

Control System Upgradation with Linear Actuator in Coil Unloading Machine

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ABSTRACT: This paper deals with the placement of the coil for the dispatching process associated with linear actuator. The method of coil unloading is automated with the help of HMI, sensors, motors, linear actuator. The method is carried out through the ladder logic methodology. The Linear actuator application machine process is done on the PLC [Programmable Logic Controller]. Earlier PLC controllers are huge program size, spare parts are rare, inbuilt programming that we couldn't change as per the requirements and absolute model which is difficult to learn. The camshaft mechanism takes overtime to assemble the coil position. And also coils pick up and drop step by step process is difficult. To overcome this problem use the advanced PLC controller model SIEMENS-S7 1200 instead of earlier telemechanic PLC controller because in this SIEMENS-S7 1200 model PLC the HMI is used to display the coil positions.

KEYWORDS-PLC, Linear actuator, Inductive proximity sensor, laser sensor, Relay, Reed switch, power circuit, control circuit, DC motor, HMI device

I. INTRODUCTION

A Watch mandatory for every human's to enjoy the luxurious and auspicious life. To build a watch, it comes across several stages and operations to view the final product. The certain operation on building a watch are Press Shop, Ebauche, Auto Turning, Gear hobbing, Burnishing, Gear Assembly. The machine should be placed on flat floor. Supply voltage = 220 V - 50 Hz. The 7000 Caliber range watches about the unloading a coil with checking of resistance. The resistance is about 2.850 ± 1.50 for 7001 type Calibers. To overcome the absolute mechanism and inbuilt programming. To set the coil positions accurately which is used to choose and place the components and to display its position in degrees by HMI.

II. RELATED WORKS

In this paper, we discuss the upgrade the machine so that the problems workers facing in day to day life will be reduced. We have replaced LVDT instead of cylinder to reduce the circuit panel congestion on the presence of cylinder interfaced to the relays. Pneumatic actuators, or pneumatic cylinders, are also similar to hydraulic actuators but they use compressed gas to create force as an alternative of a liquid. They work likewise a piston in which air is driven into a chamber and come out of the other side of the chamber. Air actuators will not be essentially used for heavy-duty machinery and cases where huge amounts of weight are noted. Because air is the basic source, pneumatic actuators are used in several places of mechanical activity. Fig.1 shows the picture of LVDT.



Fig.1 LVDT

The working principle of LVDT are its primary winding(p) are energized with a constant amplitude AC.The Block Diagram shows a clear view about the replacement done in the area of linear actuator previously cylinder has been used. Her we accomplish that our upgrade reduces the space congestion and error can be found easily. Fig 2 shows the block diagram of proposed method.

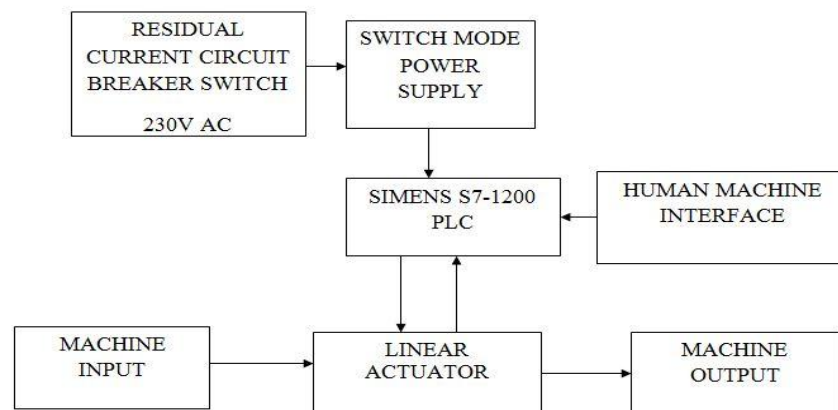


Fig:2 Block Diagram

III.METHODOLOGY

A. PLC

PLC is called a programmable logic controller, which is also known as a programmable controller. A computer module prototype name referred and used in the control sector industry & commercials. PLC is unique which is different from normal computer prototype.Fig 3 shows the picture if PLC.

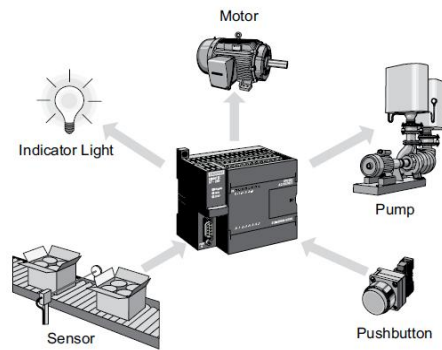


Fig:3. PLC

B.INDUCTIVE PROXIMITY SENSOR

A proximity sensor used to sense the nearby objects without any actual contact with the object. An electromagnetic field is emitted by the sensor and senses the changes occurred in the field. The required target sensed is known as inductive proximity sensor's mark. Proximity sensor targets differ from the demand of different sensors. Fig 4 shows the picture of proximity sensor.



