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Automatic Hydraulic Marking Machine

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Abstract—*Nowadays, maintenance is major part of any industry. Some factories took much time in replacing cylindrical parts which lead to decline in production. When we visited many vernacular industries, we found that when they find difficulties while replacing some small cylindrical parts cause they are not marked. Automatic hydraulic marking machine which would be used to mark name or logo of the company. This hydraulic marking machine is also used to mark a logo in cylindrical object like engine valve, shaft etc. Machine they are using now to mark the name or logo of the company they have found that, marking cannot be done properly on both ends of the word. we have used main three parts which is used to make it automatic are Solenoid valve, Proximity sensor, Pressure gauge. Solenoid valve are to used to shut off, release, dose, distribute or mix fluids .Proximity sensor is a sensor able to detect the presence of nearby objects without any physical contact.pressure gauge is used to indicating the pressure of fluid by using of this we can maintain depth of cut of logo or marking It would be more efficient and effective for marking circular parts easily.*

1. INTRODUCTION

Hydraulic marking machine which make working model of automatic hydraulic marking machine which is tried to mark name or logo of the company. This hydraulic marking machine is also used to mark a logo in cylindrical object like engine valve , shaft etc.

1.1. Need of Hydraulic Marking Machine

When we visited the industry, we found that when they got valve in replacement they could not identify that, the valve was manufactured by them or not? For that problem, they have decided to mark the name or logo of the company on the valve. When they tried to mark the name or logo of the company they have found that, marking cannot be done properly on both ends of the word.As these ends are not marked properly they tried to mark for the second time but the first marked was damaged. So that, the costing is increased, Production is reduce & it's takes more time.So that, we have decided to manufacture the "hydraulic marking machine". Team which is decided to creating innovative systems and solution that can run a customer's job more efficiently and profitably.To able to envision the future of technological advancements can be critical to staying a step ahead in the competition.

1.2. SOURCE OF DATA AND PROBLEM

When we visited the industries, we found that the most common problem of the industries are when they got valve in the replacement they couldn't found that valve is manufactured by them or not ? While visited we found that this common problem is obtained from the following industries like :

1) Perfect forgings ,Rajkot

2) Bhavani forgings ,Rajkot

3) Profi-tech engineers ,Rajkot

2. MACHINE MATERIAL

Material used for "hydraulic marking machine"is CAST IRON. Because of following properties C.I. material is used for "hydraulic marking machine".Cast iron is an iron-carbon alloy with a typical carbon content of 3.0-4.5 wt. %.also si (0.5-3.5 wt. %) and small amount of Mn, s and p are always present.Cast iron is its low price and the ability to make products of a complex shape. C.I. offers a reasonable resistance against corrosion.The mechanical properties are lower than those of cast or wrought steels, especially when loaded in tension.In compression high loads can be supported. The mechanical property of C.I.depends on the morphology of the carbon.This morphology is depends on composition and process parameters.

3. PARTS OF HYDRAULIC MARKING MACHINE

Basic components of hydraulic marking machines are

1) BASE

2) HYDRAULIC SYSTEM

3) MOUNTINGS

4) ROLLERS

5) TIE-RODS

3.1. BASE

Raw material: - C.I.

Size: - 450x200x180 mm .

MIG welding process is used.

Simless pipe.

It's providing rigid support to our machine.

