UNIVERSITI TEKNIKAL MALAYSIA MELAKA

ENHANCEMENT OF CONTROL SYSTEM USING HMI FOR MAP204

This report submitted in accordance with requirement of the Universiti Teknikal Malaysia Melaka (UTeM) for the Bachelor's Degree in Electronics Engineering Technology (Industrial Electronics) (Hons.)

By

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I hereby, declared this report entitled “Enhancement of control system using HMI for MAP 204” is the results of my own research except as cited in references.

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Author’s Name : MUHAMMAD SYUKRI B MD SALLEH

Date : 27 JANUARY 2016

APPROVAL

This report submitted in to the Faculty of Engineering Technology of UTeM as a partial fulfillment of the requirements for the degree of Bachelor Degree of Engineering Technology Electronic Industry Hons. The member of the supervisory is as follow:

……

(EN SHAMSUL FAKHAR B ABD GANI)

ABSTRAK

MAP 204 adalah alat latihan yang mempunyai peranti pengendalian rotolinear berserta dengan pemegang. Kegunaan MAP 204 adalah untuk memindahkan atau mengalihkan objek dengan dari suatu tempat ke tempat yang lain menggunakan pemegang. Alat latihan ini dibina daripada bahan yang diperbuat daripada keluli tahan karat. Pergerakan itu adalah melalui penggerak rotolinear yang pengepit objek. Kebiasaannya MAP 204 di kawal dengan menggunakan butang tekan panel yang mana kurang dari segi pengawalan dan dari segi kerupaannya. Projek ini adalah untuk membuat suatu alat kawalan yang baru bagi MAP 204 mesin. Penambah baikkan daripada butang tekan panel kepada skrin sesentuh. Konsep yang digunakan adalah konsep HMI (Human Machine Interface) iaitu perhubungan antara manusia dan mesin. Aturcara (Ladder Diagram) untuk projek ini akan dibina menggunakan perisian CX-Programmer. Manakala visual grafik bagi "touch sceen panel" akan dibina menggunakan perisian NB-Designer. System pengawalan ini membolehkan pengguna mengawal system dengan pilihan seperi mula atau berhenti, automaTik atau manual, dan reset operasi.

ABSTRACT

Map 204 is a training kit machine that has horizontal rotolinear handling device with external gripper. The function of the handling device is to transfer the part from a starting area to an unloading area. These areas are recreated using both parts made from stainless steel. The movement is through a rotolinear actuator that displaces an outer gripper. The conventional MAP 204 system is controlled by using push button control panel which is inconvenient in term of controllability and appearance. This project is about to create a new control method of MAP 204. The new control method is the touch screen panel. The concept that will be applied is HMI Human Machine Interface. The upgrade PLC programming code with additional sensor will be develop by using the CX-Programmer software. But for the Human Machine Interface will be develop by the NB-Designer software. This front panel provides user interface which is used to operate the system with multiple options such as start or stop operation, auto or manual operation and reset the operation option.

DEDICATION

A special thank you to my parent

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LIST OF ABBREVIATIONS, SYMBOLS AND NOMENCLATURE

HMI	:	Human Machine Interface
PLC	:	Programmable Logic Controller
GRAFCET	:	GRAphe Fonctionnel de Commande Etape Transition.
NO	:	Normally Open
NC	:	Normally Closed
PSM	:	Projek Sarjana Muda
FYP	:	Final Year Project.
MAP	:	Multiple Application Platforms

CHAPTER 1

INTRODUCTION

In this chapter will discuss about the introduction of MAP-204 and explanation about the technique that use to upgrade the controlling method of the MAP-204 by using CX-Programmer. The general ideas on his project also have been given in the block diagram figure. Besides that objectives, problem statement and the report structure is attached as well.

1.1 Project Briefing.

HMI (Human Machine Interface) is about the user interface in manufacturing or process in a manufacturing. This project is about to enhancement of MAP 204 control system with HMI and improvement to the system to detect the presence of the part before starting the system. The control panel of the MAP 204 will be touch screen. The conventional the MAP 204 is controlled by the using push button control panel. Besides that, the MAP 204 doesn't have any features that can detect the presence of the part before starting the system.

First of all, the CX-Programmer is software that used to build the ladder diagram or the PLC programming. The function of programming code is to make the movement of system MAP 204 following the sequence of the MAP 204 system. The HMI of MAP 204 will be built by the NB-Designer software. This front panel provides user interface which is used to operate the system with multiple options such as start or stop operation, auto or manual operation and reset operation.

