



UNIVERSITI TEKNIKAL MALAYSIA MELAKA

**COMPUTER INTEGRATED MANUFACTURING
(CONTINUITY ELECTRICAL BOARD CHECKER)**

**This report submitted in accordance with requirement of the Universiti Teknikal
Malaysia Melaka (UTeM) for the Bachelor Degree of Manufacturing Engineering
(Robotic and Automation) with Honours.**

by

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I hereby, declared this report entitled “Computer Integrated Manufacturing (Continuity Electrical Board Checker)”is the results of my own research except as cited in references.

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APPROVAL

This report is submitted to the Faculty of Manufacturing Engineering of UTeM as a partial fulfillment of the requirements for the degree of Bachelor of Manufacturing Engineering (Robotic & Automation) with Honours. The member of the supervisory committee is as follow:

.....

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ABSTRAK

Projek Sarjana Muda (PSM) adalah satu projek yang standard untuk mendapatkan ijazah sarjana muda. Terdapat banyak tajuk yang UTeM telah berikan tetapi saya telah membuat pilihan untuk memilih tajuk berjudul Projek Integrasi Pembuatan Berkomputer. Ini adalah suatu peluang bagi saya untuk menunjukkan kemahiran dan pengetahuan yang telah saya pelajari selama menuntut di UTeM untuk di aplikasikan didalam projek ini. Bagi skop untuk projek CIM saya ini adalah untuk membina suatu sistem untuk memeriksa kesinambungan arus elektrik di dalam papan litar elektrik buatan sendiri. Papan elektrik akan ditempatkan pada sebuah jig khusus yang sesuai pada pembawa produk iaitu papan litar elektrik buatan sendiri di dalam CIM ini. Stesen satu akan menyemak kesinambungan antara dua titik dipapan panyang gagal ujian akan dikeluarkan dari konveyor stesen dua. Di dalam Makmal CIM UTeM terdapat 2 Siemens PLC, 2 stesen dan konveyor. PLC pertama akan mengawal konveyor dan stesen 1 dan PLC yang lain akan mengawal stesen 2.

ABSTRACT

Final year project (PSM) is the standard project for get a degree certificate. There are many titles that UTeM given but I was interesting the title Computer Integrated Manufacturing Project. This is opportunities to show the skills and knowledge that I have learned during study in UTeM. The scope for CIM Project is to develop a continuity electrical board checker system on CIM where it performs continuity test on the self-made circuit board. The electrical board will be placed on a special jig that is fixed to the CIM's carrier base. The probing station will check the continuity between the two points on the board and the board which failed the test will be removed at the reject station. In the UTeM CIM lab is provide 2 Siemens PLCs, 2 workstations and a conveyer. The first PLC will control conveyer and workstation 1 and other PLC will control the workstation 2.

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DEDICATION

To my beloved parents, Mr. Jurij Bin Jalaludin and Mrs. Sabaridah Binti Ismail for their seems less expression of love and fully support for me during my study at Universiti Teknikal Malaysia Melaka (UTeM) and my university, Universiti Teknikal Malaysia Melaka (UTeM) and then to finish up this Bachelor Project report.

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TABLE OF CONTENT

Abstrak	i
Abstract	ii
Dedication	iii
Acknowledgement	iv
Table of Content	v
List of Tables	viii
List of Figures	ix
List of Abbreviations	xiii
1. INTRODUCTION	1
1.1 Problem Statement	4
1.2 Related Scope	4
1.3 Scope	5
1.4 Objective	5
2. LITERATURE REVIEW	6
2.1 Sensors	7
2.2 Actuator	8
2.2.1 DC Motor	9
2.2.1.1 Brushed DC Motor	9
2.2.1.2 Brushless DC Motor	10
2.2.1.3 Inductive DC Motor	11
2.2.2 Pneumatic Cylinder	12
2.3 Microcontroller	14
2.3.1 Siemens PLC	14
2.3.2 Ladder Diagram	20
2.4 Compact Inverter	23
2.5 Solenoid Valve	24

