

Design of Stamping Machine for Use in Industries

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Abstract— As it is identified in a regular production of glass grinding in industry. So it is need of hour to make a machine which performs the task rapidly and safely. Stamping is one of the most important part for any industry to stamp their logo on their product. The workers of the industry stamps their logo with manually operation which causes wastage of paints and their human efforts also got decreases with the time. More number of labours are required to perform this operation like one person is require to hold that product and one person is required to make a stamp on that product. It requires more time to perform this small operation. By identifying the problem related to the stamping on products, we have decided to make an automatic stamping machine which will reduce the effort needed to making stamp on products. There will be no wastage of paints or there will be no unnecessary sound of machine while making stamp on products. This machine also provides flexibility while stamping. It can stamp on several products at less time. It is seriously needed to upgrade the traditional way of sealing to make it optimised. We had worked for the stamping machine used in industries by using this machine we are able to seal the grinding wheels which at the end of line stamped with manual process which is unproductive.

Keywords-Spray painting, labours, wastage, automatic stamping

I. INTRODUCTION

The problem which we are trying to solve is to make stamp on materials or work pieces very maturely. In many industries the spray painting work is done, but there is a lot of wastage of paints and lot of workers are required in the industries to perform that operation. Just for example: they require just 20% of paint to stamp on work piece and they waste total 80% of paint just for that one stamp. For solving this problem, we are making a machine called automatic pneumatic stamp for making stamp on number of work pieces at the very less time. We will save the paint, the labor cost and most important thing is that we will save the time of industry and production. We have to check the pneumatic cylinder at various pressure loads. At gives high air pressure the cylinder rod move fast and low pressure situation the cylinder move slowly by applying pressure for considering specification of the pneumatic cylinder and various pressure variation will give by using pressure regulator. Today industrial automation of stamping company logo is limited to high part volumes and robot trajectories that a reprogrammed by offline programming and manual teach-in. The traditional way of stamping is very time consuming and laborious. As it is identified in a regular production of glass grinding in Industry. So it is need of hour to make a machine which performs the task rapidly and safely. The modern day has brought Stamping to a new level of use and application. So through this project we want compensate this problem up to some extent. With the help of this machine a trial to make the stamping machine to overcome the traditional way of stamping as the safety point of view. There is manual application of stamp on grinding wheel and needed to mechanised the same. So, the machine explained below is endeavour to innovative approach to find solution to this existing problem. Which will reduce time for stamping, save energy and human effort, make work safe and lessen efforts to great limit.

II. PROBLEM STATEMENT

Stamping is one of the most important part for any industry to stamp their logo on their product. The workers of the industry

stamps their logo with manually operation which causes wastage of paints and their human efforts also got decreases with the time. More number of labours are required to perform this operation like one person is require to hold that product and one person is required to make a stamp on that product. It requires more time to perform this small operation. Unnecessarily it requires more space to perform these small operations. Packed places are requiring performing these operations. The working principle of this project is to solve this entire problem by making a type of machine which can save human efforts and cost and also the time of the industry.

III. OBJECTIVE

The modern day has brought stamping to a new level of use and application. So through this project we want compensate this problem up to some extent. With the help of this project work we have tried to make the stamping machine to overcome the traditional way of stamping as the safety point of view. Our aim is to make the stamping machine used in industries by using this machine we are able to seal the grinding wheels which at the end of line stamped with manual process which is unproductive. In order to fulfil the aim the following objectives are set.

- 1) To decide the overcome traditional way of stamping.
- 2) Designing of system which gives the required output for the situation.
- 3) From this design, to development the machine for stamping.
- 4) Fabrication of the system.
- 5) To increase productivity.

IV. PROPOSED WORK

It consist of conveyor belt carrying grinding wheel loaded after the last step of production, pneumatic system (piston & cylinder), paint and oil mixer, air compressor, sensor and microprocessor unit. The said system will work for performance of stamping on consecutive grind wheel one by one. Sensor sense availability of grind wheel and excites the pneumatic system and applies paint on grinding wheel.

