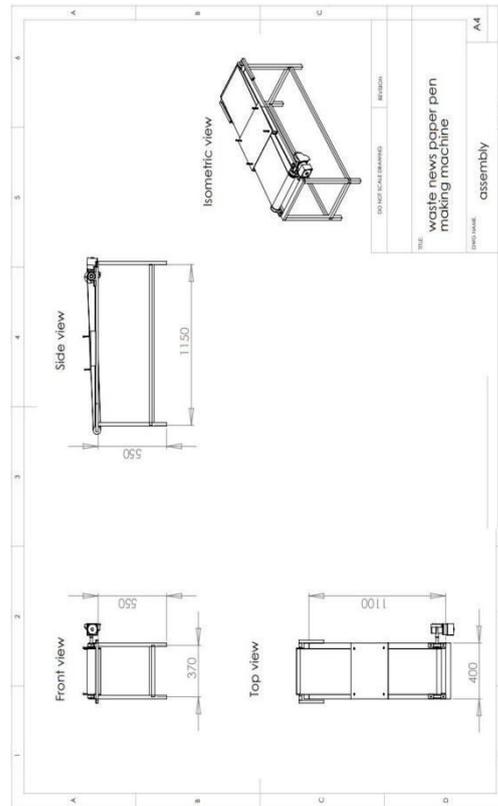


Fig 2.8 Assembly

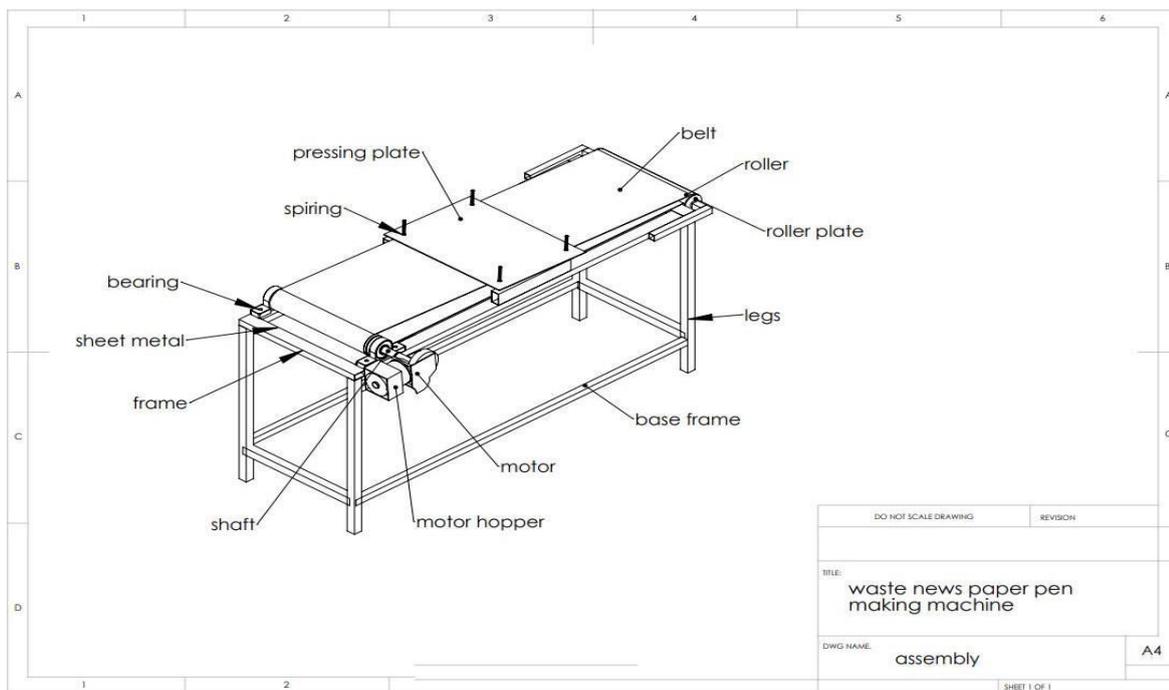


Fig 2.9 Assembly with labeled parts

IV. COMPONENTS REQUIRE

A. DC Motors



Fig 3.1 DC Motor

A DC motor is an electrical motor that uses direct current (DC) to produce mechanical force. The most common types rely on magnetic forces produced by currents in the coils. Nearly all types of DC motors have some internal mechanism, either electro-mechanical or electronic, to periodically change the direction of current in part of the motor.

The motor is being used of 12 volts and 50 watts.

Since the motor is of 50 watts and from battery it requires the power of 50watts hence the battery can deliver the power to the motor if it charged completely for 90 min approximately to rotate the motor

Motor

$$\text{speed} = N = 76 \text{ rpm}$$

$$\text{Power} = 50 \text{ watts}$$

$$P = 2\pi NT/60$$

$$T = P \cdot 60 / 2\pi N$$

$$= (50 \times 60) / (2 \times \pi \times 76)$$

$$T = 6.282 \text{ N-m}$$

$$T = 6.282 \times 10^3 \text{ N-mm}$$

The material being used for the shaft is mild steel Yield

stress $\sigma_y = 380 \text{ Mpa}$ for M S Material

$$\text{Shear stress } f_s = \sigma_y / (2 \times \text{FOS})$$

(FOS= factor of safety)

$$= 380 / 2 \times 2$$

$$=$$

$$95 \text{ Mpa } T / J = G\theta / L =$$

$$f_s / R$$

$$T / J = f_s / R$$

$$T = (\pi / 16) \times f_s \times d^3$$

$$6.282 \times 10^3 = (\pi / 16) \times 95 \times d^3$$

$$d = 6.9574 \text{ mm}$$

$$d = 18 \text{ mm}$$

Taking diameter of shaft as 18mm for the motor Hence the design of the motor shaft is safe.