2.6	Continuity Test	28
2.6.1	Continuity Board Tester	28
2.6.2	Electrical Probe	29
2.7	History CIM	30
3.	METHODOLOGY	31
3.1	CIM Layout	33
3.2	Flow Chart	35
3.2.1	Main Flow Chart	35
3.2.2	Sub-Flow Chart: Workstation 1	36
3.2.2.1	Sub-flow chart for workstation 1	37
3.2.3	Sub-Flow Chart: Conveyer movement	38
3.2.4	Sub-Flow Chart: Workstation 2	39
3.3	List of Material	40
3.4	Workstation 1 (Board Checker)	41
3.5	Workstation 2 (Rejecter)	43
3.6	The jigs for the base	44
3.7	Self-made Circuit Board (Product)	47
3.8	Programmable Logic Control	48
3.9	Hardware Setup	49
4.	DEVELOPMENT OF CIM	52
4.1	Workstation 1	52
4.1.1	Placement and Adjustment	53
4.1.2	Connection in PLC 1	54
4.2	Workstation2	58
4.2.1	Adjustment for workstation 2	59
4.2.2	Connection in PLC2	64
4.3	Ladder Diagram for PLC1	65
4.4	Ladder Diagram for PLC2	69

5.	TESTING< RESULT AND DISCUSSION	74
5.1	Special Jigs (BASE)	74
5.2	Testing workstation 1	77
5.2.1	The Result Workstation 1	79
5.3	Testing Workstation 2	80
5.3.1	Vacuum Gripper	80
5.3.2	Result Workstation 2	81
5.4	Final Result	82
6.	CONCLUSION AND SUGGESTION	84
	REFERENCE	86
	APPENDICES	88

LIST OF TABLE

2.1	Input Table	22
2.2	Output Table	23
4.1	Result testing workstation 1	58
4.2	Connection in workstation 2	64
5.1	Analyze the special jigs	75
5.2	Analyze the bottom of special jigs	76
5.3	Result testing workstation 1	79
5.4	Timing Result	82
5.5	Final Result 1	82
5.4	Final Result 2	83

LIST OF FIGURES

1.1	Modern and classic manufacturing layout.	1
1.2	Example CIM of Dave Cimma Company.	2
1.3	UTeM CIM Lab.	5
2.1	Electronic proximity sensor.	7
2.2	Electronic proximity diagram.	7
2.3	Brushed Motor.	10
2.4	Induction motor.	11
2.5	Pneumatic cylinder.	12
2.6	Pneumatic Cylinder Diagram.	13
2.7	Siemens PLC.	14
2.8	Attach sensor on PLC diagram.	16
2.9	Attach actuator on PLC diagram.	16
2.10	USB/PPI+ programming cable.	17
2.11	VF-S7e is the compact and simple inverter.	24
2.12	5 Port Pilot Operated Solenoid Valve.	25
2.13	Solenoid valve diagram.	26
2.14	Continuity test by operator.	29
2.15	Probes.	30

3.1	CIM diagram.	33
3.2	Pneumatic cylinder pusher.	34
3.3	Probes.	41
3.4	Probes with spring.	41
3.5	Probes attach on cylinder.	41
3.6	Workstation 2.	43
3.7	The base on the CIM conveyer.	44
3.8	The acrylic.	45
3.9	The acrylic with woods stand.	45
3.10	The jig for base of CIM (design 1).	46
3.11	The jig for base of CIM (design 2).	46
3.12	Self-made Circuit Board.	47
3.13	Siemens PLC.	48
3.14	PLC installation.	48
4.1	Original workstation 1.	53
4.2	Adjustment workstation 1.	54
4.3	Connection between workstation 1, conveyer and PLC 1.	55
4.4	Solenoid valve connection.	55
4.5	Solenoid valve connection with relay.	56
4.6	Probes Connection.	57
4.7	Final Connection for workstation 1.	57
4.8	Original workstation 2.	59