Fig:4.PROXIMITY SENSOR.

C.LASER SENSOR

The light is being emitted by the LASER and it will be reflected by the detector or any other surface in which it falls and the reflected light signal is being collected by the detector which is placed at the receiver side by this was the LASER sensor works. Depending on the position of the beam on the sensors the angle is measured and hence the height from the sensor to the target surface is sensed. Fig 5 shows the photographic view of laser sensor.



Fig:5LASER SENSOR

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D. REED SWITCH

The **reed switch** is widely used because it operates on applied magnetic field. By actuating the coil from the switch the reed relay or magnet brought close to the switch. In switch, the magnet is pulled off, and it comes back to its previous position. Fig 6 shows the picture of reed switch.



Fig:6 REED SWITCH

E. ACTUATOR

The conversion of an electrical signal of a controller to the physical condition is known as Actuators. They are linked to PLC Output. A motor starter is an example of an actuator that is linked to a PLC output. Fig 7 shows the diagram of actuators.

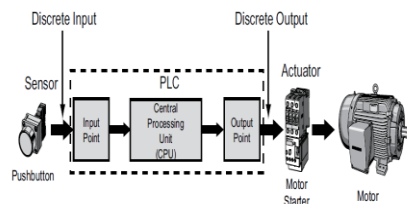


Fig:7 ACTUATOR

F. SMPS: SWITCHED MODE POWER SUPPLY

SMPS is a power supply that incorporates power efficiency. The input 230V supply is given to the SMPS, which converts it to 24V & 5A DC which is required for the operation of relays, contactors, sensors, solenoid valves, LED's etc. SMPS is shown in Fig 8

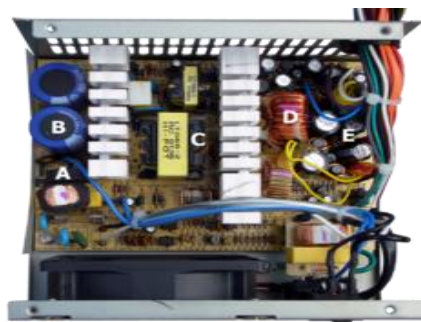


Fig:8 SMPS

G. CONTROL CIRCUIT

Control circuit controls the whole operation and makes the machine to work with our sequence of operation. It includes Time PLC in which we program the logic. Through the output of PLC, we drive relays, solenoids and also the complete sequence of operation.

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H.RELAYS

A relay is an electrically operated switch that are necessarily to control a circuit by a low power signal or where several circuits must be controlled by one signal. The principle of relay logic is built on relays which energize and de-energize related contacts. Relays is shown in Fig 9.

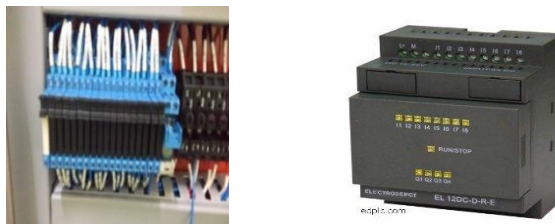


Fig:9 RELAYS

IV.EXPERIMENTAL RESULT

The experimental setup for the proposed method had been shown below. This shows the way of unloading the coil in thermocol tray for the final dispatching process. Fig 10 shows the final stage output machine.



Fig:10 Unloading machine

A.USES:

- Display the arms accurate degree.
- To change the values as per the requirements

V.CONCLUSION

In this paper, We have done the project on coil unloading machine using the PLCs with the support of linear actuator. We have done the conversion on reducing the cylinder. By this conversion, it is easy to find error accurately and space congestion is reduced. The further advancement on this paper is we are making a conversion on replacing the LVDT to Robo Arm for easy and efficient work.

REFERENCES

1. PawełRzucidło, PawełRzucidło, Rzeszów University of Technology " testing of electro-mechanical actuators "6th international multidisciplinary conference
2. Ramesh R., Jyothirmai S., Lavanya K., Intelligent automation of design and manufacturing in machine tools using an open architecture motion controller, Journal of Manufacturing Systems, 32, 1, 2013.
3. Wu, Shang-The; Mo, Szu-Chieh; Wu, Bo-Siou, (2008), An LVDT-based self-actuating displacement transducer, Science Direct, Sensors and Actuators A 141 (2008)
4. DánielIstvánBuza, Ferenc Juhász, GyörgyMíru, Fēlegyházi, TamásHolczér, International Workshop on Smart Grid Security, 181-192,2014
5. Herceg, Ed, (2006), Factors to Consider in Selecting and Specifying LVDT for applications, Nikkei Electronics Asia, March 2006
6. DánielDarvas,IstvánMajzik, Enrique Blanco viñuela, International Conference on Integrated Formal Methods, 508-522, 2016.