B. Frame



Fig 3.2 Frame

A rectangle shaped angle rod is used for the construction of the frame. 1.60 mm thickness is used in concern of load factor. The machinery we are about to manufacture is a light-duty machine.

C. Sheet metal



Fig 3.3 Sheet metal

Sheet metal is metal formed into thin, flat pieces, usually by an industrial process. Thicknesses can vary significantly; extremely thin sheets are considered foil or leaf, and pieces thicker than 6 mm (0.25 in) are considered plate, such as plate steel, a class of structural steel. Sheet metal is available in flat pieces or coiled strips. The coils are formed by running a continuous sheet of metal through a roll slitter.

D. Rollers



Fig 3.4 Rollers

A revolving cylinder over or on which something is moved or which is used to press, shape, spread, or smooth something.

E. Conveyor belt



Fig 3.5 Conveyor belt

A conveyor belt uses a wide belt and pulleys and is supported by rollers or a flat pan along its path. Conveyors are durable and reliable components used in automated distribution and warehousing, as well as manufacturing and production facilities.

F. Bearing



Fig 3.6 Bearing

Bearings are "parts that assist objects' rotation". They support the shaft that rotates inside the machinery. Machines that use bearings include automobiles, airplanes, electric generators and so on.

G. Plywood



Fig 3.7 Plywood

Plywood is a composite material manufactured from thin layers, or "plies", of wood veneer that are glued together with adjacent layers, having both glued with each other at right angle or at 90 degrees angle.

H. Spring



Fig 3.8 Spring

A spring is a coiled piece of metal, usually steel, that stores energy. The word spring can also be used for any elastic object that stores energy, such as a rubber band. The stored energy can be used to create push and pull forces.

I. Nut and bolts



Fig 3.9 Nut and bolts

A nut is a type of fastener with a threaded hole. Nuts are almost always used in conjunction with a mating bolt to fasten multiple parts together. The two partners are kept together by a combination of their threads' friction (with slight elastic deformation), a slight stretching of the bolt, and compression of the parts to be held together.

J. Wires



Fig 3.10 Wires

A wire is a flexible, round, bar of metal. Overhead power cabling. The conductor consists of seven strands of steel (centre, high tensile strength), surrounded by four outer layers of aluminium (high conductivity). Sample diameter 40 mm. Wire is commonly formed by drawing the metal through a hole in a die or draw plate

K. ON-OFF-ON Switches



Fig 3.11 ON-OFF- Switches

On-off-on toggle switches are variations of the on-on design. They add a third, neutral off position in the centre. In (on) off (on) switches, the off position is the default resting position and both on positions will click back to this once released.

L. LED Power Supply



Fig 3.12 LED Power Supply

An LED power supply, often also called an LED driver or transformer, is a device used to regulate the power needed to operate LED lighting. They convert alternating current (AC) to a direct current (DC) and have a range of functions that allow the user to control their LEDs

ASSEMBLED MODEL



V. WORKING PROCESS

Process 1: As we already discussed, (newspapers) are sliced according to the size for binding the graphite lead inside the paper by folding it first. Then the glue is applied to the paper while it passes through the conveyor belt.

Process 2: Pressure plates are present in the way, when the papers pass through these plates, it starts rotating due to the resistance of the pressure plates against the rotation of the conveyor belt. Due to the spring support given to the pressure plates, it does not squeeze out the pencil while moving. Therefore the rotational speed of the conveyor is limited by the belt speed does not affect the rotational resistance caused by pressure plates.

Process 3: Due to the pressure plate resistance, the graphite needle with paper starts rotating hence it gets the shape of the pencil. Even though the process is done, the pencil is wet due to the excess glue used on it. The drying process takes place after the wet pencils are obtained. If this process is absent, the pencil obtained will remain wet and will not obtain the properties of the pencil.

Process 4: Then after drying, finishing or filing takes place to give the pencil an exact shape. It is used to remove the hardened glue in the pencil while the drying process and gives the pencil circular or any other shape required. After all these processes the paper pencil is obtained which gives the same usage as the normal wooden pencil.

VI. CONCLUSION

We have taken up this project as a real challenge, as we were not experienced in the field. We started our work on this project facing new hurdles initially.

The maneuverability of the device is quite good and the handling is quite simple. For commercial purposes one can improve the efficiency of the device effectively by increasing the size of the device.

REFERENCES

TEXT BOOKS

- M.R. S. Khurmi & J. K. Gupta - Machine Design- Eurasia publishing house New Delhi, 14th Edition, 2008
- N. T.R. Banga & S. C.Sharma – Industrial Organization and Engineering Economic (Estimation & Costing) Published by Romesh Chander Khanna, New Delhi 24th Edition 2006
- O. Theory of Machine –Rattan S.S Tata - McGraw Hill Publishing Company New Delhi, 2nd Edition, 2006



INTERNATIONAL
STANDARD
SERIAL
NUMBER
INDIA



INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

IN SCIENCE | ENGINEERING | TECHNOLOGY

 9940 572 462  6381 907 438  ijirset@gmail.com



www.ijirset.com

Scan to save the contact details