

USE OF PIC FOR INDUSTRIAL APPLICATIONS

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Key Words: PIC, power factor, synchronous motor, DC motor

ABSTRACT

Nowadays, requirement of serial and qualified production has increased the importance of industrial control. Specially, the use of PIC controller in industrial application has become very popular. In this study, measurement of reactive power, controlling of excitation voltage of synchronous motor and controlling of DC motor have been achieved using PIC 16F877. It has been shown that this type of control is easier and cheaper than classical controls.

I. INTRODUCTION

Programmable controllers, microprocessor or microcontrollers, are the most important part of industrial applications. These devices are used for measurement, protection and motion control. It has been shown that development of microprocessor and microcontroller technology is a result of the development of the semiconductor technology [1]. On the contrary classical control, microcontrollers can easily be adapted to different applications depending on the properties of projects.

Preparation of classical control circuit is very difficult using transistor, diode, resistance, capacitors, coil, op-amp and other integrated circuits. To use of these components in the circuit can increase the cost and occupies places and may decrease the efficiency [2]. In addition, while setting up these components on the circuit, they can be affected by humidity, temperature and mechanical pressure.

In this study, PIC 16F877 microcontroller has been applied to power factor measurement, excitation of synchronous motor and speed control of DC motor. The test results showed that the PIC can be used for rapid and cheap implementation of multi functions logic

applications. PIC has superior features such as changing software, cheap price, environment units, easy programmable, usage elasticity compare with microprocessor.

II. COMPARISON OF MICROCONTROLLER AND MICROPROCESSOR

Microcontroller is used to design systems instead of microprocessors. Because, microcontrollers are embedded devices having a central processing unit, interrupts, counters, timers, I/O ports, RAM, ROM/EPROM which are used to control other systems [3]. As these components are embedded in the same integrated circuit, the size and the cost of the system has been decreased. Most importantly, to design of the system is easier compare with microprocessors. The address bus, the data bus and the control bus connecting the components such as CPU, RAM, EPROM and PIA (Peripheral Interface Adapter) will not be considered separately in such systems. All of these are placed into the PICs by the company which produced these circuits. The integrated circuit used in this study operates at 20 MHz clock frequency and runs each instruction as fast as 200 ns. It has 8Kx14 words of flash as a program memory and 256 byte EEPROM as a data memory. As their structures are based on CMOS technology, PICs consume very less energy. Nowadays, PICs have been the most preferable devices due to their properties discussed above [4-6].

Microcontrollers are used for communication systems such as telephone, fax and modem. In addition, microcontrollers are used also in CD technology, radio, TV, recorder, toys and other industrial application intensively [7].