Velocity Controlled Automated Stamping Machine

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ABSTRACT *In process automation linear velocity of a conveyor is required to change according to process speed. Linear speed of a conveyor can be sensed by sensing mechanism which will convert velocity into a pulse train. Number of pulses/second will define the linear acceleration of conveyor in to a frequency. Integration of robotic arm with conveyor is the task of synchronising linear acceleration of conveyor, and linear actuator of robotic arm equals to zero. A PLC based control system will convert frequency feedback from conveyor into frequency command of a servo operated mechanical actuator of a pick and place robotic arm system. The vertical actuator in the end effecter moves up and down this robotic system will stamp the paper perfectly as it moves across the conveyor at regulated speeds. The perfect stamping on paper will be the result of velocity matching of robotic system and conveyor. The need of this model is to increase the production level, to reduce the damages in the model and to minimize the production cost. To make the relative velocity between the robotic high speed arm and the belt conveyor to zero so that any operations can be done between these two processes. Proper stamping on required positions on paper for different speeds on conveyor is the main objective of this project.*

KeyWords- *Automation, Conveyor, Robotic Arm, Stamping Machine.*

INTRODUCTION

The machine named "VELOCITY CONTROLLED ROBOTIC STAMPING MACHINE" is a machine is used for stamping in a automatic way. The conveyor which have the paper is rotate in a velocity which can be vary. The PLC is used for the programming. Most of the factory automation will be done by PLC. Ladder programming is used for the programming [01]. With the help of velocity controlled robotic stamping machine we can increase the productivity of the factory. It can able perform continues operation without any error.

The phrase pneuma method respiration air. With the assist of compressed air the vertical movement of robotic arm are controlled. The robot arm motions and the conveyor pace are synchronised for that reason the right stamping operation may be done [02].

The aim of this undertaking is to get a clear image at the paper because it moves across the conveyor by using the stamping movement of robotic arm at various speeds at precise periods.

Mechanization is named as utilization of various control frameworks, for example, numerical control, programmable rationale control or other mechanical control frameworks in worry with PC applications or data technology(such as Computer Aided Design or Computer Aided Machining) to control all the modern apparatus and procedures, in this manner decreasing the requirement for human mediation [03]. As dependably stated, for development of ventures, mechanization is should and ought to supersede the mechanical development. Where motorization gives human administrators hardware to help them alongside the strong prerequisites of work, robotization diminishes the association for human tactile and mental necessities also. Robotization assumes a predominant part on the planet economy nowadays and in every day application in businesses [04].

In method automation linear velocity of a conveyor is needed to alternate consistent with process speed. Linear velocity of a conveyor may be sensed by using sensing mechanism as a way to convert velocity in ti a pulse train. Number of pulses/second will define the linear acceleration of conveyor in to a frequency [05]. Integration of robotic arm with conveyors is the mission of synchronising linear acceleration of conveyor, and linear actuator of robot arm equals to zero.

A plc based control system will convert frequency feedback from conveyor into frequency command of a servo operated mechanical actuator of robotic system [06]. The vertical actuator of robotic system. The vertical actuator in the name of end effectors is operated by a pneumatic cylinder in which the end effectors

moves up and down this robotic system will stamp the paper perfectly on paper will be the result of velocity matching of robotic system and conveyor. The undertaking include sensors that detects the question measure and sends the flag to the microcontroller [07]. The microcontroller sends flag to circuit which drives the different engines of the mechanical arm to hold the question and place it in the predefined area.
While taking the robotic system into consideration with the help if a servo motor , the high speed horizontal arm of the robot can be moved with higher velocity and better precision . with the help of transducers (encoders) and the sensing systems and thereby making the relative velocity between them zero [08]. Exhibit day industry is progressively turning towards PC based computerization for the most part because of the requirement for expanded efficiency and conveyance of finished results with uniform quality. The rigidity and for the most part high cost of hard-robotization frameworks, which have been utilized for computerized producing undertakings previously, have prompted a wide based enthusiasm for the utilization of robots fit for playing out an assortment of assembling capacities in an adaptable domain and at bring down expenses [09].

METHODOLOGY

Following are the steps involved in present work

A. Problem Statement

Now a days, companies are looking forward to fully automatic machines. By the help of this type of machines companies can increase the productivity. Automated machines can help to reduce the manpower. The requirement of stamping machine is very important, for all the activities we have machines but for the sealing and stamping purpose the availability is very low. In this situation the automated stamping machine is very useful to do the needful. We can increase the speed of the conveyor or we can decrease the speed of the conveyor. According to the requirements we can change the productivity of the system by varying the speed of the conveyor. The paper on the conveyor will be punched or stamped by the puncher. Hence we can increase the productivity of the system and reduce the manpower.