4.9	Component removed.	60
4.10	Air supply shared.	61
4.11	Motor connection for workstation 2.	61
4.12	The result reduces weight.	62
4.13	Change the cylinder.	63
4.14	Remove aluminum plate.	63
4.15	Attach another power supply.	64
4.16	Connection for PLC 2.	65
4.17	Declaration for PLC 1.	65
4.18	Network 1 for PLC 1.	66
4.19	Network 2 and 3 for PLC 1.	66
4.20	Network 4 for PLC 1.	67
4.21	Network 5 for PLC 1.	67
4.22	Network 6 and 7 for PLC 1.	68
4.23	Network 8 and 9 for PLC 1.	68
4.24	Network 10 for PLC 1.	69
4.25	Declaration for PLC 2.	69
4.26	Network 1 and 2 for PLC 2.	70
4.27	Network 3 and 4 for PLC 2.	70
4.28	Network 5 and 6 for PLC 2.	71
4.29	Network 7, 8, 9 and 10 for PLC 2.	72
4.30	Network 11 and 12 for PLC 2.	73

5.1	Distance between special jigs and workstations.	75
5.2	Design for special jigs.	76
5.3	Probe design.	78
5.4	Final Probe Design.	78
5.5	Workstation 1 final.	79
5.6	Vacuum cup.	80

LIST OF ABBREVIATIONS

AC		Alternating Current
CAD	-	Computer Aided Design
CAM	-	Computer Aided Manufacturing
CIM	-	Computer Integrated Manufacturing
CPU		Central Processing Unit
DC		Direct Current
I/O	-	Input and Output
OK		Good Product
NG		Fail Product
PLC		Programmable Logic Controller

CHAPTER 1

INTRODUCTION

In 1980, scientists and engineers are trying to improve the manufacturing process by introducing more and more computerized systems on the manufacturing process. A classic manufacturing plant may have many software systems. Some of these systems can be do like manufacturing system, production scheduling system, equipment andlabour utilization system, supervisory control system, material tracking system, equipment monitoring system, shop floor data gathering system, statistical process control system, and preventive maintenance system.

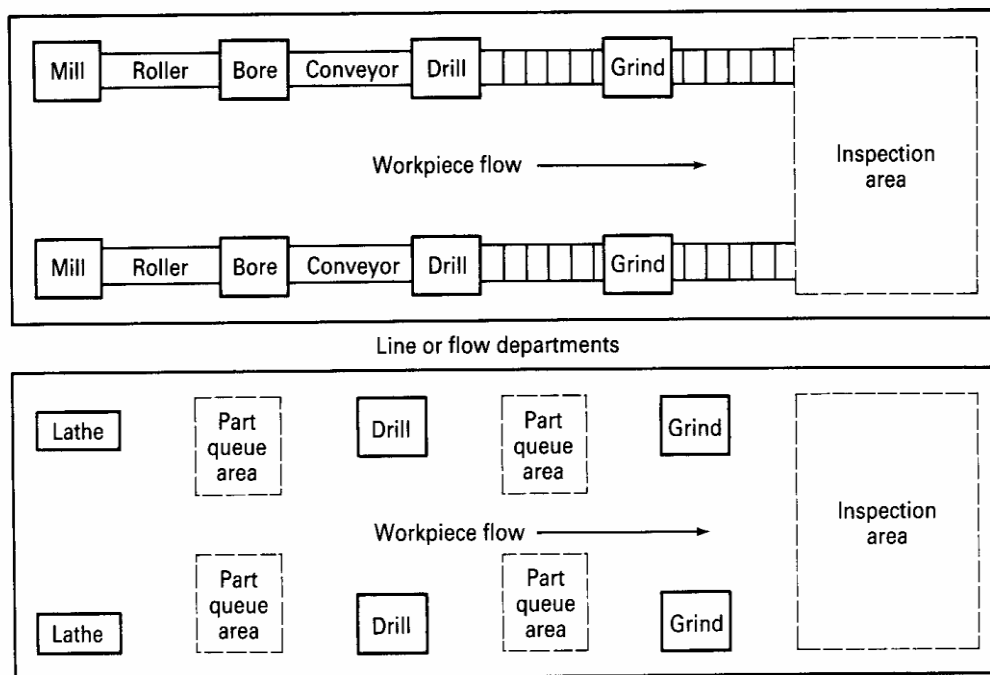


Figure 1.1: Modern and classic manufacturing layout(1)

In the classic manufacturing, the system process use flow department layout (Figure 1.a (below). Flow layout is the system that has queue area to transfer the workpieceto

another workstation. The system is normally uses manual system to transfer workpiece in the production line that will increase the labour cost and cycle time. The line department layout (Figure 1.a (above)) has uses roller and conveyor to transfer the workpiece. The systems that used conveyor are known as automated system. Computer Integrated Manufacturing is a combination of software and hardware to make the system work exactly as what the task given for example assembly line. The word Integration in term of manufacturing might be visualized as the figure below.

