

A PROJECT REPORT ON
HYDRAULIC PEDAL
POWERED
AGARBATTI MAKING
MACHINE

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PROJECT GUIDE
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CERTIFICATE

This is to certify that this Report submitted by
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work as prescribed by the Maharashtra State Board of Technical Education for the
subject **HYDRAULIC PEDAL POWERED AGARBATTI MAKING
MACHINE.**

And that I have instructed/guided him for the said work from time to time and I found
him to be satisfactorily progressive; and that following students were associated with
him for his work. However his contribution was proportionate:

1. _____
2. _____
3. _____
4. _____

And that the said work has been assessed by me and I am satisfied that the same is up
to the envisaged for the level of the course. And that the said work may be promoted
to the External Examiner.

[NAME OF GUIDE & SIGN]

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ABSTRACT

The utility model relates to a zero electricity hydraulic agerbatti making machine which comprises a cylinder. The said machine is characterized in that a hydraulic machine is mounted on the upper portion of the cylinder; the piston rod is connected with a nylon piston at the lower end. An agerbatti stick mold is arranged at the bottom of the cylinder, and a hand operated power pack unit is mounted below agerbatti stick mold. The hand operated power pack consist of high pressure hose pipe and small piston cylinder and oil tank and non-return valve and spring loaded foot lever and pressure gauge. The hydraulic agerbatti making machine has the advantages that it is convenient and rapid to use and can be started after raw materials are directly placed in the machine, it is time-saving, labor-saving, efficient, rapid and high in yield as compared with a traditional manual agerbatti making machine, the appearance of an agerbatti stick made by the hydraulic agerbatti making machine is can be flexibly selected, the mold is easily replaced as needed, the thickness and the length of the incense stick made by the zero electricity hydraulic agerbatti making machine can be automatically controlled by adjusting the mold nut assembly.

Sketching tools have been extensively used for giving initial shape to the ideas. Final shaping was done with the help of computer software like CAD (Computer aided drafting), Inventor and Solid works.



DIE ASSEMBLY TOP VIEW



DIE ASSEMBLY FRONT VIEW



CYLINDER



CYLINDER DIE ASSEMBLY



EXTRUSION DIE



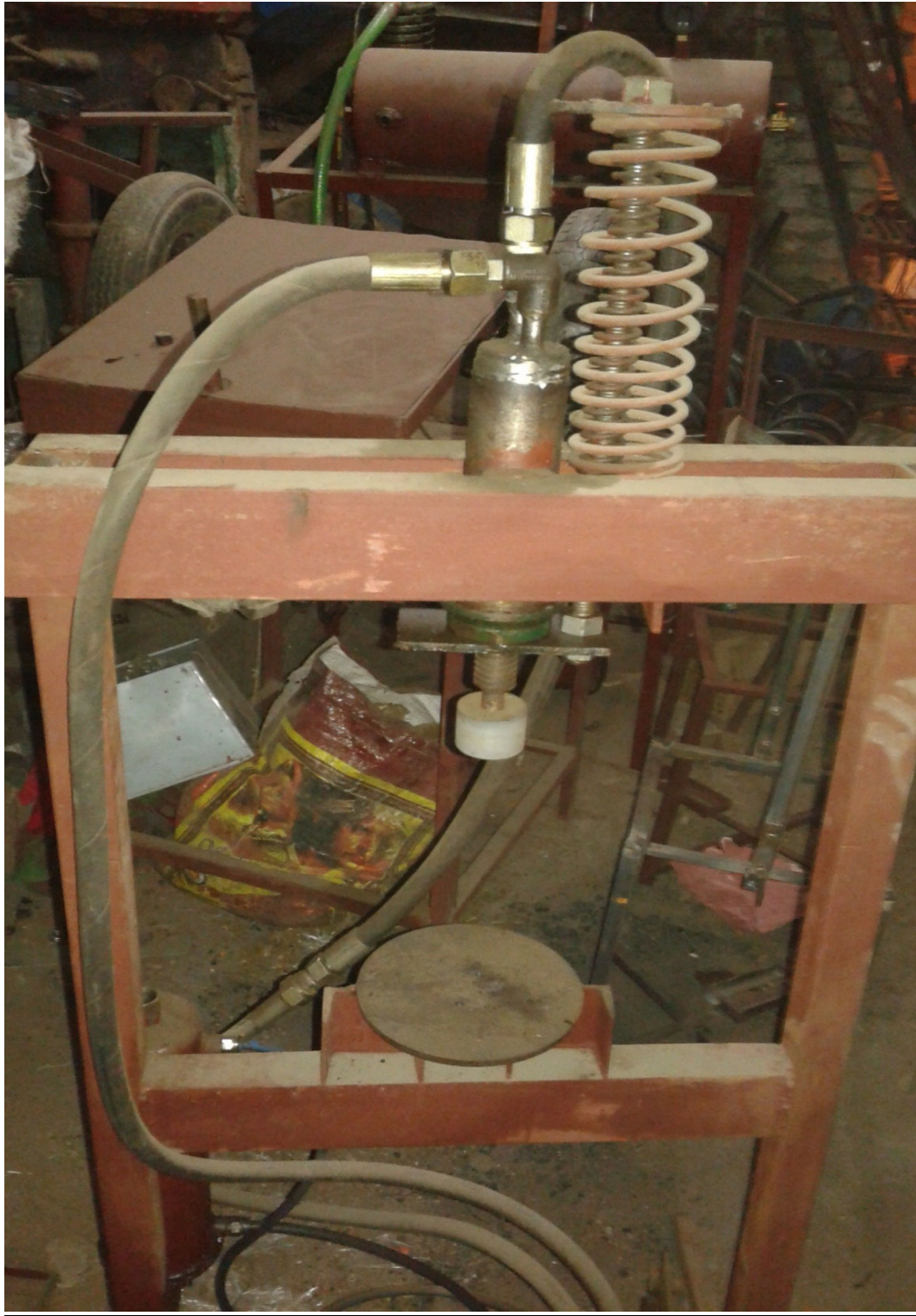
NOZZLE



FRAME FRONT VIEW



FRAME BOTTOM SIDE



FRAME TOP SIDE



DIE AND FRAME ASSEMBLED



SPRING AND HYDRAULIC CYLINDER



EXTRUSION DIE

AIM & OBJECTIVES OF THE PROJECT

Main aim of the project is to make a agarbatti machine which takes less time and less energy to make large no of agarbatti with less effort.

The machine should be such that it should be affordable and easy to use with less maintenance.

OBJECTIVES:

- To make a machine which work without electricity.
- To increase rate of production with easy mechanism.
- To reduce human effort.
- To increase output.
- To provide employment to people.

PRINCIPLE USED

Hydraulic presses work on the "PASCALS LAW". Figure 1. shows the principle of operation of hydraulics. So the basic concept of hydraulics is not new. Today most hydraulic systems utilize oil rather than water but the principle is the same. You cannot compress a liquid and a force that is applied at one point is transmitted to another point by that incompressible fluid. Because of its liquid nature, hydraulic systems can transmit force through pipes of any shape and length the force can be applied at one central point and transmitted efficiently to another point or to multiple points far away.

