

DESIGN AND FABRICATION OF BALING MACHINE

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ABSTRACT

Enterprises are confronting a great deal of issues in putting away and taking care of the piece. A lot of room is needed to store the piece. To conquer these issues the pieces can be packed and put away in a block structure. Today, all the advanced assembling undertakings are attempting to grow best improved diminished weight and financially savvy items that meet the planned plan practically and dependably. In this situation, underlying improvement apparatuses like geography and shape advancement with assembling recreations are getting alluring in item configuration measures. These apparatuses additionally help in decreasing item advancement times. In most recent couple of years, shape improvement has arisen as the important instrument to deAbstract - Industries are confronting a great deal of issues in putting away and taking care of the piece. A lot of room is needed to store the piece. To defeat these issues the pieces can be packed and put away in a block structure. Today, all the advanced assembling undertakings are attempting to grow best improved decreased weight and financially savvy items that meet the proposed plan practically and dependably. In this situation, primary improvement instruments like geography and shape streamlining with assembling recreations are getting alluring in item configuration measures. These apparatuses additionally help in lessening item advancement times. In most recent couple of years, shape advancement has arisen as the important device to grow new plan recommendations particularly in paper ventures. Primary streamlining apparatuses have acquired central significance in modern applications. In this venture, geography improvement has been applied on different parts of 5Ton pressure driven paper baling press.

Key Words: Pascal's principle, Optimization.

I. INTRODUCTION

A baling machine is a gadget used to pack materials into a bundle for capacity, transport, or dealing with. A few kinds of machines exist for this reason, as some are planned explicitly for one material, while others might have the option to deal with different materials. Water driven piece baling presses are hardware that discovers utilization to pack various sorts of scraps into parcel structures utilizing water powered force. These presses are utilized in various manners to pack light, slight just as delicate materials. With a few sorts of balers accessible for various materials/applications, these Balers are likewise utilized in material reusing offices. There is additionally an arrangement of tying parcels physically with assistance of gave grooves, accordingly helping in saving a lot of cost of transportation. Pressure driven piece bailing presses are intended for: Paper scrap Plastic piece Cotton squander all these can be framed into cuboid parcels. Further, as the thickness of bundles is high, these are likewise helpful to store, transport and utilized in metallurgy. Highlighting complex electrical-water driven control have two working modes viz. Auto and Inching, these accompany pressure movable offices that make these Hydraulic piece baling squeezes best in execution just as simple in working and high in efficiency. Since a serious level of compaction is accomplished, it helps in saving costly extra room just as permits making transport and taking care of all the more without any problem. These balers are made of steel with water driven Ram for packing the material stacked. Some balers offered are basic and work concentrated, however appropriate for more modest volumes.

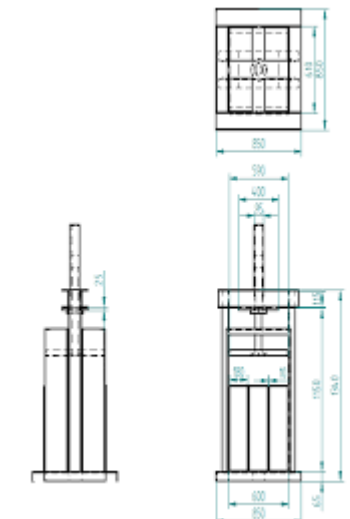
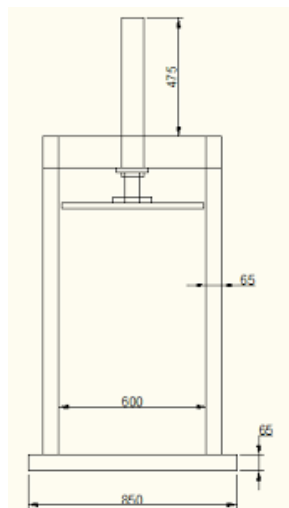
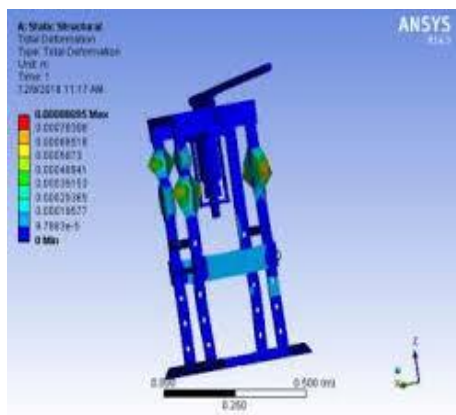
A baler is basically a sort of cultivating machine used to pack a harvest like feed or straw into bundles and tie them; they are additionally utilized in areas like reusing offices to accumulate and pack paper, plastic and different pieces of cut or destroyed materials. A baler, frequently called a roughage baler is a piece of homestead apparatus used to pack a cut and raked crop (like feed, cotton, flax straw, salt swamp feed, or silage) into minimized bundles that are not difficult to deal with, transport and store.