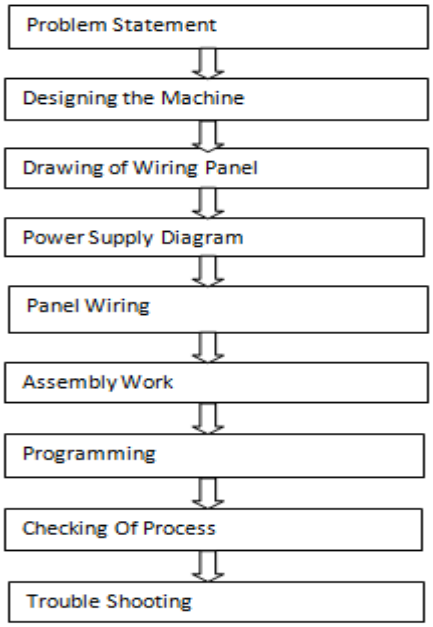


Figure.1 Steps involved in Present Work

B. Designing of the machine parts

Here we need to design the entire machine. The different parts of the system, mechanical designing, electrical designing and pneumatic designing. This is doing using different software in computer.

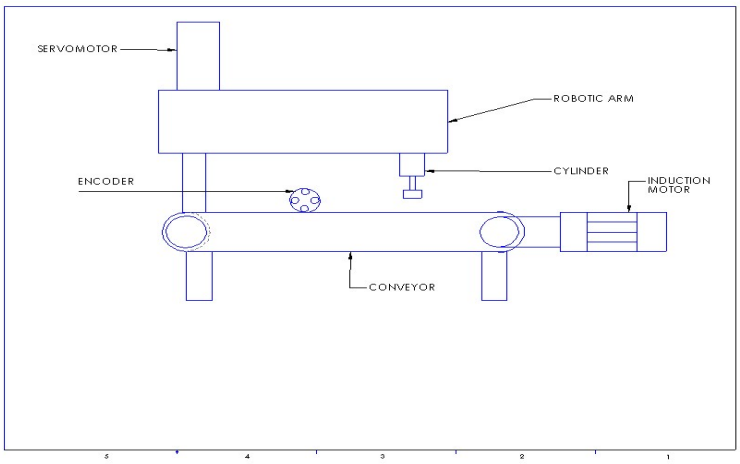


Figure.2 Parts of the System

C. Drawing of wiring panel

Here we need to draw the panel diagram for the connections. Here we need to mention each and every connection in the system, from where a connection wire is start and where that connection end. We need to mention the starting and ending points of every connection.

D. Power supply diagram

In this step we need to draw the supply diagram. What are the supplies comes in to the machine and their connections to different components.

E. Panel wiring

According to the drawing we need to setup the wiring panel. We have drawing of wiring panel and power supply diagram according to these diagrams we need to wire the circuits. Electrical wiring is an important work. Each and every connection is needed to make perfect.

F. Assembly work

Assemble the components to make the machine. Here based on the design of machine we need to assemble the components of machine. Mechanically we need to check for every joints and fittings of the components.

G. Programming

Write the program for the process using PLC software. We know the working sequence of the machine process, based on that we need o write the PLC ladder program for the process. This is the starting process and this is the last process these things are we need to consider while writing the program. The sequence is need to write one by one based on the working of machine. We use different software for writing the PLC program.

H. Checking of process

Upload the program to PLC and run the program. Check the working of the machine. Here after writing the PLC program for the working of the machine we need to upload the program to the PLC memory. Then simulate the program for checking the working of the machine. Here analyze each steps of the process based on the sequence.

I.Trouble shooting

While simulating the program there may be some problems may occur. We need to identify each and every mistakes in the working and then trouble shoot this mistakes. Here find out the problems occur in the machine process and solve those problems.

WORKING

A plc based control system will convert frequency feedback from conveyor into frequency command of a servo operated mechanical actuator. The vertical actuator in the name of end effectors is operated by a pneumatic cylinder in which the end effectors moves up and down this robotic system will stamp the paper perfectly on paper will be the result of velocity matching of robotic system and conveyor.

The 3 phase induction motor is used to move the conveyor belt. The conveyor belt cannot be rotated at the same speed as the motor, thus the reduction of the speed is required while transforming the power from rotary motion to linear motion . This is achieved by gear reduction with the help of a bevel gear mechanism . Thus the speed is reduced . Chain sprocket mechanisms are used to transform the power from gear to roller shaft. The rollers are fixed to the rollers are chosen . There are two rollers in the conveyor system., one is

driven roller and the other one is driver roller. The driver roller is fixed to the body of the conveyor and the driven roller is attached with the tension plate adjusted by a lead screw mechanism for tightening and loosening the belt. The roller shaft are attached to the frame of the conveyor with the help of roller bearing and these bearings are housed in pillow head bear housing flanged type. An encoder is fixed to the belt conveyor to sense the speed of the conveyor belt and give the feedback to the PLC. According to the programme of the run in the PLC. it will provide output to the servo motor and the solenoids. The robotic arm will move with the same velocity of the conveyor with which move. When the solenoid actuate then the cylinder will make movement. Then it will punch without spreading.