There are two cylinders of different diameter, which are interconnected by same liquid. The transmits pressure applied through smaller diameter cylinder to larger diameter cylinder. Smaller cylinder is having plunger and larger cylinder is having ram (piston and piston rod). One end of plunger is connected to lever. When force is applied by lever it gets multiplied to many times and that multiplied force acts on the plunger. Due to this force the plunger compresses the liquid. The liquid will be pressurized as it is confined between plunger and piston. This pressure in liquid is transmitted by liquid to piston. As the piston is having larger area than plunger, the force delivered by piston and piston rod is much larger than force acting on the plunger.

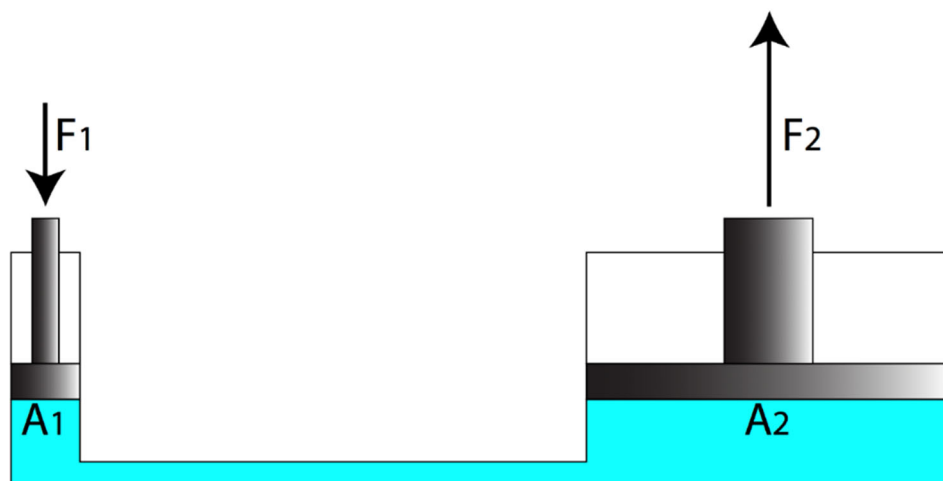


FIGURE.1

INTRODUCTION

The burning of incense in religious and social functions has been practiced in India since early times. Dhup an aromatic powder or paste is burnt in Indian homes as a fragrant fumigant and is reputed to possess insecticide and antiseptic properties. Agarbatti also is known, as Udubattis similar to joss sticks are a development of Dhup. Agarbatties are obtainable in different colors and with different perfumes. The burning time of an agarbatti varies from 15 minutes to e hours according to quality and size. Agarbatti is also obtainable in other forms such as dashang (sticky paste or powder deep (cones and Dhup, tablets, etc.). About 75% of the Agarbatties manufactured are of cheap quality containing only charcoal powder or low quality sandal wood powder with a mixture of 50% of wood gum powder. Cheap perfumes are used to give them a top note. In superior varieties, essential oils, purified resins, natural fixatives like amber, must and civet is used along with synthetic aromatics. Absolutes are used in the costlier types.

RECIPE TO PREPARE 1000 PKTS./10,000 STICKS OF AGARBATTI

S.no. Item Quantity

1. Charcoa	16 kg.
2. Gigatu	4.8 kg.
3. White chips powder	2 kg.
4. Sandal wood powder	1 kg
5. Bamboo sticks	6 kgs.
6. Kuppam dust	2 kg.
7. Perfumes	1.5 kg.
8. D.E.P.	5 kgs

MARKET SURVEY

Agarbatties are used by all communities in India, Sri Lanka, Burma and by Indians residing abroad. As on today about 90 foreign countries are using our agarbatties. Agarbatti industry is one of the labour intensive cottage type of traditional industries in India and Karnataka state leads in this industry, the main centers of manufacturing being Mysore and Bangalore. In Orissa different social institutions like Aurobindo Ashram, Gayatri Ashram, are manufacturing characteristic fragrant agarbatties. Parimal Agarbatti, Berhampur, Suravi, Susree, Indica, are very popular in Orissa market. Still 70% of the total sale of the product come from South India. More and more cottage-based units can come up in small towns and village areas of the state to meet the local demand. The raw materials are nowadays available in and around Cuttack, Bhubaneswar and in Calcutta also. Rolled sticks are nowadays marketed by some agents and can be available at doorstep. Only essencing is to be done and stress should be given on marketing the product.

PROCESS USED (EXTRUSION)

Extrusion is a process used to create objects of a fixed cross-sectional profile. A material is pushed or pulled through a die of the desired cross-section. The two main advantages of this process over other manufacturing processes are its ability to create very complex cross-sections, and to work materials that are brittle, because the material only encounters compressive and shear stresses. It also forms parts with an excellent surface finish.

Extrusion may be continuous (theoretically producing indefinitely long material) or semi-continuous (producing many pieces). The extrusion process can be done with the material hot or cold

Commonly extruded materials include metals, polymers, ceramics, concrete, play dough, and foodstuffs. The products of extrusion are generally called "extrudates". Drawing metal is the main way to produce wire and sheet, and bar and tube are also often draw

Hollow cavities within extruded material cannot be produced using a simple flat extrusion die, because there would be no way to support the center barrier of the die. Instead, the die assumes the shape of a block with depth, beginning first with a shape profile that supports the center section. The die shape then internally changes along its length into the final shape, with the suspended center pieces supported from the back of the die.

DESIGN

The subject of MACHINE DESIGN deals with the art of designing machine of structure. A machine is a combination of resistance bodies with successfully constrained relative motions which is used for transforming other forms of energy into mechanical energy or transmitting and modifying available design is to create new and better machines or structures and improving the existing ones such that it will convert and control motions either with or without transmitting power. It is the practical application of machinery to the design and construction of machine and structure. In order to design simple component satisfactorily, a sound knowledge of applied science is essential. In addition, strength and properties of materials including some metrological are of prime importance. Knowledge of theory of machine and other branch of applied mechanics is also required in order to know the velocity. Acceleration and inertia force of the various links in motion, mechanics of machinery involve the design.

DESIGN CALCULATIONS

DESIGN OF CYLINDER:-

Maximum Oil pressure $P = 25 \text{ kg/cm}^2$

Max. $f_t = 280 \text{ kg/cm}^2$ and max. $f_b = 280 \text{ kg/cm}^2$. (from PSG data book) For this information we have to find the thickness. That is we have to find 't'
Where t = thickness of cylinder wall.

Using the relation,

$$\text{Thickness} = \frac{D}{2} \left[\sqrt{\frac{280+25}{280-25}} - 1 \right]$$

$$t = 1.5 (0.19)$$

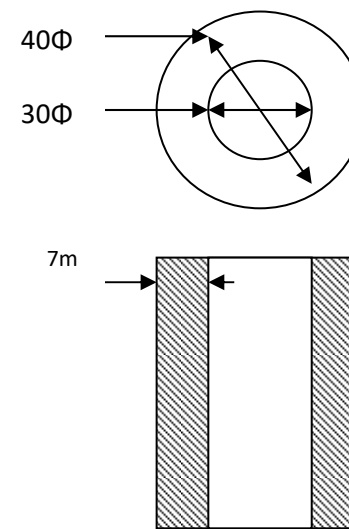
$$t = 0.285 \text{ cm} = 2.8 \text{ mm}$$

We are taking the inner diameter as the diameter of the plunger as 30 mm dia.