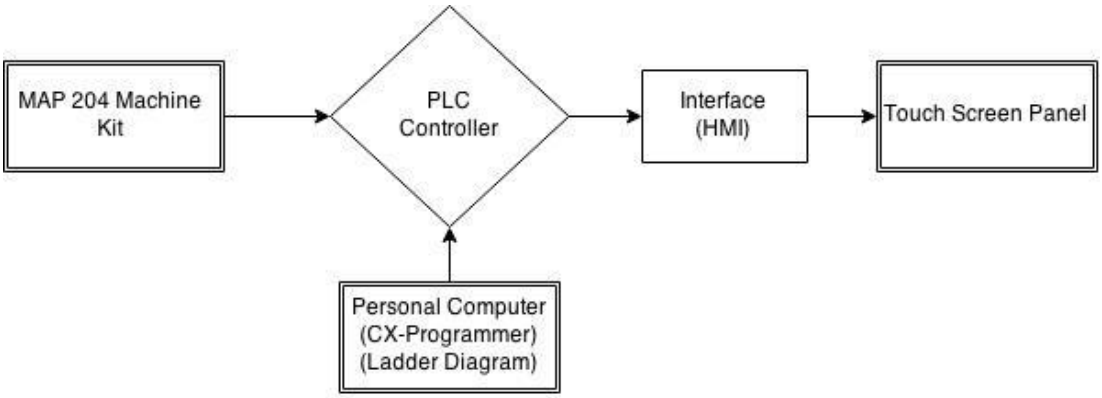

Figure 1.1 Illustration Block Diagram of Project

1.2 Problem Statement

Nowadays, a major problem that being faced in many industry is a about the lack of time for the production. For example, let's say that suddenly something problem occurs in their production line. The maintenance need to check to their every production line to determined where the exactly the problem occur

The MAP – 204 has only one method input is using the push button. Two push button being use. First push button is about to start system and second push button is about to stop the system of the MAP – 204 machine.

1.3 Project Objectives

The objective of this project is:

1. Identify and enhance the new controlling method of MAP 204
2. Design and develop the HMI for the MAP 204
3. Implement the designed HMI into the MAP 204

1.4 Project Scope.

1.4.1 Research about GRAFCET of the MAP 204.

- Firstly study about the GRAFCET. The GRAFCET is a one of the design technique to build the ladder diagram. Obtain the MAP 204 sequence and determined the sensor that will activate sequence.

1.4.2 Build the ladder diagram of the MAP 204.

- From the GRAFCET the ladder diagram can be built. The ladder diagram will construct in CX-Programmer software. Four type the ladder diagram can be built:
    - Control Circuit

- Power Circuit
- Timer Circuit
- Work Bit Circuit

1.4.3 Doing some research about the suitable sensor to be implementing on the MAP 204.

- The sensor is use to detect the presence of the part. Do some research about what a most suitable sensor type that can be implement on the MAP 204. Study about how to integrate the sensor with MAP 204 station.

1.4.4 Design the HMI that can be integrated with the MAP 204 station.

- Using the CX-Designer software to design the layout of the touch screen panel for MAP 204 station.

1.4.5 Implementation on the MAP 204.

- After all requirements is successfully build. The HMI will be implementing on the MAP 204.

1.5 Report Structure.

This thesis is a document report of the ideas generated and concepts applied, the activities performed and the final product of this project product produced. The thesis consists of three chapters and each chapter is described as below:

Chapter 1, the introduction of MAP-204 and explanation about the technique that use to upgrade the controlling method of the MAP-204 by using CX-Programmer. The general ideas on his project also have been given in the block diagram figure. Besides that objectives, problem statement and the report structure is attached as well.

Chapter 2, discussing about the literature review. From the literature review, will be explanation about an analysis of each phase in this project. The explanation will include about the dimension, operation and specification of the equipment and part.

Chapter 3 is the introduction of the methodology for the project, design flow and construction of the project. The description will be given to each procedure in the completion of the project.

CHAPTER 2

INTRODUCTION

This chapter will be discussing about the literature review. From the literature review, will be explanation about an analysis of each phase in this project. The explanation will include about the dimension, operation and specification of the equipment and part.

2.1 MAP Series (MAP 204).

The MAP-204 is a horizontal roto-linear handling device with external gripper. The MAP-204 consists of a roto-linear handling device fitted with an external gripper which moves a part from one position to another [1]

The function of the handling device to transfer the part from a starting area to an unloading area. These areas are created using both parts made from stainless steel. The movement is through a rotolinear actuator that displaces an outer gripper[2]. The figure 2.1 is a figure the MAP 204:

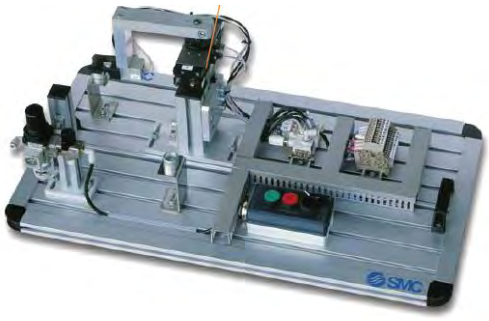

Figure 2.1 Figure of MAP 204

2.1.1 MAP 204 components.

1) Roto-linear manipulator device.

This roto-linear device can move to 4 directions. First direction is from angle 0^o until 90^o. This device also can move upward and downward.

Figure 2.1.1.a Roto Linear Device

2) An external gripper.

An external gripper is fitted to the roto-linear manipulator. The function is about to hold the part during the transfer from one place to the other place.

Figure 2.1.1.b An External Gripper

3) Part and part holder.

a. The part is a part that being hold and move by the gripper.
b. The part holder is about the place to put the part.

Figure 2.1.1.c Part and Part Holder