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REALIZATION OF ADAPTABLE PID CONTROLLER WITHIN AUTOMATED TEMPERATURE PROCESS UNIT

By

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Thesis submitted to Arab Academy for science, Technology and Maritime Transport - College of Engineering & Technology in partial fulfillment of the requirements for

THE DEGREE OF MASTER OF SCIENCE

in

ELECTRICAL AND CONTROL ENGINEERING

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Alexandria 2012/2013

ABSTRACT:

Industrial temperature control is a common and essential part in most of process industries since many years. Most products receive one or more heat cycles to either cook the product, separate different components (as in petroleum refining), melt the product so it can be formed into shapes or strands, steam generation, paper production, air conditioning, etc. Therefore, it is essential to control the process temperature in order to satisfy the performance index either in transient or steady state.

Advanced automation system utilizes different types of control system level, such as PLC (programmable logic controller), DCS (Distributed Control System), and SCADA (supervisory and Data Acquisition System). Programmable logic controllers are now the most widely used in industrial process control technology. A programmable logic controller (PLC) is an industrial grade computer that is capable of being programmed to perform control functions.

Most of temperature control systems are of complex nature and have multi variables. Hence, temperature controller should be robust and adaptable to deal with such problem efficiently.

This work describes and implements a control algorithm applied to temperature control unit where this unit updated to be utilized in practical implementation as automated process unit. PID controller is one of the most controller used in industrial but it need to be adaptable in real situation in order to overcome the parameter variation and system disturbance. An adaptable PID controller based on analogical gate technique is implemented using an industrial Programmable Logic Controller (PLC) to control the temperature of a process by actuating of a three way valve. The valve distributes the hot and cooled vessel in order to adjust the temperature of a vessel. The system control hardware consists of first; PLC as a field controller with high sampling rates, second; Human Machine Interface (HMI) as a local operating and adjusting station, finally; SCADA software to adjust and supervise the overall system. The process parameter estimation, simulation results and practical results are obtained and compared for system validation.