To find the outer diameter of the cylinder,

$$\begin{aligned} \text{Outer diameter } D_o &= D_i + 2(t) \\ &= 3.0 + 2(0.28) \\ &= 3.0 + 0.56 \\ &= 3.56 \text{ cm} \end{aligned}$$

Safely taking rounded diameter = 40 mm



DESIGN OF LEVER:

By law of moments,

$$F \times 12 = f \times 11$$

$F = f \times 11/12$ where f = force applied or effort and F = force obtained by leverage.

Now normally a person can apply a 30 kg force. So we take $f = 30\text{kg}$.

Now $11 = 58\text{cm}$. And $12 = 10\text{cm}$. Considered.

$$\therefore F = 30 \times 58/10 = 174 \text{ kg.}$$

Force applied by leverage = 174 kg.

DESIGN OF BIGGER CYLINDER:

From hydraulic press formula,

$$W = A/a \times F$$

$$W = \pi/4 d_a^2 \times F \quad \pi/4 d_A^2$$

$$\therefore w = d A/d_a \times F$$

Now d_a = diameter of smaller cylinder = 3 cm.

We have $w = 1846\text{kg}$. & $F = 174 \text{ kg}$.

$$\therefore d A^2 = W \times D_A/f$$

$$dA^2 = 1846 \times (3)^2 / 174$$

$$dA = 9.77\text{cm.} \approx 9.8 \text{ cm.}$$

Therefore diameter of bigger cylinder = 98 mm.

Now for thickness of cylinder wall of bigger cylinder,

We have, $t = pd/2ft_1$ where p = internal pressure,

& d = diameter of cylinder, ft_1 = permissible stress.

We have $p = F/A = 174 / [\pi/4 \times d^2] = 174 / \pi/4 \times [3]^2$

$$= 24.62 \text{ kg/cm}^2$$
$$d = 9.8 \text{ cm.}$$

Now ultimate stress for cylinder material = 800 kg/cm²

Considering factor of safety as 5.

We get permissible stress = ultimate stress/factor of safety

$$\therefore ft_1 = 800/5$$

$$ft_1 = 160 \text{ kg/cm}^2$$

Inputting these value in the thickness formula,

We get, $t = 24.62 \times 9.8/2 \times 160$

$$= 0.753 \text{ cm.}$$

$$\approx 0.8 \text{ cm.} = 8 \text{ mm.}$$

DESIGN OF C-SECTION:

Material: - M.S.

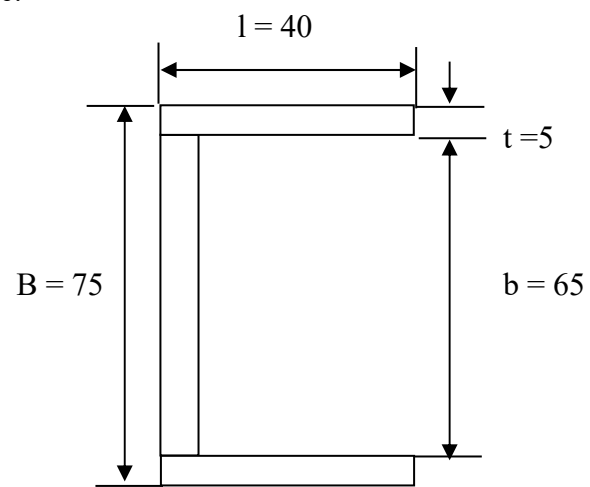
The vertical column channel is subjected to bending stress

Stress given by $\Rightarrow M/I = fb / y$

In above equation first we will find the moment of inertia about x and y

Axis and take the minimum moment of inertia considering the channel of

ISLC 75 x 40 size.



We know the channel is subject to axial compressive load
In column section the maximum bending moment occurs at channel of
section

$$M = Ra \times L/2$$

$$M = 750 \times 1500/2$$

$$M = 562500 \text{ N-mm}$$

We know

$$fb = M/Z$$

$$Z = t (l \times b + (b^2/6))$$

$$Z = 5 (40 \times 65 + (65^2/6))$$

$$Z = 3304 \text{ mm}^3$$

Now check bending stress induced in C section

$$f_b \text{ induced} = M/Z$$

$$f_b \text{ induced} = 562500 / 3304 = 170.25 \text{ N / mm}^2$$

As induced stress value is less than allowable stress value design is safe.

$$f_b = \text{Permissible bending stress} = 320 \text{ N / mm}^2$$

$$f_b \text{ induced} < f_b \text{ allowable}$$

Hence our design is safe.

DESIGN OF WELDED JOINT OF CHANNEL:

The welded joint is subjected to pure bending moment . so it should be design for bending stress. We know minimum area of weld or throat area

$$\begin{aligned} \text{Where } A &= 0.707 \times s \times l \\ s &= \text{size of weld} \\ l &= \text{length of weld} \end{aligned}$$

$$A = 0.707 \times 5 \times (75 + 40 + 35 + 58 + 35)$$

$$A = 0.707 \times 5 \times 243$$

$$A = 859 \text{ mm}^2$$

Bending strength of parallel fillet weld

$$P = A \times f_b \qquad f_b = 80 \text{ N / mm}^2$$

As load applied at the end of lever is 250 N . So moment generated at the welded joint is

$$\begin{aligned} M &= P \times L \\ &= 250 \times 450 \\ &= 112500 \text{ N - mm} \end{aligned}$$

we know $f_b = M / Z$

$$\begin{aligned} Z &= \frac{BH^3 - bh^3}{6H} \\ Z &= \frac{40 \times 75^3 - 35 \times 58^3}{6 \times 75} \end{aligned}$$

$$Z = 209824$$

Calculating induce stress developed in welded joint

$$\begin{aligned} f_b \text{ induced} &= 112500 / 209824 \\ &= 0.536 \text{ N /mm}^2 \end{aligned}$$

As induce stress is less then allowable stress the design is safe.

DESIGN OF PISTON ROD:

The piston rod is subjected to compressive load.

We know (stress) = p/a

= 300kg/cm in compression for mild steel.

Taking factor of safety =3

= $300/3 = 100\text{kg/cm}^2$

& $p = 1846 \text{ kg. (compressive)}$

$\therefore A = P/ = 1846/100 = 18.46$

$\therefore \pi/4 \times d^2 = 18.46$

$\therefore d = 4.8 \text{ cm}$

$\therefore d = 4.8 \text{ cm.} \approx 5 \text{ cm.}$

Therefore diameter of piston rod = 50 mm.

Length of piston rod is taken 48.5 cm as per the requirement.

DESIGN OF SPRING

The spring is used to return back piston in upward direction. From trial and error method we select spring with inner diameter 53mm due to size restriction.

For First Spring

$D_i = 53\text{mm}$

For average service life 422N/mm^2 .