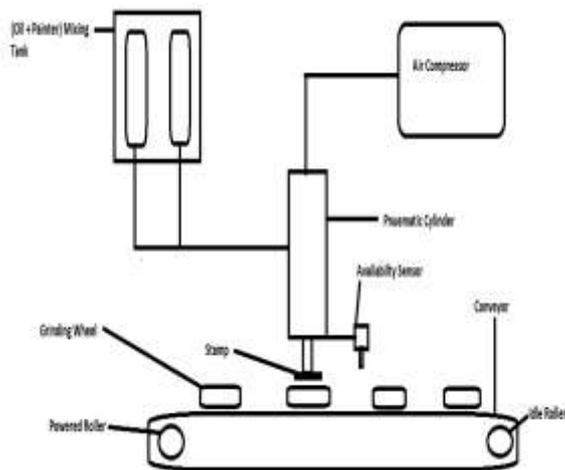


Fig :-1. Stamping Machine Concept

Design of Different Component

- 1 Design Of Piston and Cylinder
- 2 Design of Pneumatic System (Valve)
- 3 Rope drive (Size, shape, position, pressure)
- 4 Design Of Conveyor Belt
- 5 Design of Timing of System.

V. DESIGN

A. Internal construction and other features of valves

- Flow requirement depending on size of actuator & speed of movement.
- Response time of the valve.
- Air pressure available.
- Type of actuation required – solenoid, air pilot or mechanical
- Type of connection – sub base, side ported.
- No. of positions – two or three position.
- Return mechanism such as spring, air pilot.
- Lubricated or non lubricated.
- Functions like 2/2, 3/2, 5/2, 5/3, normally open or close etc



Fig:-2. Solenoid Valve

B. Pneumatic Cylinder

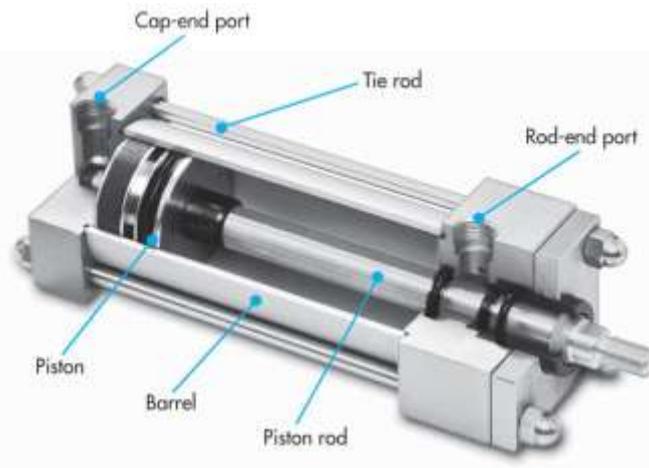


Fig.:-3. Elements of pneumatic cylinder

If the piston rod is in compression, Use the ‘Push Force’ table below, as follows:

1. Observe the operating pressure concealed to that required.
2. In the same column, observe the force required to progress the load (always round up).
3. In the same line, look over to the cylinder bore required. If the cylinder volume dimensions are huge for the application, increase the running pressure, if possible, & reiterate the exercise.

Table :-1. Pneumatic cylinder selection (Deduction for Pull Force)

Piston Rod Size (mm)	Piston Rod Area (mm ²)	Reduction in Force (N) at Various Pressures in Bar			
		1	5	7	10
4	13	1	6	9	13
6	28	3	14	20	28
8	50	5	25	35	50
10	79	8	39	55	79
12	113	11	57	79	113
16	201	20	101	141	201
20	314	31	157	220	314
25	491	49	245	344	491
32	804	80	402	563	804
40	1257	126	628	880	1257

If the piston rod is in stress, Use the ‘Deduction for tension Force’ table. The practice is same but due to the contraction area affected by the piston rod, the force present on the ‘pull’ stroke will be minor. To determine the pull force:

1. Follow the step for ‘push’ force as described previously.
2. Utilizing the ‘Deduction for Pull Force’ table, determine the force indicated corresponding to the rod & pressure selected.
3. Deduct this from the original ‘push’ force. The outcome is the total force present to shift the load.

If this force is not extent enough, reiterate the process & increase the system operating pressure or cylinder diameter if practicable.

Table:-2. Pneumatic cylinder selection (Deduction for Push Force)

Cylinder Bore Size (mm)	Piston Area (mm ²)	Cylinder Push Force (N) at Various Pressure in Bar			
		1	5	7	10
6	28	3	14	20	28
8	50	5	25	35	50
10	79	8	39	55	79
12	113	11	57	79	113
14	154	15	77	108	154
16	201	20	101	141	201
20	314	31	157	220	314
25	491	49	245	344	491
32	804	80	402	563	804
40	1257	126	628	880	1257
50	1963	196	982	1374	1963
63	3117	312	1559	2182	3117
80	5027	503	2513	3519	5027
100	7854	785	3927	5498	7854
125	1227	1227	6136	8590	12272
160	20106	2011	10053	14074	20106
200	31416	3142	15708	21991	31416

C. Controller

Compact Programmable Controllers otherwise known as application controllers can be used for the control of the system. These controllers can e used for time control and supervisory functions such as: conveyor speed control, speed control of individual drives, speed and belt slip control, load equilibration in two driving drum and velocity difference control between two motors on one driving drum. Compact Programmable Controllers otherwise known as application controllers can be used for the control of the system. These controllers can e used for time control and supervisory functions such as: conveyor speed control, speed control of individual drives, speed and belt slip control, load equilibration between two driving drum and speed difference control between two motors on one driving drum.