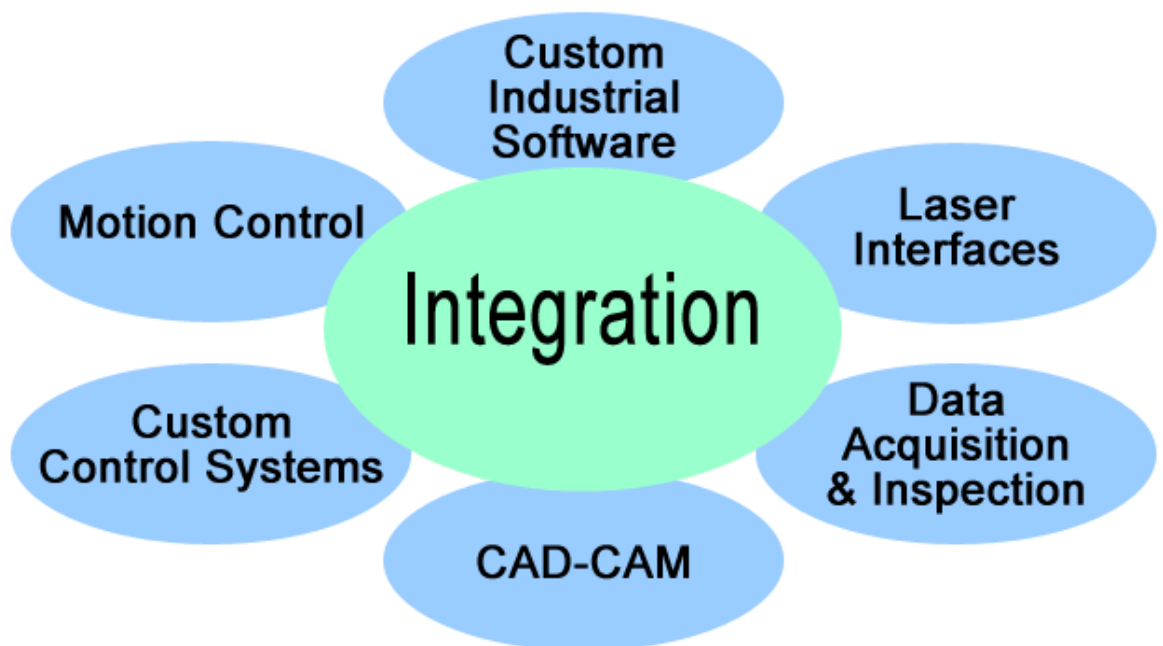


Figure 1.2: Example CIM of Dave Cimma Company.(17)

In Figure 1.b is show the example of applying the Computer Integrated Manufacturing in Dave Cimma Company. There are software and hardware used to make their product by applying CIM. The software used in this company is CAD/CAM, custom industrial software, custom control system and data acquisition. The software used to make sketching and analyze the product before to make a real one. The motion control and laser interfaces are the hardware that used to make a product from the software. So, CIM implies that there are at least two computers exchanging information each other to make a product.

The term CIM is a method of manufacturing and the name of a computer-automated system in which individual engineering, production, marketing, and support functions of a manufacturing enterprise are organized. In a CIM system functional areas such as design, analysis, planning, purchasing, cost accounting, inventory control, and distribution are linked through the computer with factory floor functions such as materials handling and management, providing direct control and monitoring of all process operations.(3)

As the method of manufacturing, three components distinguish CIM from other manufacturing methodologies are:

- Means for data storage, retrieval, manipulation and presentation;
- Mechanisms for sensing state and modifying processes;
- Algorithms for uniting the data processing component with the sensor/modification component.

CIM implies that there are at least two computers exchanging information, e.g. the controller of an arm robot and the micro-controller of a CNC machine.