Wire diameter range is 6 mm

We get wire diameter (d) = 6 mm from range

Outer diameter of spring = $D_i + 2 \times 6$

$D_o = 65 \text{ mm.}$

Calculating the load bearing capacity of spring

$$\text{Spring index} = C = D/d = 65/53 = 1.22$$

$$C = 1.22$$

$$K = [4C - 1 / 4C - 4] - 0.615 / C$$

$$\text{For } C = 1.22 \quad K = 3.904$$

Now to find 'P₁',

We know

$$\text{Shear stress} = \frac{8 K P_1 D_o}{3.14 d^3}$$

$$P_1 = \frac{422 \times 3.14 \times 6^3}{8 \times 3.904 \times 65}$$

$$P_1 = 140.98 \text{ N}$$

$$P_1 = 14 \text{ kg}$$

For Second Spring

$$D_i = 19 \text{ mm}$$

For average service life 422N/mm².

Wire diameter range is 3 mm

We get wire diameter (d) = 3 mm from range

$$\text{Outer diameter of spring} = D_i + 2 \times 3$$

$$D_o = 25 \text{ mm.}$$

Calculating the load bearing capacity of spring

$$\text{Spring index} = C = D/d = 25/19 = 1.31$$

$$C = 1.31$$

$$K = [4C - 1 / 4C - 4] - 0.615 / C$$

$$\text{For } C = 1.31 \quad K = 2.96$$

Now to find 'P₂',

We know

$$8 K P_2 D_0$$

Shear stress = -----

$$3.14 d^3$$

$$P_2 = \frac{422 \times 3.14 \times 3^3}{8 \times 2.96 \times 25}$$

$$8 \times 2.96 \times 25$$

$$P_2 = 60.43N$$

$$P_2 = 7 \text{ kg}$$

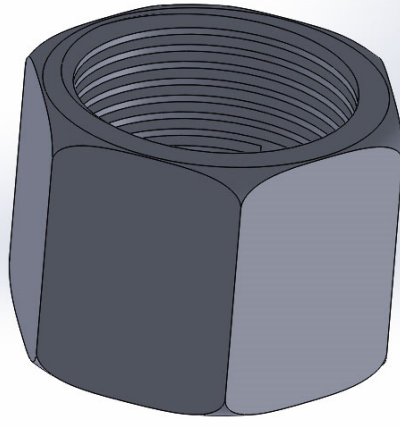
$$\text{Total load} = P_1 + P_2$$

$$= 14 + 7$$

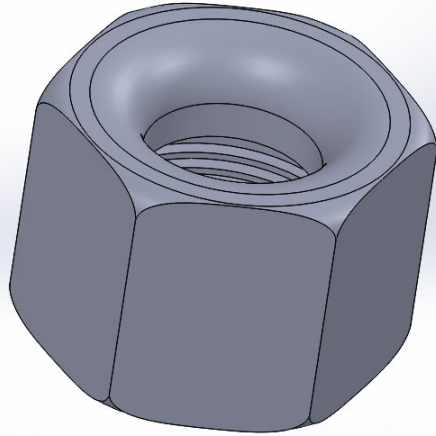
$$= 21 \text{ kg}$$

Hence our design is safe.

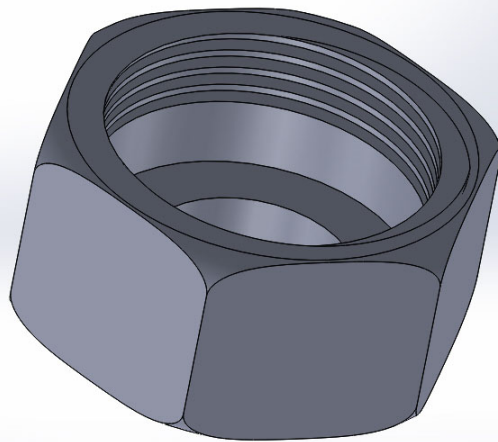
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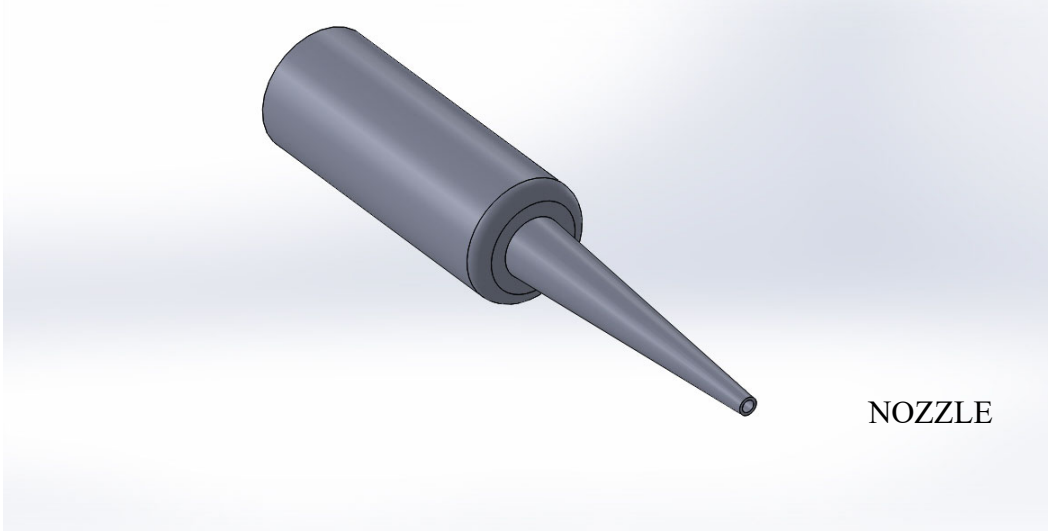
BACK NUT