V. RESULTS

The graph above show that the end results of the comparison of traditional way of stamping and automatic stamping.

- The reading for subsequent cycle is identified as 18.16 sec for manual performance of the stamping and 8.958 sec for stamp by machine.
- The graph show there is saving in 9.202 sec per cycle which can grow the productivity considerably and also the saving in manpower requirement.

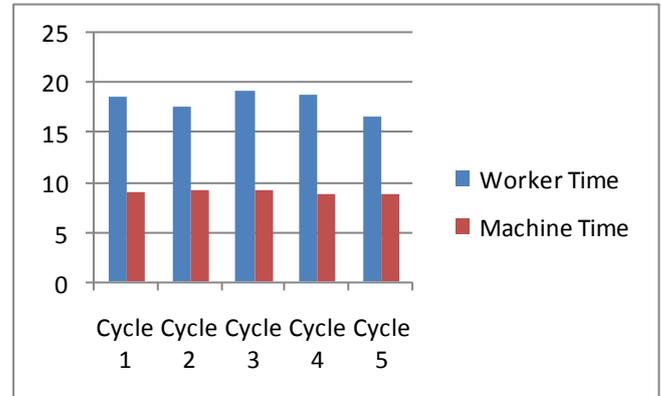


Chart:-1. Time Comparison Between Worker and Machine (In Sec.)

Picture given below show the final product Company finished on machine it gives a rough finished stamp on abrasive wheel which needed to finished by some adjustments like paint density, stamp pressure, perpendicularity of plate towards stamp pressed. Further the output achieved is near to the desired requirement of stamp. There is always space for improvement and the trial is fortunately very near to the requirement. So, the necessary steps are planned for its further development to achieve accurate and quality stamping on product.

The table below give a brief idea about usage of paint by stamping machine, the number shows saving in paint per item stamped. One of the objectives of our stamping machine has achieved machine. It gives subsequent savings in cost of stamping which reduces the investment on paint made. The product painted can also increased by controlling valve of tank from which paint is supplied to the stamp.

Table :-3.Product Stamped per liter

Sr. No.	Method of Stamping	No. of Pieces stamped per 100ml of paint plus thinner
1.	Stamping with spray gun	44
2.	Stamping by Automatic stamping machine	57

VI. CONCLUSION

It will be used in industries over existing method of stamping which is a clumsy method of stamping and also hazardous to human health. With stamping machine all the complexities of

the process are overcome and does a stamping operation in human less environment.

It will increase productivity by increase part per cycle. As the previous method is human intended causing dependency of stamping operation on workers, they as actually responsible for rated output of finishing shop. Which is also tiring work for workers. After performing the stamping operation on machine it give 8.952 sec cycle over 16.15 sec of previous cycle. Which tends to grow output and productivity as well

It can be used for other solid parts too. The stamping machine can be worked out for other parts to which are box type can be utilized efficiently.

Simple system to maintain and operate. Construction of machine is very simple and easy to understand. The same controller can be utilized to operate more than one machine at time. Which gives multiple output at the same time and saving in cost.

Replace human intervention and human effect on production. Spray painting is very unhealthy for human if worked in environment for long time. So machine has replaced human completely which can be done as per work standard specification. Further employees moral is increased if the system is installed over the previous one causing increasing work environment safety. And alteration can be done on standard guidelines of Govt. institute.

Mass production can be made then less possible cost. Utilization of stamping machine in mass production lead to greater reduction in production cost. The cycle time required for job is changed effectively which is a very big achievement in case of Mass Production Company. So, by adding some load and unload mechanism the machine can be fully automated.

Body can be made in different sizes as per requirements. The machine designed is for type -5 abrasive wheel which is quite small shape product. But the same machine can be used for variety of shape and sizes. Some parameters needed to be changed and adjustment has provided for stamping different sized objects regarding strength of belt is matter of study.

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