II. OBJECTIVE AND METHODOLOGY

Underlying streamlining instruments have acquired the fundamental significance in modern applications because of creative plans, diminished weight and financially savvy items. Particularly, in paper, airplane and auto ventures, geography advancement has become an indispensable piece of the item configuration measure. In this undertaking, geography enhancement has been applied on different parts of scrap baling press and 5Ton water driven press.

METHODOLOGY

Procedure is the efficient, hypothetical examination of the techniques applied to abroad of study.it contains the hypothetical investigation of the body of the strategies and standards related with a part of information. Ordinarily, it includes ideas like hypothetical model, stages and quantitative or subjective procedures. IT represents the connection between the significant parts and the arranging of the cycle.



III. SOFTWARE & HARDWARE SPECIFICATION

COMPONENTS

- Hydraulic Cylinder
- Connecting Pipes
- Hydraulic Motor
- Hydraulic Pump
- Valve
- Push Button
- Sensors
- Power Supply
- Circuit Diagram

HYDRAULIC CYLINDER

Hydraulic cylinders get their power from pressurized hydraulic fluid, that's usually oil. The hydraulic cylinder consists of a cylinder barrel, wherein a piston linked to a piston rod movements from side to side. The barrel is closed on one stop by using the cylinder bottom (additionally called the cap) and the alternative give up by the cylinder head (additionally referred to as the gland) where the piston rod comes out of the cylinder. The piston has sliding earrings and seals. The piston divides the interior of the cylinder into two chambers, the bottom chamber (cap quit) and the piston rod aspect chamber (rod stop / head stop). Flanges, trunnions, clevises, and lugs are commonplace cylinder mounting options. The piston rod additionally has mounting attachments to connect the cylinder to the object or gadget factor that it's miles pushing or pulling. A hydraulic cylinder is the actuator or "motor" facet of this machine. The "generator" side of the hydraulic device is the hydraulic pump which can provide a hard and fast or regulated glide of oil to the hydraulic cylinder, to transport the piston. The piston pushes the oil within the other chamber returned to the reservoir.

CONNECTING PIPES

Pressure driven funneling is a vital piece of the water powered framework. Hose pipe adaptability empowers segments to be situated inside the most proficient spots, in light of the fact that the hose can twist all-around corners, through close places or across significant distances. Here are a couple of things you should know with regards to water powered funneling. Water powered funneling gives transportation to liquid starting with one segment then onto the next. It can give an innate adaptability to originators now and again. The SAE addresses questions with respect to its J517 water powered hose standard. This standard is the most well-known perspective in mechanical hydrodynamics. The J517 are rules that apply to the SAE 100R arrangement of hoses.