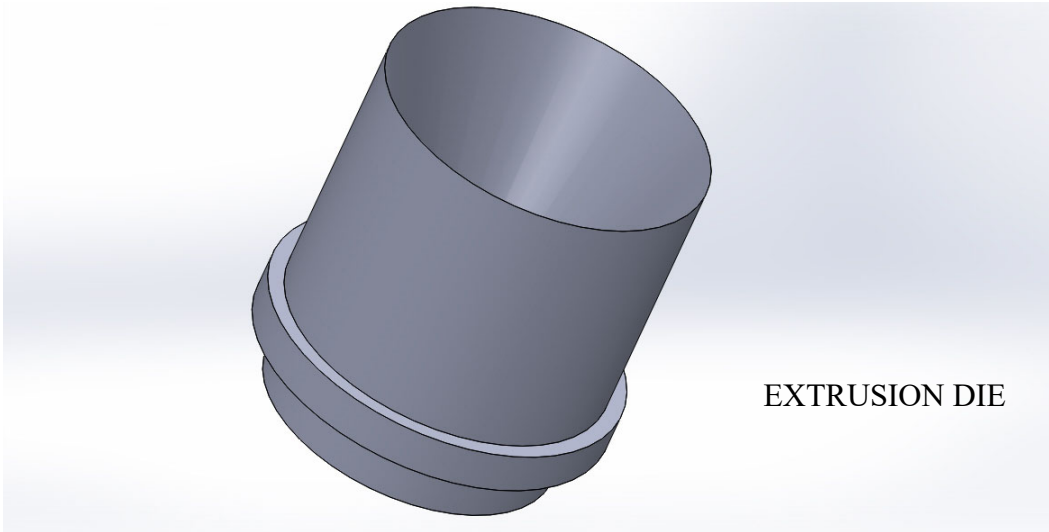
BACK NUT



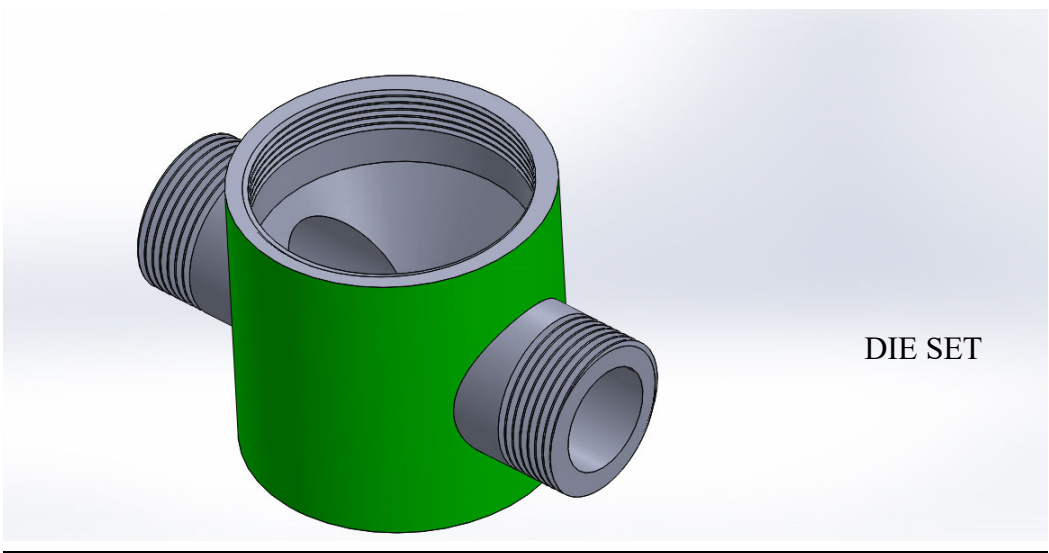
FRONT NUT



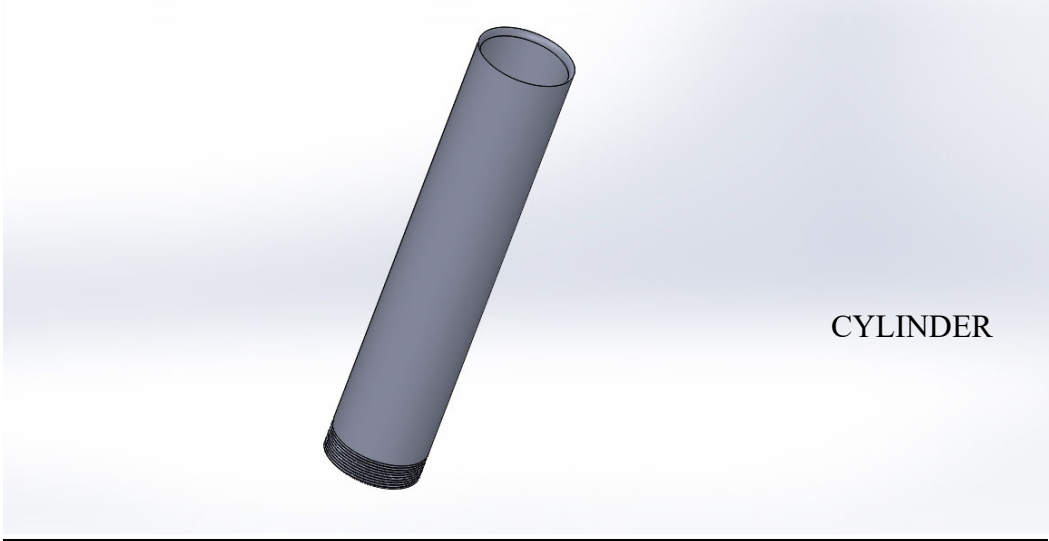
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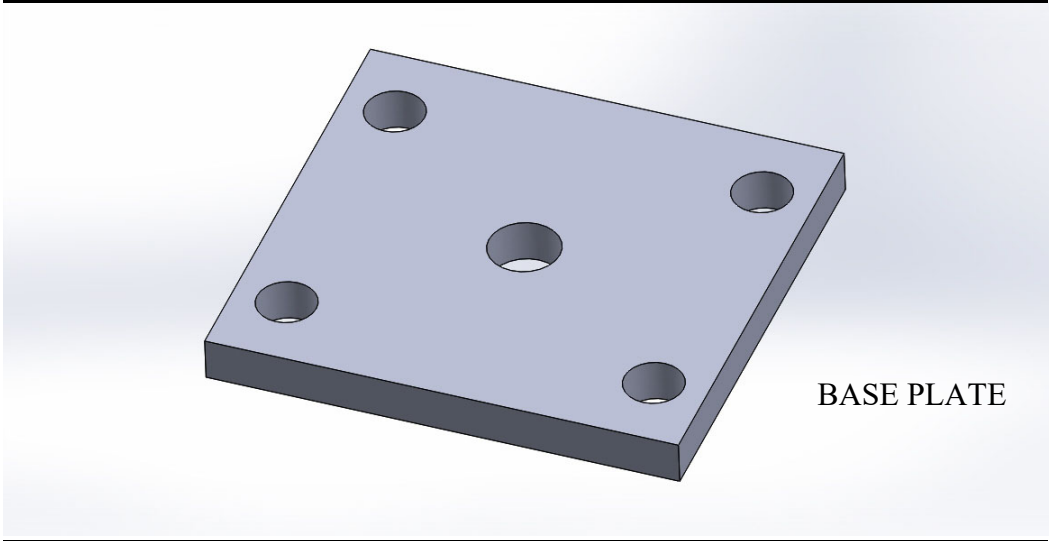
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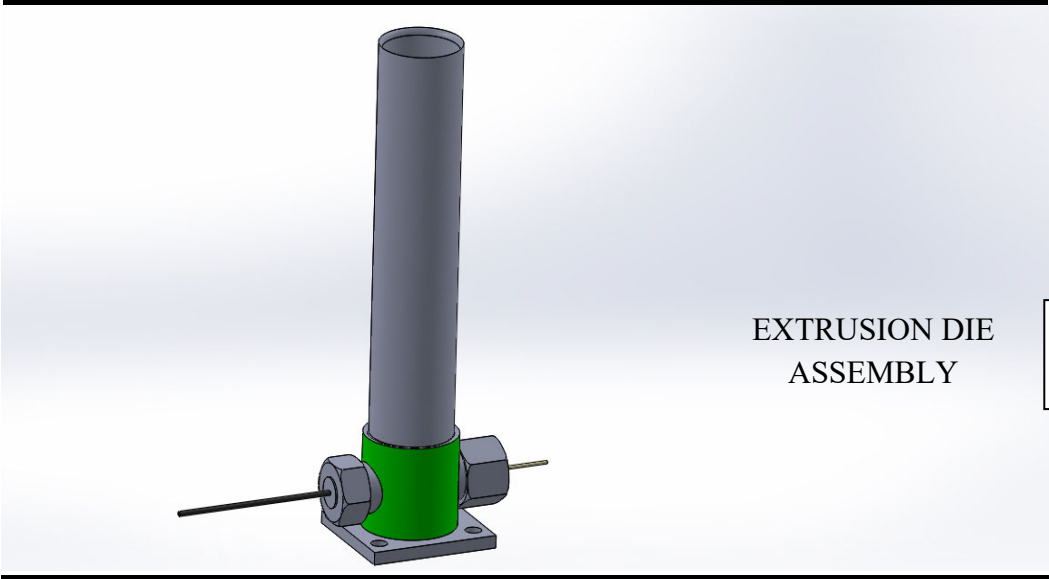
DIE SET



