AUTOMATION IN NEWS PAPER CUTTING USING PLC

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Abstract—To understand the application and importance of the involvement of automation in conventional cutting machine in manufacturing. A cutting machine is available in various shapes and sizes, with small hand-held power cutting systems and to bench mounted and finally floor-mounted models. This paper includes the types of cutters, and shop formulas for setting up each operation. Safety plays a critical part in any operation involving power equipment. This paper also includes procedures for maintaining, and proper setting up the work and methods of selecting various tools, and object holding devices to get a job done safely without causing damage to the equipment, yourself, or someone nearby

INTRODUCTION

This project is based on Automation. Automation is basically the delegation of human control functions to technical equipments aimed towards achieving: Higher productivity, Superior quality of end product, Efficient usage of energy and raw materials, Improved safety in working conditions etc. This automation is made for industrial use in paper cutting and folding purpose. The used tools are Programmable Logic Controller (PLC) is an industrial computer that monitors inputs, makes decision based on its program and controls outputs to automate a process or machine. And also RC network and SYNC motor are used for automation purpose.

Block Diagram

HMI

PLC

Driver

Motor

HMI
HMI is the acronym for Human Machine Interface, and can be designed as just that; an interface between the user and the machine. An HMI is considered an interface; a very broad term that can include MP3 players, industrial computers, household appliances, and office equipment. However, an HMI is much more specific to manufacturing and process control systems. An HMI provides a visual representation of a control system and provides real time data acquisition. An HMI can increase productivity by having a centralized control center that is extremely user-friendly.

A Human Machine Interface (HMI) is exactly what the name implies; a graphical interface that allows humans and machines to interact. Human machine interfaces vary widely, from control panels for nuclear power plants, to the screen on an iPhone. However, for this discussion we are referring to an HMI control panel for manufacturing-type processes. An HMI is the centralized control unit for manufacturing lines, equipped with Data Recipes, event logging, video feed, and event triggering, so that one may access the system at any moment for any purpose. For a manufacturing line to be integrated with an HMI, it must first be working with a Programmable Logic Controller (PLC). It is the PLC that takes the information from the sensors, and transforms it to Boolean algebra, so the HMI can decipher and make decisions.
A programmable logic controller, PLC, or programmable controller is a digital computer used for automation of typically industrial electromechanical processes, such as control of machinery on factory assembly lines, amusement rides, or light fixtures. PLCs are used in many machines, in many industries. PLCs are designed for multiple arrangements of digital and analog inputs and outputs, extended temperature ranges, immunity to electrical noise, and resistance to vibration and impact. Programs to control machine operation are typically stored in battery-backed-up or non-volatile memory. A PLC is an example of a "hard" real-time system since output results must be produced in response to input conditions within a limited time, otherwise unintended operation will result.

Before the PLC, control, sequencing, and safety interlock logic for manufacturing automobiles was mainly composed of relays, cam timers, drum sequencers, and dedicated closed-loop controllers. Since these could number in the hundreds or even thousands, the process for updating such facilities for the yearly model change-over was very time consuming and expensive, as electricians needed to individually rewire the relays to change their operational characteristics.

**RC Charging Circuit**

All Electrical or Electronic circuits or systems suffer from some form of “time-delay” between its input and output, when a signal or voltage, either continuous, (DC) or alternating (AC) is firstly applied to it. This delay is generally known as the time delay or Time Constant of the circuit and it is the time response of the circuit when a step voltage or signal is firstly applied.

The resultant time constant of any Electrical Circuit or system will mainly depend upon the reactive components either capacitive or inductive connected to it and is a measurement of the response time with units of, Tau – τ When an increasing DC voltage is applied to a discharged Capacitor, the capacitor draws a charging current and “charges up”, and when the voltage is reduced, the capacitor discharges in the opposite direction. Because capacitors are able to store electrical energy they act like small batteries and can store or release the energy as required.

The charge on the plates of the magnetic field, the motor is said to be in synchronization.

The charge on the plates of the magnetic field is formed from the sum of the magnetic field vectors of the three phases of the stator windings The operation of a synchronous motor is due to the interaction of the magnetic fields of the stator and the rotor. Its stator winding, which consists of a 3 phase winding, is provided with a 3 phase supply, and the rotor is provided with a DC supply. The 3 phase stator winding carrying 3 phase currents produces 3 phase rotating magnetic flux. The rotor locks in with the rotating magnetic field and rotates along with it.

### ACTUAL WORKING

The overall automation is based on alignment of the all the unit. Basically this system is designed using human machine interface in which the instructions from the human are given as input to the machine. Which are further processed by programming logic controller.

In PLC appropriate dimensions and size of the paper are predefined. When the paper is processed in the cutting and folding unit if the dimensions are accurate then paper is made to cut. If size of paper doesn’t match with the size at PLC then paper is maintained to the predefined size and then made to cut and fold. For this purpose one master and 6 slave PLCs are provided in this cutter and folder unit. Which maintains the cutting and folding of the printed paper.
Along with this synchronous motor is provided. Which is used at cutter machine to role paper in forward and backward direction. The RC network is provided to the protect the motor.

**CONCLUSION**

For paper cutting machine based on programmable logic controller machine has got faster execution time and is more efficient in working along with safety measures to reject faulty material and ease in operation. Due to relay contactor logic more hardware is required as well wiring is more complex which has now been overcome by present programmable logic controller machine. The present system is superior in both performance and is more flexible in operation. Moreover, the running time has got shortened. Thus, desired requirement of customers has been fulfilled by this automation.

**REFERENCES**