HYDRAULIC MOTOR

A water driven engine is a mechanical actuator that changes over water powered pressing factor and stream into force and rakish dislodging (pivot). The water driven engine is the rotating partner of the pressure driven chamber as a straight actuator. Most extensively, the class of gadgets called pressure driven engines has once in a while incorporated those that sudden spike in demand for hydropower (in particular, water motors and water engines) yet in the present phrasing the name ordinarily alludes all the more explicitly to engines that utilization water driven liquid as a component of shut water powered circuits in current water driven hardware. Thoughtfully, a water powered engine ought to be compatible with a pressure driven siphon since it plays out the contrary capacity - like the manner in which a DC electric engine is hypothetically tradable with a DC electrical generator. Notwithstanding, numerous pressure driven siphons can't be utilized as water powered engines since they can't be back driven. Likewise, a water powered engine is typically intended for working pressing factor at the two sides of the engine, though most pressure driven siphons depend on low pressing factor gave from the repository at the information side and would release liquid when mishandled as an engine.

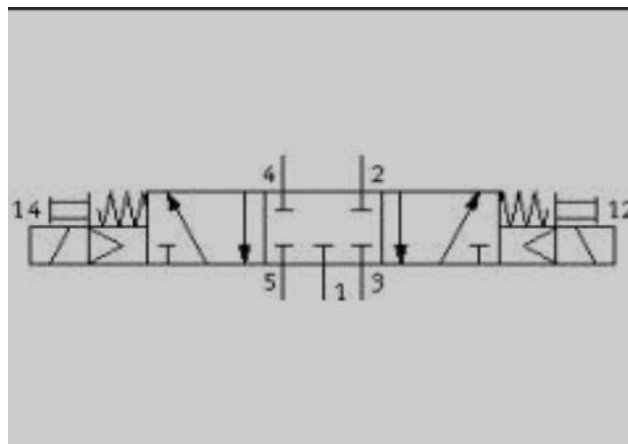
HYDRAULIC PUMP

Water powered siphons are utilized in pressure driven drive frameworks and can be hydrostatic or hydrodynamic. A pressure driven siphon is a mechanical wellspring of force that changes over mechanical force into water powered energy (hydrostatic energy for example stream, pressure). It produces stream with sufficient ability to defeat pressure instigated by the heap at the siphon outlet. At the point when water powered siphon works, it makes a vacuum at the siphon delta, which powers fluid from the repository into the gulf line to the siphon and by mechanical activity conveys this fluid to the siphon outlet and powers it into the pressure driven framework. Hydrostatic siphons are positive dislodging siphons while hydrodynamic siphons can be fixed removal siphons, in which the uprooting (move through the siphon per pivot of the siphon) can't be changed or variable relocation siphons, which have a more confounded development that permits the uprooting to be changed. Hydrodynamic siphons are more incessant in everyday life. Hydrostatic siphons of different sorts all work on the rule of Pascal's law.

HYDRAULIC VALVES

The most essential portrayal of a valve is a mechanical gadget that opens and closes, regularly to control the progression of liquid—fluid or air. Valves exist in virtually every industry, from vehicle motors to the foundries that cast the motor's valves; this article isn't about the poppet valves in your 1999 Civic SI VTEC. This article is about pressure driven valves. Water powered valves are remarkable on the grounds that they should be fit for

withstanding 3,000 psi or a greater amount of liquid pressing factor, which expect them to be made from solid (and regularly substantial) steel and iron. Their development should be to such an extent that water driven pressing factor is totally contained, yet ready to work easily and precisely, without being kept from working in view of the great powers forced by that compressed liquid. So a pressure driven valve is only a gadget that opens and closes to permit the stream that will move actuators and burdens. It sounds basic, yet there are different methods utilized in water power to permit this to happen. Valves can be precisely worked (by handle, handle or cam), electric solenoid-worked, or pilot-worked (air or water driven pressing factor impels the valve). A few valves utilize the pressing factor of the circuit's liquid to activate themselves, as with alleviation valves. Valves can likewise be impelled with links, switches, uncloggers, force engines, etc. indeed, there are valves on the machines that make valves.