CYLINDER



BASE PLATE



EXTRUSION DIE
ASSEMBLY

RAW MATERIAL & STANDARD MATERIAL

SR NO	PART NAME	MATERIAL	QTY
1	FRAME C SECTION	MS	30 kg
2	HYDURALIC CYLINDER	STD	1
3	PIUPE SECTION	MS	1
4	NOZZEL ASSEMBLY	SS	1 SET
5	FRONT THREADED CONE	MS	1
6	NUT BOLT WASHER m 10	MS	8
7	WELDING ROD	-	150
8	COLOUR	-	2 lit

FABRICATION OF MAIN PARTS

Procedure for fabricating each component is explained below:

1. PISTON ROD:

We took a round circular M.S. bar of 55 mm diameter and 500 mm long. This bar was then fixed in the four jaw chuck of lathe. After which turning and facing operations were carried on lathe. And the shaft size was reduced to 50mm diameter and 485mm long. On one end of the shaft its diameter was reduced to 31mm for a length of 25mm. The step thus formed was given a radius of 6mm. Then on the other end of shaft, a hole was drilled at center of depth 57mm and hole size 10.2mm. The shaft was then removed from lathe machine after giving a finishing cut. The shaft was then fitted in a column type drilling machine. A hole of 5mm was drilled at a distance of 17.5mm from the center of shaft having length 10.7mm. Then the hole of 10.2mm was tapped using tap drill of M12 x pitch tap.

FUNCTIONS:

It is used to hold the shoe die and to transmit the force for bending of pipes.

2. PISTON:

A circular piece of 12mm thickness and 100mm diameter was taken. This piece was then held in the four jaw chuck of lathe machine. And turning operation was carried out along with facing operation till the material was reduced up to the size 10mm x 97mm. Then a hole of 12mm was bored at the center of piston. Then another hole of size 5mm diameter was drilled at a distance of 17.5mm from the center hole. The hole of 5mm was drilled by a 5mm drill on drilling machine.

FUNCTION:

It transmits the force to the piston rod to carry out bending.

3. PLUNGER:

A round circular M.S. bar of 20mm diameter and 115 mm long was taken. This bar was then fixed in the four jaw chuck of the lathe machine. Then facing and turning operations were carried out till the bar size was reduced to 16mm diameter and 112mm long. On end of bar a radius of 6mm was given for a length of 6mm. Then on the other end of bar a hole of mm was drilled at the center of bar for a depth of 5mm. After drilling, tap of M 4.5 x pitch tap was used for tapping.

FUNCTION:

It is used to pressurize the oil by compressing it and supplying it to the pressure cylinder.

4. LEVER ROD:

A round circular M.S. bar of 22mm diameter and 580 mm long was taken. The ends of the bar were then rounded by filing it. Then this rod was heated from one end till it was red hot. The heated end was flattened by hammering it. And through hole of 8mm was drilled at the flattened end.

FUNCTION:

It multiplies the applied force and helps in pressurizing the oil through plunger.

5. END BLOCK:

A rectangular M.S. block of size 112 x 125 x 45mm was taken. This rectangular block was then fitted in the four chuck of lathe. The two sides of rectangular block were faced on the lathe. After this a hole of 10mm was drilled at the center of the block. Then the hole was enlarged to 20mm by using a 20mm drill. After this the hole was enlarged to 70mm by carrying out boring operation on lathe machine using a single point cutting tool. After that internal threading (V-thread) were carried out up to size of M74. After this the block was fitted on the shaper machine vise. The breadth of the block was reduced from 112 mm to 110mm on the shaper machine by reducing 1mm on either side. A slot of size 5 x 32mm was cut across the thickness on the machine. Similar operation was carried out on opposite side. The length of the block was reduced from 125mm to 120mm by removing a material of 2.5mm on the either side. Then on one of the slotted side, 2 holes of size 10.2mm were drilled at a distance of 39mm on the either side of center. Similarly the other two holes are drilled on the opposite slotted side. Then the four holes were finally tapped using a tap drill of M14x pitch tap.

FUNCTIONS:

It acts as an end construction for pressure cylinder and to guide the piston rod.

6. PISTON ROD GUIDE :

First of all, a round bar of 82mm was taken. This round bar was then fixed in the chuck of the lathe and the diameter was reduced to 81 mm. Then a step was given on the bar at a distance of 21 mm from one end. And the remaining bar was reduced to diameter of 74 mm. This part was then threaded on the external surface on the lathe. Then a hexagonal shape was given at the head of the bar for arranging spanner attachment. Hexagonal shape was given of height 13.5 mm from the head. The hexagonal shape was given by milling it on the milling machine by using dividing head.

FUNCTIONS:

It is used to guide the piston rod.

7. PRESSURE CYLINDER:

A pipe of standard size 98 mm diameter with a thickness of 6 mm was taken. The internal surface of the pipe was then superfinished by honing process. The thickness of the pipe was reduced to 8 mm by finishing the internal surface of the pipe.

FUNCTIONS

It is used as a housing for piston rod, piston and spring assembly and is confined to liquid.

8. PLUNGER PUMP HOUSING:

A rectangular block of size 130 x 120 x 42 mm was manufactured on lathe machine from a block of 130 x 130 x 42 mm by facing & turning operation. A HOLE OF 18mm was drilled through. Then steps were made of $\varnothing 22\text{mm} \times 3\text{mm}$ at on side & on opposite side steps of $\varnothing 28 \times 13 \text{ mm}$, $\varnothing 30 \times 22\text{mm}$, & $\varnothing 38 \times 2 \text{ mm}$ were made. Then from bottom at a height of 43.7 mm a hole of $\varnothing 8 \text{ mm}$ & 14 mm deep was drilled & was tapped. A hole of 8 mm was drilled of 35 mm depth on the opposite side & this hole was further enlarged by drilling a hole of 12 mm x 25 mm & a hole of 16 mm was drilled & further it was tapped by a tap drill.

FUNCTIONS:

It houses the plunger and the different valves such as Release valve, gravity check valve, etc.