3.2. HYDRAULIC SYSTEM:-

Hydraulic system consists following components

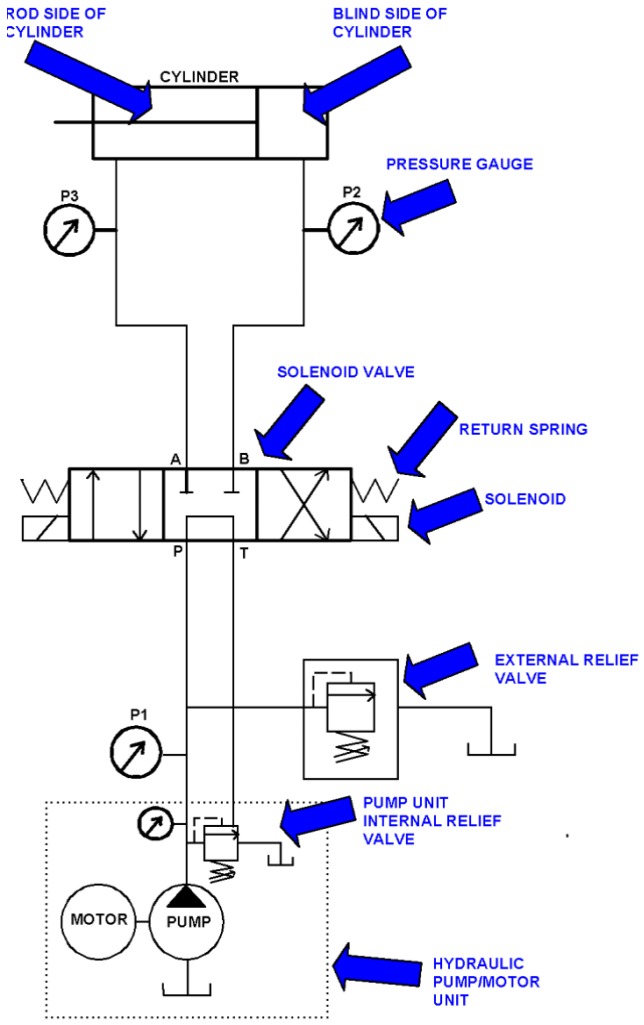
1) Oil tank

2) Motor

3) Pump

4) Hydraulic Cylinder

3.2.1 HYDRAULIC CIRCUIT



The reciprocation is done manually. The control valve is three way two positions DCV. It is push button actuated and is spring return type. When the DCV is in position 1, the pressurized oil from pump enters into Port P and through the port A to the actuator. It pushes the actuator to the right. When DCV is changed position 2 by means of the push button PB manually the actuator port gets connected to the tank. This drain out the oil to the tank and the return spring will push the piston back to the original position. The relief valve connected to the pump will ensure that the pressure does not exceed the set valve. At the set value of pressure, relief valve will open and bring down the pressure in the system[1].

3.2.2 OIL TANK

An oil tank is a container, usually used for storing the oil.

Size of oil tank : 300 x 200 x 150 mm

Oil tank capacity :- 8 liter

3.2.3 MOTOR

An AC motor is an electric motor driven by an alternating current. It commonly consist of two basic parts, an outside stationary stator having coils supplied with alternating current to produced a rotating magnetic field, and an inside rotor attach to the output shaft that is given a torque by the rotating field.

Motor specification :-

Electricsupply:-3-PHASE

Speed :- 1440rpm

Motor power : - ½ h.p.

3.2.4 PUMP

It transfers oil from oil tank to piston-cylinder at suitable pressure. We are using external rotary gear pump. Capacity: - 2.5 liter/minute.

3.2.5 PISTON-CYLINDER

Bore size : 40 mm

Rod diameter :- 20mm

Stroke size : 100 mm

Cylinder grade :- ST 52 Seamless pipe

Piston-cylinder capacity:-200 kg.

3.2.6 MOUNTING

It is manufactured by casting process.

It moves linearly on the tie-rod, with the help of piston-cylinder arrangement. It used to hold the punch.

3.2.7 ROLLERS

MATERIAL**:** - EN 31 (bearing material) Process like heat treatment is done on the rollers to increase the strength of the rollers.Rollers are used to revolving the work-pieces like cylindrical parts

3.2.8 TIE-RODS

It is one type of guide ways, used to provide specific path for mounting.It is made from cast iron (grade EN-8D)Hard chromium plating is done on the tie-rods to increase the hardness.

Size: - 20mm diameter.

4. MACHINE MOUNTINGS

Machine mountings are used for machines cleaning, controlling & safety. Machine mountings like

1) Solenoid valve

2) Proximity sensor

3) Pressure gauge.

4.1 SOLENOID VALVE

Solenoid valve is an electrometrical valve use with liquid or gas. the valve is controlled by an electric through a solenoid: in this machine two port valve is used which on or off the flow. Solenoid valve are the most frequently used elements in fluidics. their tasks are to shut off, release, dose, distribute or mix fluids . they are found in many application areas. Solenoids offer fast and safe switching, high reliability long service life, good medium compatibility of the materials used low control power and compact design. Solenoid valve has two main parts: the Solenoid and the valve. the Solenoid converts electrical energy into mechanical energy which in turn open or closes valve mechanically. Solenoid valves may use metal seals or rubber seals, and may also have electrical interface to easy control . a spring may be used to hold the valve opened or closed while the valve is not activated.

4.2 PROXIMITY SENSOR

Proximity sensor is a sensor able to detect the presence of nearby objects without any physical contact. A Proximity sensor often emits an electromagnetic or a beam of electromagnetic radiation and looks for changes in the field or return signal.The object being sensed is often referred to as the proximity sensors target. Different proximity sensor target demand different sensors.

The maximum distance that this sensor can detect is define “nominal range”. Some sensors have adjustment of the nominal range or means to report a graduated detection distance.Proximity sensors can have a high reliability and long functional life because of the absence of mechanical parts and lack of physical contact between sensor and the sensed object.Proximity sensors are also used in machine vibration monitoring to measures the vibration in distance between a shaft and its support bearing.

5. DESIGN OF MACHINE

We doing design different components of the hydraulic marking machine In creo 2.0 parametric software.[2]

5.1 BASE

Raw material: - C.I.

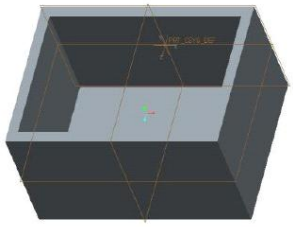
Size :- 450x200x180 mm .

MIG welding process is used.