5/3way Solenoid Operated Valve

PUSH BUTTON

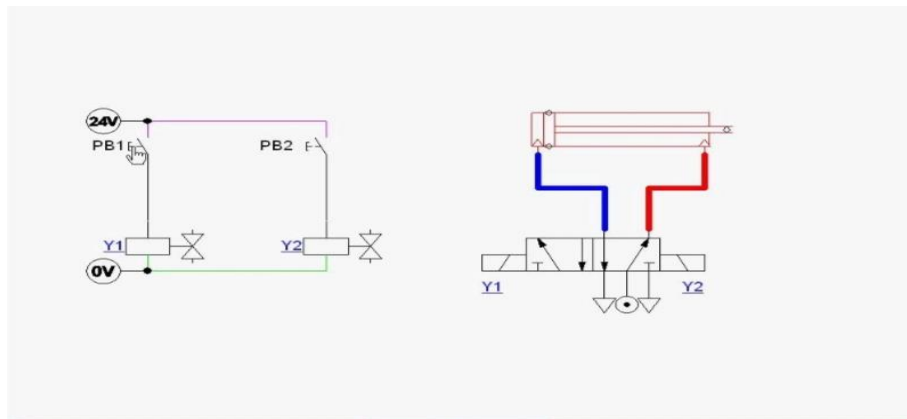
A press button (likewise spelled pushbutton) or basically button is a basic change instrument to control some part of a machine or an interaction. Catches are regularly made out of hard material, typically plastic or metal. The surface is normally level or formed to oblige the human finger or hand, in order to be effectively discouraged or pushed. Catches are frequently one-sided switches, albeit numerous unprejudiced catches (because of their actual nature) actually require a spring to get back to their unpushed state. Terms for the "pushing" of a catch incorporate squeezing, discouraging, squashing, slapping, hitting, and punching

CAPACITIVE SENSOR

Sensors are utilized in regular articles, for example, contact touchy lift catches (material sensor) and lights which diminish or light up by contacting the base, other than countless uses of which a great many people are rarely mindful. With progresses in miniature apparatus and simple to-utilize microcontroller stages, the employments of sensors have extended past the customary fields of temperature, pressing factor or stream estimation, for instance into MARG sensors. Also, simple sensors, for example, potentiometers and power detecting resistors are still broadly utilized. Applications incorporate assembling and apparatus, planes and aviation, vehicles, medication, advanced mechanics and numerous different parts of our everyday life. There are wide scopes of different sensors, estimating synthetic and actual properties of materials. A couple of models incorporate optical sensors for Refractive list estimation, vibrational sensors for liquid consistency estimation and electro-synthetic sensors for observing pH of liquids. A capacitive sensor is a nearness sensor that identifies close by objects by their impact on the electrical field made by the sensor. Straightforward capacitive sensors have been financially accessible for a long time, and have discovered a specialty in nonmetallic article discovery, however are restricted to short ranges, normally under 1 cm.

CIRCUIT DIAGRAM

As the need of computerization increments fundamentally, a control framework should be effectively programmable, adaptable, dependable, vigorous and savvy. In this paper a survey on the utilization of programmable rationale regulator (PLC) in our present market is examined. Examinations on the uses of PLCs in energy research, designing investigations.



