Programmable Control of Feeding and Buffering of Bar Work Pieces

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Abstract – In Industries, there are numerous of operations, which have to be done by the Operators Manually which leads to: Higher labor costs, Manufacturing Lead time i.e. the elapsed time between customer order and product delivery, Problems regarding Safety and also Lower Production and Lower Product Quality.

The present work briefs about a machine that used to make automatic feeding and buffering of bar work pieces which is fully controlled by the plc which makes the feeding and buffering process more economical. The system sequence of operation is designed by ladder diagram and the plc programming software. In this the bar piece that move along the conveyor belt while the machine operates and is placed to the chuck of the CNC machine by the robotic arm or Rotary unit. The entire system is more flexible and time saving.

Keywords - PLC, Automation

I. INTRODUCTION

The field of automation has had a notable impact in a wide range of industries beyond manufacturing. Automation is the use of control systems and information technologies to reduce the need for human work in the production of goods and services. In the scope of industrialization, automation is a step beyond mechanization. Whereas mechanization provides human operators with machinery to assist them with the muscular requirements of work, automation greatly decreases the need for human sensory and mental requirements as well. Automation plays an increasingly important role in the world economy. One such Example is in the industries were, Bar type of work pieces made of stainless steel using industries like Pump Shafts, Valves, Fasteners, Machine Tools, Surgical & Medical Parts, Bolts, Pins etc are to be carried to the tool post in order to make the required process. But this transfer of work pieces are not so easy, when it come to manual transfer and feeding Process. This directly or indirectly effects the production and the economy of the firm. Ongoing, project describe the feeding and buffering of the bar work pieces to the machine tool. Feeding is the process which feeds work pieces say from a temporary storage system to the machine tool to carry out further actions. Buffer storage refers to the part of a warehouse in which back-up or reserve stock is stored (Temporary - storage).

II. OBJECTIVE

The main objective of the project is to Design and Develop a Programmable Control of feeding and Buffering of Bar Work pieces with PLC. To make the feeding and buffering of bar work pieces handling which can reduce the manual feeding of the work pieces this principle can be used in different industries like Pump Shafts, Cam shafts, Valves, Fasteners, Machine Tools, Surgical & Medical Parts, Bolts, Pins industries for feeding and buffering of work pieces is usually done manually.

III. PROBLEM DEFINITION

Competition Cams or COMP Cams, is a specialty performance automotive, motorcycle, parts manufacturer. The company has five US locations including headquarters in Memphis, Tennessee founded in 1976. And one of the leading producers of Cam Shaft. The procedure of producing the cam shaft is made with top facilities, starting from the raw bar work pieces to the final Cam shaft. Initially the material bar stock is selected and the COMP Cam worker feeds the Work piece to the CNC machine manually. These, types of operation are risky and are prone to Injuries and also whenever there are huge materials to be delivered out of the firm, the company needs more workers/laborers to take up the work and it will increase the labor cost. To mitigate this problem the company has to automate the process, to reduce labor cost, Safety of the workers. Buffering process is also important, to make the Temporary storage of the work pieces from the ware house, as it is long process to carry out the work pieces for the warehouse for every cycle. We have to first store these minimum number of work pieces from the ware house to a stack magazine to save the time and for
continues operation of the process. And so, these two operations Buffering and feeding is to be automated to have a smooth and continues operation of material transfer to the chuck of the CNC machine.

IV. METHODOLOGY

Bar Pieces are moved over a conveyor belt; they are further moved to the stack magazine for buffer storage.

And when a bar piece is needed to be fed to the chuck the robotic Arm or the linear/rotary unit which is used to feed the work piece.

V. PROCESS DESCRIPTION

This chapter gives the brief description about the hardware components in this project and complete idea of the components used in the system.

A. WORKING DIAGRAM

The basic block diagram (as shown in FIG. I) of the process and its explanation is given as follows

![FIG I Front view of the Feeding and buffering of bar work pieces sequence.](image)

B. INPUTS

The input module includes the transformer to step down the voltage from 220v to 12v and 5v, Sensors and start/stop button. Proximity/capacitive sensors whose output is given as an input to the PLC.

Sensors are used to detect the bar position. These sensors kept near the conveyor, inserter, Rotary drive feeder and the tray, limit switches near the chuck. And one push button to start.

C. OUTPUTS

The various output devices used in the bottling process are 12VDC 40A SPDT Automotive Relay - Plastic Tab, DC Geared Motor. These are connected to the output module.

D. PLC

PLC is a solid state device. They are well-adapted to a range of automation tasks. All control operations are done using the PLC. The entire process is automated by feeding the necessary conditions into the PLC using ladder logic. Ladder logic is one of the methods of programming a PLC. Thus depending on the logic developed for the buffering and feeding of bar pieces.

![Mini PLC Board](image)

F. FEEDING AND BUFFERING UNIT

Buffer stores have the task of decoupling pieces of production equipment from each other and thus providing loose linkage which results in better overall system performance in cases of individual machine malfunctions. The illustration shows a buffer store which accepts bar material (for example, with diameters of 10 to 30 mm and lengths of 150 to 600 mm) from a conveyor belt, stores this temporarily and outputs to a machine tool on demand. All the necessary motions can be produced using pneumatic components. The work pieces which are pushed off the roller conveyor pass to the inserter and are stored in the stack magazine. On removal from this, the work pieces are separated by a rotary feed device and fed to the machine tool by a three-axis handling unit.

G. CONCLUSION

The thesis presents an automated Feeding and buffering of the bar type of work pieces using PLC. A total control is made in a filling is achieved. The present system will provide a great deal of applications in the field of automation, especially in mass production industries where there are large number of components to be processed and handled in a short period of time and there’s need for increased production. The programming to this system developed is flexible, quicker and easier. This will increase the total...
production output; this increase in production can yield significant financial benefits and savings. This concept can be used in manufacturing industries like Pump Shafts, Cam shafts, Valves, Fasteners, Machine Tools, Surgical & Medical Parts, Bolts, Pin industries for feeding and buffering of work pieces is usually done manually.

VI. REFERENCE