5.2 OIL TANK

An oil tank is a container, usually used for storing the oil. Size of oil tank : 300 x 200 x 150 mm

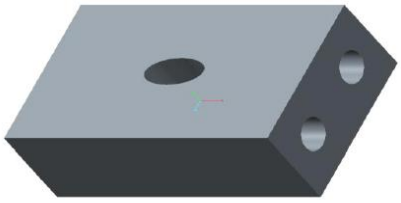
Oil tank capacity :- 8 liter



4.3 MOUNTING

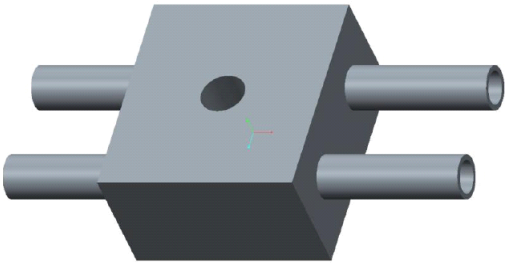
It is manufactured by casting process.It moves linearly on the tie-rod, with the help of piston- cylinder arrangement.

It used to hold the punch.



5.4TIE-RODS

It is one type of guide ways, used to provide specific path for mounting.It is made from cast iron (grade EN-8D)Hard chromium plating is done on the tie-rods to increase the hardness. Size: - 20mm diameter.



5.5 PISTON-CYLINDER

Bore size : 40 mm

Rod diameter :- 20mm

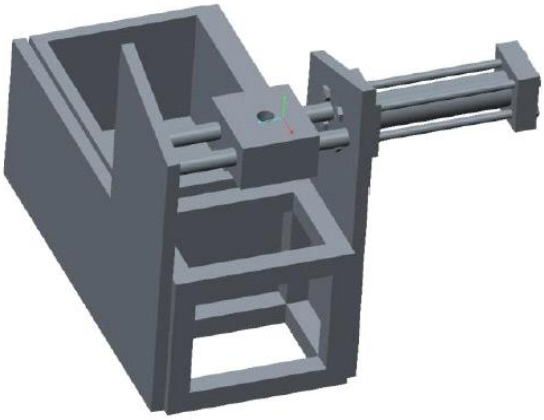
Stroke size : 100 mm

Cylinder grade :- ST 52 seamless pipe

Piston-cylinder capacity:-200 kg.

4.6 HYDRAULIC MARKING MACHINE

After assembly of all the components in fully constains appereance of machine is as below.



In construction of this machine we have two side plates for sporting of the tie rod on which we mounted mounting .In mounting we can hold die ,with the help of this die we will mark a company logo on cylindrical object.

6. WORKING OF HYDRAULIC MARKING MACHINE

First of all on the switch from electric panel.Due to that motor is started; pressure is generated by the pump.Oil is entering in the piton-cylinder with the help of pump.Due to the pressure of oil in the cylinder piston moves in forward direction therefore mounting gets motion.The machine has a proxy switch for the adjustment of stroke-length.One handle is placed on mounting through which required depth can be provided to punch.Two rollers are placed on the base of machine.Valve is mounted on these rollers. Due to the motion of piston mounting get forward motion through which we get required mark on valve.

6.1 CALCULATION

Piston blind area

$$A = \pi * 20^2$$

=1256 mm^2

=1.928 $inch^2$

Rod side area

$A_R = \pi * 10_2$

=3.14* 10^2

=0.48 $inch^2$

Required Pump capacity

$$Q = 0.26 \frac{A*S}{t}$$

A = 1.928

S=100mm =3.93 inch

t=2 sec

$$q = \frac{0.26 * 1.928 * 3.93}{2}$$

A= 0.9850 g.cm

Power required by pump

$$P_{HP} = \frac{q*p}{1714}$$

P=700 assumed psi

$$P_{hp} = \frac{0.9850 * 700}{1714}$$

=0.40HP

7. WORKING FLUID

Oil grade: - 68 no. (Hydraulic oil)

Hydraulic fluids are liquids used as the motive medium in hydraulic machinery and equipment.

This fluids are used in a variety of machines including automobiles.

Hydraulic oil ISO 68	
Property	**Value in metric unit**
Density at 15.6°C	0.880 * 103 kg/m3
Flash point	204°C
Pour point	-40°C
Kinematic viscosity at 400C	68 cSt
Viscosity index	135

8. ADVANTAGES, CONCLUSION AND FUTURE SCOPE

8.1 ADVANTAGES

- It is hydraulic, rather than manual.
- Mass production can be possible.
- Reduce time consumption.
- Life of punch can be increase.
- It can be operated automatically and manually.
- Stroke length can be adjusted.

8.2 CONCLUSION

By making project of hydraulic marking machine we can also mark name or logo of the company in cylindrical object like engine valve, shaft etc. Work piece cannot damage. Life of punch is increase as compare to the manually marking machine.

8.3 FUTURE SCOPE

- This machine is use for marking a logo on cylindrical object also. Cylindrical objects like engine valves ,shafts etc.
- After creating the design in creo 2.0 , we will going to do analysis of design.
- Then we will make a prototype(working model) of hydraulic Marking machine.
- We can also use pneumatic system instead of hydraulic system.
- This hydraulic marking machine can also be modified in CNC machine.

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