PROCESS CHART'S OF PARTS

1. END BLOCK

Operation	Machine	Description of operation	Tool used	Time
Facing	Lathe	To make the two faces Parallel to each other.	Single point Cutting tool	5 min.
Boring	Lathe	Bore a hole of 70 mm at the Center.	Center drill, Boring tool	15 min.
Threading	Lathe	Threading of M 74 and pitch Thread.	Threading Tool	25 min.
Shaping	Shaper	Faces were reduced to required size.	Shaper tool	20 min.
Drilling	Drilling	Four holes were drilled of required size.	Drill beat 10.2 mm	15 min.
Tapping	Tapping Tool	Four holes were tapped.	Tap M14 x Pitch tap	10 min.

2. LEVER ROD

Operation	Machine	Description of Operation	Tool used	Time
Filing	--	Both ends were rounded.	File	10 min.
Heating	Furnace	The rod was heated till it was red hot.	-	30 min
Hammering	--	The heated end was flattened.	Hammer	5 min.
Drilling	Drilling	Holes were drilled at Flattened end.	Drill beat 8 mm.	5min.

3. PISTON ROD

Operation	Machine	Description of Operation	Tool used	Time
Facing And Turning	Lathe	The bar was reduced to Required size.	Single point Cutting tool	25 min.
Drilling	Lathe	A hole was drilled of depth 57 mm at center.	Drill beat 10.2 mm.	5 min.
Drilling	Drilling	A hole of size was drilled.	Drill beat 5mm.	10 min.
Tapping		The hole was tapped.	Tap of M12 X pitch	5 min

4. PISTON

Operation	Machine	Description of Operation	Tool used	Time
Facing And Turning	Lathe	The circular plate was Reduced to required size.	Single point Cutting tool	10 min.
Drilling	Lathe	A hole was drilled at center.	Drill beat 12 mm.	5 min.
Drilling	drilling	A hole was drilled at distance 17.5 mm from center.	Drill beat 5mm.	5min.

5. PLUNGER

Operation	Machine	Description of Operation	Tool used	Time
Facing And Turning	Lathe	The size of bar was reduced To required size.	Single point Cutting tool	20 min.
Drilling	Lathe	A hole was drilled at center.	Drill beat	5 min.
Tapping	--	The hole was tapped.	Tap M4.5 xPitch tap	5 min.

6. PISTON ROD GUIDE

Operation	Machine	Description of Operation	Tool used	Time
Turning	Lathe	The size of bar was reduced to 81mm.	Single point Cutting tool	10 min.
Turning	Lathe	Leaving 21 mm on one side, a step was given and the remaining bar was reduced to 74 mm.	Single Point cutting tool	15 min.
Threading	Lathe	The latter turned part was Then threaded to the required shape.	Threading Tool (V tool)	40 min.
Drilling	Lathe	A small center drill was Drilled.	Drill 5mm.	5 min.
Boring	Boring	The hole was enlarged to 50 mm.	Boring tool	30 min.
Milling	Milling	The unthreaded head was Given a hexagonal shape of height 13.5 mm by using dividing head.	Plain Milling Cutter	60 min.

7. RESERVOIR CYLINDER

Operation	Machine	Description of Operation	Tool used	Time
Drilling	Drilling	A hole was drilled at a Distance of 100 mm.	Drill beat 5 mm	5min.
Hammering	---	One end was hammered and made tapered.	Hammer	15 min.
Tapping	---	The pipe was tapped.	Tap M 10 x pitch tap	5 min.

8. PRESSURE CYLINDER

Operation	Machine	Description of Operation	Tool used	Time
Honing	Vertical honing	The pipe was super finished from inside.	Hones	20 min.
Drilling	Drilling	Two holes were drilled at distance 220 mm from one end.	Drill beat 6.2 mm.	5 min.

9. PLUNGER PUMP HOUSING

Operation	Machine	Description of Operation	Tool used	Time
Facing	Lathe	A rectangular block of size 130 x 120 x 42 mm was manufactured.	Single point Cutting tool	10 min.
Drilling	Lathe	A hole of 18mm was drilled.	Center drill & drill bear 18mm	10 min.
Boring	Lathe	Marking step of Ø 28 x 13 mm, Ø 30 x 22 mm & Ø38 x 2 mm.	Single point Cutting tool	20 min.
Drilling	Drilling	From bottom at height of 43.7 mm, a hole of 8mm drilled & was tapped.	Drill of 8 mm & Tap drill of 10 mm	10 min.
Drilling	Drilling	A hole of 8 mm was drilled of 35 mm depth on the opposite side & this hole was further enlarged by drilling a hole of 12 mm x 25 mm & a hole of 16mm was drilled and further it was tapped by a 18 mm tap drill.	Drill of 8 mm, 12 mm, 18 mm & Tap drill of 18mm	10 min.

ASSEMBLY

ASSEMBLY OF HYDRAULIC AGERBATI MACHINEMACHINE:

The hydraulic AGERBATI MACHINE can be assembled in following manner.

1. Take the plunger pump housing and the side having maximum cross section area and four holes, mark its center.
2. Now take the pressure cylinder and place it over the plunger pump housing and weld it circumferentially such that two holes should be in and two holes out of its coverage.
3. Similarly place and weld the reservoir cylinder on the plunger pump housing and pressure cylinder.
4. Mark the center of end block on one of its side, which is not tapped, and draw a circle
5. Place the former assembly on this circle and weld the pressure cylinder circumferentially on the end block.
6. On the other end of plunger pump housing, fit the lever with nut and bolt.
7. Fit the piston, cup seal and back up plate to the piston rod with the help of L key nut and insert this assembly into the pressure cylinder through the end block.
8. Then insert the retracting spring over the piston rod and enclose this assembly into the pressure cylinder by tightening the piston rod guide to the end block.
9. Fit the lower and upper wings to the end block by means of blots.
10. The assembly thus formed is placed on the stand.
11. After this insert all the valves into plunger pump housing along with balls and washers.
12. Remove the refill cap from the reservoir cylinder and fill the reservoir by hydraulic oil and tighten the cap.
13. Thus the assembly of hydraulic agarbatti machine is ready.

WORKING OF MACHINE

Working principle of machine is based on extrusion process when we press the foot pedal force is applied on the small piston at the bottom due to which oil from the reservoir is pumped to the hydraulic cylinder through hydraulic lines due to which the oil which is pressurized enters into the cylinder and pushes the cylinder down the downward movement of the piston causes to flow the semisolid material i.e. agarbatti masala to enter into the extrusion die and when we insert the stick the masala along with the stick covered with it comes in front due extrusion process. We can change the diameter of the agarbatti by changing the diameter of front end extrusion hole. In this way the pedal powered hydraulic machine works.

COST ESTIMATION

Cost estimation may be defined as the process of forecasting the expenses that must be incurred to manufacture a product. These expenses take into a consideration all expenditure involved in a design and manufacturing with all related services facilities such as pattern making, tool, making as well as a portion of the general administrative and selling costs.

PURPOSE OF COST ESTIMATING:

1. To determine the selling price of a product for a quotation or contract so as to ensure a reasonable profit to the company.
2. Check the quotation supplied by vendors.
3. Determine the most economical process or material to manufacture the product.

To determine standards of production performance that may be used to control the cost.