Some factors involved when considering a CIM implementation are the production volume, the experience of the company or personnel to make the integration, the level of the integration into the product itself and the integration of the production processes. CIM can be most useful in high level of ICT is used in many of company or facility, such as CAD/CAM systems, the availability of process planning and its data. It also give many advantages such as increase productivity, reduce overall lead time, decrease design costs and cut work-in-process inventory.

1.1 Problem Statement

This project aim to develop a continuity electrical board checker that checks electrical boards. There are many problems occur to check the electrical boards by operator in normal operation. The problems are:

1. Confusion : The operators may have some confusion while checking the electrical boards because loss of focus in a long time.
2. Unproductive time: The operator can make mistake or lost spirit in workspace that will increase a lead time of production time.
3. Cost : In term of a large production plan, using operator incurs higher cost.

1.2 Related scope

To develop a continuity electrical board checker system on CIM where it performs continuity test on the self-made circuit board. The electrical board will be placed on a special jig that is fixed to the CIM's carrier base. The probing station will check the continuity between the two points on the board and the board which failed the test will be removed at the reject station.

1.3 Scope



Figure 1.3: UTeM CIM lab.

The work scope in CIM project will be made in UTeM CIM lab. The system will be comprised of conveyor that linked with Siemens PLC. There are will be a checker workstation and rejecter workstation. These robots need a modification to doing their task respectively and also using Siemens PLC. For motion control, the pneumatic cylinder and several DC motor are provided. The product for this project is self-made circuit board that will place on special jig of base to move along of conveyor. The product will be checked using a probe and circuit board that can give a signal to Siemens PLC. To reject the product, the robot has a vacuum that can remove the product out of conveyor. All Siemens PLC are linked to CPU to provide a user interface and programming.

1.4 Objective

1. To study and understand the role of CIM system in manufacturing.
2. To study the feasibility in developing the board checker system on the available CIM system.
3. To analyze and compare the system with the tasks given.

CHAPTER 2

LITERATURE REVIEW

A literature review is a body of text that aims to review the critical points of current knowledge including substantive findings as well as theoretical and methodological contributions to a particular topic. Literature reviews are secondary sources, and as such, do not report any new or original experimental work.

Most often associated with academic-oriented literature, such as these, a literature review usually precedes a research proposal and results section. Its ultimate goal is to bring the reader up to date with current literature on a topic and forms the basis for another goal, such as future research that may be needed in the area.

A well-structured literature review is characterized by a logical flow of ideas; current and relevant references with consistent, appropriate referencing style; proper use of terminology; and an unbiased and comprehensive view of the previous research on the topic.

2.1 Sensor

In the lab we will use 8 of this type of sensor on the conveyer; which detects metallic objects without touching them. The sensor is non-contact device using an electrical magnetic field for detection. In this type of device a coil is wound around an iron core within an electromagnetic field to form an inductive loop. When a ferromagnetic material is placed within the eddy current field around the sensor, such as a metal plate or metal screw, the inductance of the coil changes significantly and the sensors detection circuit detects this change producing an output voltage. Therefore, inductive proximity switches operate under the electrical principle of Faradays Law of inductance that state the electromotive force (EMF) generated is proportional to the rate of change of the magnetic flux (1)(3)(18).



Figure 2.1: electronic proximity sensor

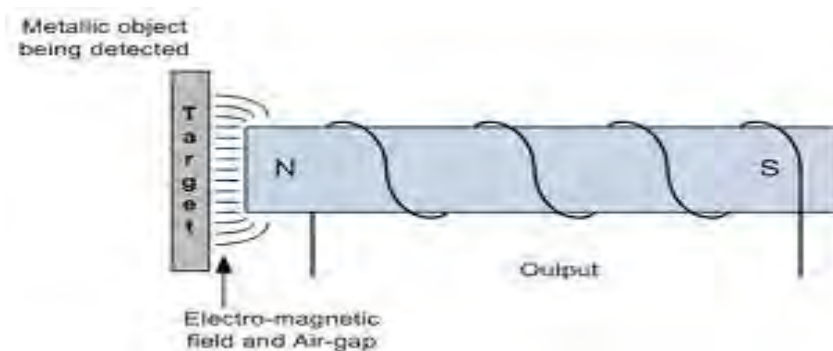


Figure 2.2: Electronic proximity diagram(3)