

MECHATRONICS BOOK SERIES

CONTROL AND INTELLIGENT SYSTEMS

Momoh Jimoh E. Salami
Abiodun Musa Aibinu
Yasir Mohd Mustafah



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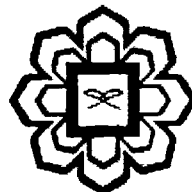
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EDITOR

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Chapter 9

Control of Automatic Drilling Machine by PLC

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9.1 Introduction

In this massive development era, world's manufacturing industry nurtured rapidly to compensate the demand of quality product in shorter time of production. Narrowing down the case to Malaysia, where the manufacturing industry has grown fast from manual factory operation to partial automation of factory operation and now is in stage of implementing fully automation in factory operation. Having a large population of 30 million and pursuing to be a modern developing industrial country by year 2020, Malaysia has become one of the most preferred places for factory establishment. Therefore automation of machines such as drilling, milling, welding and assembling will make production faster and flexible.

Control engineering has evolved over a long period. Most recently, electricity is utilized for control and the early electrical control was based on the relays because they allow power to be switched on and off without the present of mechanical switches. As the computer industry grown, it brought into the manufacturing industry the most practical logic control decision device, the Programmable Logic Controller (PLC).

The biggest force to the fast change in factory operations is the use of PLC in autonomous machine operation. The researchers report in many articles that using PLC in controlling machines such as drilling, milling and welding machine has made mass production of various types of products easier and more flexible because those machines do not have to be re-hard-wired in order to change the production from a particular type of product to another type (Onwobulu et.al, 2002). The change can be done by only reprogramming the PLC programming which is among the most uncomplicated and most comprehensible programming to master.

Most of the drilling machines in small or medium workshop are semi-automatic where the quill feed is automatically powered but, the position of holes must be oriented manually for drilling action. Some of the machines are even still manually operated where the drill bit must be fed to the work piece manually and the same action goes for positioning of holes to be drilled.

In order to drill multiple holes for a large number of work pieces, an automatic drilling machine with automatic clamper and controlled by a controller becomes essential. The repetitive tasks like loading the work piece, positioning the target holes and pressing the quill lever become tedious jobs and are prone to careless mistakes. Therefore, the drilling job needs to be automated to achieve better accuracy and productivity.

Basically, the project is to design automation operation for drilling mass similar type of part at one time. There are two fields involved in this project: Mechanical and Electrical and Control Systems. The mechanical part consists of drilling machine itself and clamping