MATERIAL COST ESTIMATION

Cost of mild steel round bar per kg Rs.22/-

Cost of mild steel rectangular blocks per kg Rs.27/

PARTS MANUFACTURED

COMPONENT	MATERIAL	WEIGHT in Kg	COST in Rs.
End block	M.S.	4.36	117.65
Plunger pump housing	M.S.	5.15	139.00
Lever rod	M.S.	3.54	78.03
Pressure cylinder	M.S.	4.108	102.50
Reservoir cylinder	M.S.	3.991	97.00
Piston rod	M.S.	4.501	99.00
Piston	M.S.	0.350	7.70
Plunger	M.S.	0.170	3.75
Piston rod guide	M.S.	2.103	46.26
		Total	691.39

STANDARD PARTS

COMPONENT	MATERIAL	WEIGHT in Kg	COST In Rs.
Cup seal	Rubber	---	40.00
Plunger bush	Rubber	---	20.00
Bolts & Nuts	M .S.	---	30.00
Washer Ø 78 mm	Rubber	---	3.00
Metallic washer – 2 Nos.	Brass	---	20.00
Washer Ø 30 mm	Rubber	---	2.00
Die & Supporter block a. Spring d = 7.6 B Values	C.I. -- --	8 kg	200.00
(1) Spring loaded check value	M.S.	---	125.00
(2) Gravity Check value	M.S.	---	155.00
(3) Release value	M.S.	---	140.00
c. Release Value Knob	Plastic	---	45.00
d. Oil (Enklo 48)	Oil	---	50.00
e. Wings	C.I	---	10.00
f. Stand	M.S.	---	150.00
		Total	990.00

MACHINING COST

S.NO.	PART	MACHINE	TIME In Hrs.	RATE Rs./Hr	TOTAL COST in Rs.
1.	End block	Lathe	0.75	60	45.00
		Shaper	0.35	75	26.25
		Drilling	0.25	30	7.50
2.	Lever rod	Drilling	0.08	30	2.50
		Smithy Furnace	0.50	100	50.00
3.	Piston rod	Drilling	0.167	30	5.00
		Lathe	0.5	60	30.00
4.	Piston	Lathe	0.25	60	15.00
		Drilling	0.08	30	2.50
5.	Plunger	Lathe	0.35	60	21.00
		Drilling	0.167	30	5.00
6.	Piston rod guide	Lathe	1.167	60	70.00
		Boring	0.333	50	16.50
		Milling	1.00	65	65.00
7.	Plunger pump housing	Lathe	1.00	60	60.00
		Drilling	0.3	30	9.00
8.	Press Cylinder	Vertical Honing	0.35	100	35.00
		Drilling	0.08	30	2.50
9.	Reservoir Cylinder	Drilling	0.08	30	2.50
				Total	470.25

TOTAL COST OF PROJECT

SR NO	PART NAME	MAT	QTY	COST
1	FRAME C SECTION	MS	30 kg	1200
2	HYDURALIC CYLINDER	STD	1	7000
3	PIUPE SECTION	MS	1	700
4	NOZZEL ASSEMBLY	SS	1 SET	1500
5	FRONT THREADED CONE	MS	1	650
6	NUT BOLT WASHER m 10	MS	8	75
7	WELDING ROD	-	150	150
8	COLOUR	-	2 lit	100
9	MISSILINIOUS			3000
			TOTAL	14375

TOTAL COST OF PROJECT = 14500/-

CONCLUSION

We were successful in making a machine which does not use any electricity and makes agarbatti with the use of hydraulic power.

- The principle's Extrusion and Pascal's Law are used in our project.

This is a machine which converts the hydraulic energy into useful product by applying less force, a lot of jobless people could find themselves in a new industry of providing agarbatti's.

After having all this information we calculated our machines efficiency and the mechanical advantage gained by the use of the hydraulic pedal power agarbatti making machine we turned out to be more efficient than the conventional agarbatti making method.

SR NO.	CONVENTIONAL AGARBATTI MAKING METHOD	HYDRAULIC AGARBATTI MAKING MACHINE
1	1 min for one agarbtti.	2 sec for one agarbatti.
2	1 hour for 50 agarbatti.	5 min for 50 agarbatti.

CARE AND MAINTANENCE

MAINTENANCE OF HYDRAULIC AGERBATI MACHINE:

The oil of the machine should be refilled regularly for efficient working of the machine.

TROUBLE SHOOTING CHART:

The piston moves to and fro without advancing ahead when actuating lever.

CAUSE:

1. Air may have leaked into the cylinder.
2. Oil level has been got down.

SOLUTION:

1. Fill the reservoir with oil.
2. Remove the values and change the washer.

Excessive leakage of oil.

CAUSE:

1. Loose fittings of valves and other connections.
2. Wear of washer.

SOLUTION:

1. Change the washer.
2. Tighten the valves and other connections.

ADVANTAGES

1. Agarbatti of different diameters and length can be easily draw from this machine.
2. Uniform thickness of stick will be generated.
3. Actual drawing process is carried out in very less time, so production rate is very high.
4. One man effort is enough to draw agarbatti stick.
5. Semi-skilled and unskilled labor can operate this machine easily.
6. Stick of longer length can also be draw.
7. The system is self-lubricating.
8. The system is noiseless.
9. It is portable and could be carried anywhere.

DISADVANTAGE

1. For drawing of different dia of stick, different dies are required.
2. As system is hydraulic, leakage may occur and hence refilling of oil is necessary.

FUTURE PLANS

We plan to install our project in a rural area so that we can create an employment opportunity in that area and after our short success we plan to make these machine on a large scale and install then in rural areas for their development.

FUTURE SCOPE

Multiple agarbatties can be produced in single pass by suitable multi die attachment at economical rate and rate of production will be increased and will directly increase the productivity.

LIST OF SUPPLIERS

ADDRESS OF SUPPLIER

- VITHAL ENGINEERING.
Authorized Dealer & Distributor; pumps & accessories 2, Amrapli, 90 Feet Road, Mulund (E) Mumbai — 400081.
- SATURN NUT BOLT MFG. CO
Manufacturer of All Types of Nut & Bolts 30, Trimbak Parshuram Street, Kamas Building, 6th Kumbharwada Mumbai - 400004.
- SURENDRA METAL CORPORATION.
Suppliers Of: - S.S.Steel Rod, Aluminum, Brass, Copper, M.S Angle, M.S Channels, Ms Sheet Patrawa 1 laChawl, 169, Trimbak Parshuram Street, Kamas Building, 6th Kumbharwada Mumbai — 400004.
- SANJAY HYDRAHLICS PVT LTD.
Suppliers of hydraulic oil and accessories.
1, 2, 3, Shiv Shankar, Sector 6, Airoli, Navi Mumbai – 400708.

BIBLIOGRAPHY

Following are the reference books for designing the AGERBATI
MACHINE:

1. Machine Design: R.S. Khurmi.
2. Machine Design Practice: P.V.Mandke.
3. Machine Design: Pandya and Shah.
4. Workshop Technology (volume –2): Chapman.
5. Hydraulic Machineries: R.S. Khurmi.
6. Design Data Book.