Circuit Diagram

IV. DESIGN CALCULATIONS

CYLINDER CAPACITY

BALE SIZE

$$=L*B*H=450*450*450(\text{mm})$$

$$=91125000 \text{ mm}^3$$

CAPACITY

$$=2000\text{kg}=2000*9.81$$

$$=19620$$

$$=19.62 \text{ KN}$$

WORKING PRESSURE

$$p=115 \text{ bar}$$

$$=11.5 \text{ N/mm}^2$$

$$=1667.5 \text{ psi}$$

CYLINDER DIAMETER

$$P=F/A$$

$$11.5 = 19620 / (\pi/4 * D^2)$$

$$D^2=2173.3591\text{mm}^2$$

$$D=46.619\text{mm}$$

Outer diameter

$$D0=Di+(2t)$$

$$=46.619+2(3.697)$$

$$=54.013\text{mm}$$

THICKNESS OF THE CYLINDER

$$F=(0.045D+1.6) \quad (\text{DDB 5.137})$$

$$=0.045*46.617+1.6$$

$$=3.697$$

PISTON ROD DESIGN

$$P=F/A$$

$$Di/d=1.27$$

$$d=46.619/1.27 =36.70\text{mm}$$

$$F=P*A$$

$$=11.5*(\pi/4*36.707^2)$$

$$F=12163.688 \text{ N}$$

VOLUME OF CYLINDER

Bore side

$$V_b = (\pi D^2/4)*L$$

$$= \pi/4 * 46.619^2 * 500$$

$$= 8.53032 * 10^5 \text{ N/MM}^2$$

Ramp side

$$V_r = \pi D^2/4 * L$$

$$= \pi/4 * 36.707^2 * 500$$

$$V_r = 5.28856 * 10^5 \text{ mm}^3$$

SELECTION OF MOTOR

$$HP = (\text{Flow rate} * \text{Pressure}) / 442$$

$$= (1.706 * 115) / 442$$

$$= 4.543 \text{ HP}$$

5 HP Motor selected

TIME FOR FORWARD RETURN STROKE

$$T = V / FR$$

Time for each stroke = 30 sec

$$FR = V / T = 8.53032 / 30$$

$$FR = 28434.4 \text{ mm}^3/\text{s}$$

$$1 \text{ mm}^3/\text{s} = 0.00006 \text{ LPM} \quad FR = 1.706 \text{ LPM}$$

Q = 2 LPM gear pump for operation

Time for return

$$T = 5.28856 * 10^5 / 28434.4$$

$$T = 18.59 \text{ s}$$

$$\sigma_c = F / A [1 + (a/n) * (lc/k)^2]$$

$$k = (I/A)^{1/2}$$

a = 1/7500 = Rankine constant for mild steel

n = 0.25 = End constant for one end fixed and other end free

Le = effective length = 0.25 = 2L

$$L = 500 \text{ mm} \quad Le = 1000 \text{ mm} \quad dp = 36.707$$

$$A = (3.14/4) * 36.707^2$$

$$= 1061.345 \text{ mm}^2$$

$$I = (3.14/4) * 36.707^4$$

$$= 89072.828 \text{ mm}^4 \quad k = 9.161$$

$$E = 2.07 * 10^5 \text{ N/mm}^2$$

$$320 = F / 1061.345 [1 + ((1/7500) / 0.25) * (1000 / 9.16)^2]$$

$$F = 46.168 \text{ kN}$$

While the load applied is 12.163 kN

Design is safe

V. RESULT

The bales formed by way of this gadget allows in easy coping with, storage and transportation. The maneuverability of the device is pretty accurate and the handling is pretty easy. Optimization layout is examined to the actual element layout this is being manufactured for the scrap baling press and hydraulic press. It's far inferred that underneath the equal loading conditions, constraints and intended design purposes, form optimization consequences in better and greater dependable design. The price of the system is low compared to the marketplace product. And then the calculations and designing of the baling gadget are explicit within the following levels.

VI. CONCLUSION

The bundles shaped by this machine helps in simple taking care of, capacity and transportation. The mobility of the gadget is very acceptable and the taking care of is very basic. Improvement configuration is contrast with the genuine part plan that is being made for the piece baling press and water powered press. The expense of the machine is excessively low when contrasted with the balers which are utilized in modern locales. The measure of plastic jug squander which is released in the climate can be diminished utilizing the reusing through the balers.

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