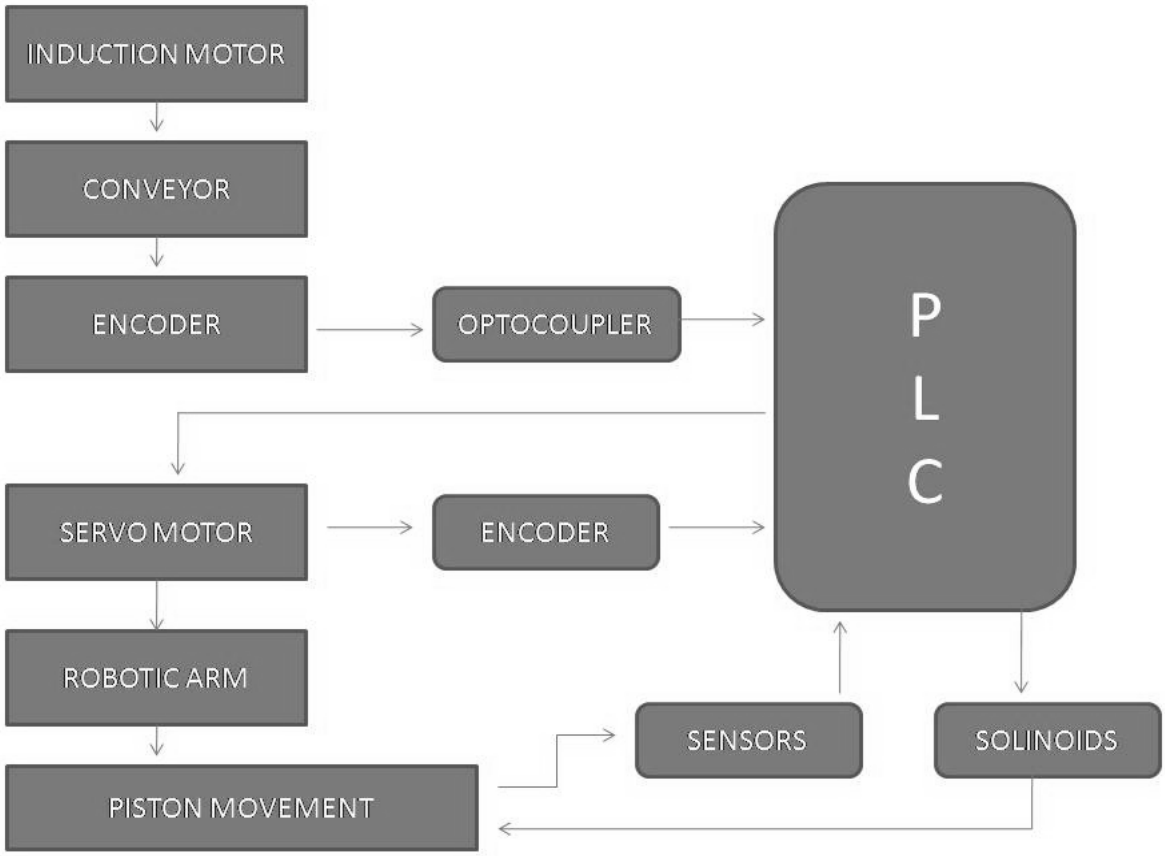
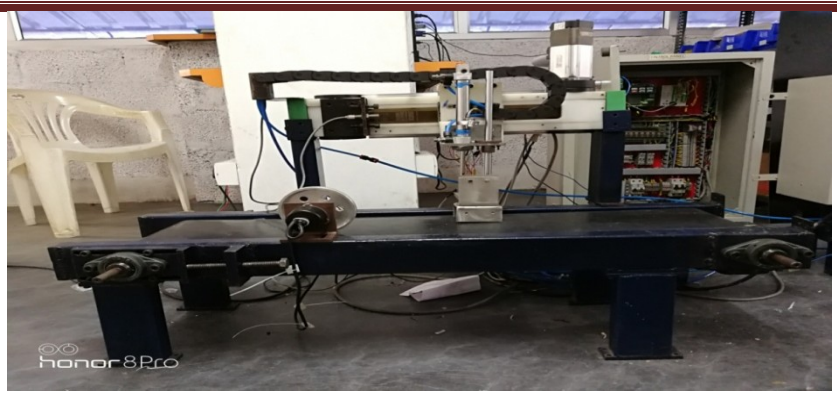


Figure.3 Working Procedure

RESULTS & DISCUSSIONS

The final result was quite satisfactory. The belt moved from starting point to the end point through the roller without conflicting with the frames. The system performed well as programmed and detects the object and punch or stamping according to their velocity. Panel wiring is completed properly, and we can understand easily which are the wire with the help of wire diagrams. Machine is work properly. Conveyor is running with the papers and robotic arm is punching precisely according to the velocity of the conveyor. Velocity of the conveyor can increased by the means of VFD. Problem of spreading the ink also solved.



.**Figure.4 Actual Machine**

CONCLUSIONS

The main objective of my project is to make an automated stamping machine with velocity controlled. I have made a demo version of the original machine in R&D department. Using this demo machine the company was made the original one for the international client of the company. They purchase the machine for punching the papers. It will help to increase their productivity and their profit. The machine reduces the time consumption for stamping reduces the labour costs. Velocity controlled automated stamping machine system is an automatic machine. This is a machine which is used to stamping the papers with varying velocity. The FRL, pressure regulator, connecting valves, cylinders are used in the pneumatic side and PLC, Relay channel in the electrical side.

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