UNIVERSITI TEKNIKAL MALAYSIA MELAKA

COMPUTER INTEGRATED MANUFACTURING
(CONTINUITY ELECTRICAL BOARD CHECKER)

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

by

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FACULTY OF MANUFACTURING ENGINEERING
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UNIVERSITI TEKNIKAL MALAYSIA MELAKA

BORANG PENGESAHAN STATUS LAPORAN PROJEK SARJANA MUDA

TAJUK:**Computer Integrated Manufacturing(Continuity electrical board checker)**

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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.

Signature	:	…….
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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:

……

Supervisor

(Signature &Official Stamp of Supervisor)

ABSTRAK

Projek Sarjana Muda(PSM) adalah satuprojek yangstandarduntukmendapatkanijazah sarjana muda. Terdapatbanyaktajuk yangUTeMtelah berikantapisayatelah membuat pilihan untuk memilih tajukberjudulProjek Integrasi Pembuatan berkomputer. Iniadalahsuatu peluang bagi sayauntukmenunjukkankemahirandanpengetahuanyangtelahsayapelajariselamamenu ntutdiUteM untuk di aplikasikan didalam projek ini. Bagi skop untuk projekCIMsaya iniadalahuntukmembina suatusistemuntuk memeriksa kesinambunganarus elektrik di dalam papanlitar eletrik buatan sendiri. Papanelektrikakanditempatkanpadasebuahjigkhususyang sesuai pada pembawa produk iaitu papan litar elektrik buatan sendiri di dalam CIM ini. Stesensatuakanmenyemakkesinambunganantaraduatitikdipapandanpapanyanggagaluj ianakandikeluarkan dari konveyordistesendua. Di dalam Makmal CIM UTeMterdapat2SiemensPLC, 2stesendankonveyor. PLCpertamaakanmengawalkonveyordanstesen1danPLCyang lainakanmengawalstesen2.

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.

ACKNOWLEDGEMENTS

During this final year project, so many people and individual are involved; without their involvement, I am sure that there difficulties that I have to face. Thus, here in opportunity, I would like to express millions of thank to UniversitiTeknikal Malaysia Melaka (UTeM) because give me a million of knowledge and skills and to those who given their fully support and cooperation during my final year project at UniversitiTeknikal Malaysia Melaka (UTeM) from the beginning until the end of product.

I would like to dedicate my deepest gratitude to my academy supervisor Mr. MohdNazrin Bin Muhammad for his invaluable guidance, help, information, encouragement throughout the duration of my final year project. I wish to thank Manufacturing Faculty staff for the generous sharing of his time, experience, knowledge and advice.

My sincere appreciation also goes to my family and friends as the endless concern, financial support, moral support, and understanding and inspired me to complete this final year project successfully.

DEDICATION

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

To my academic supervisor for this project, Mr. MohdNazrin bin Muhammadforhis invaluable guidance and information to me finish up this report and I would like to express thankful also to him for all of his advice and moral support to me.

Lastly, I would like to express thank for all staff of Manufacturing Faculty UTeM and to my friends with always support and advise me during completing the final year project that had given.

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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.

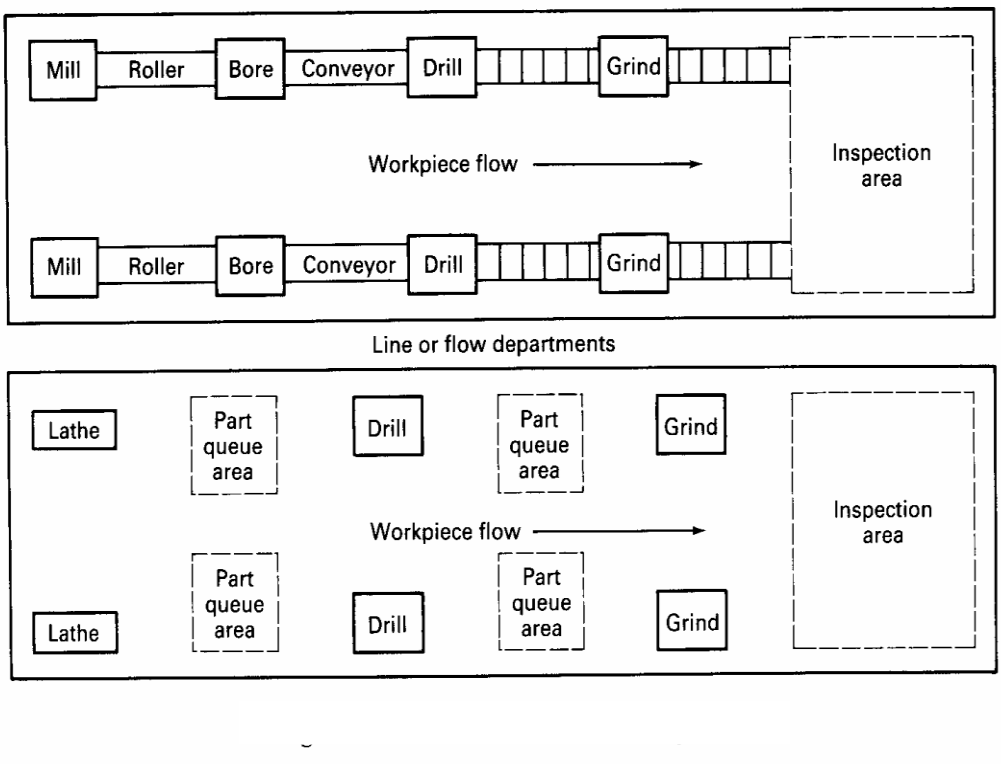

Figure 1.1: Modern and classic manufacturing layout(1)

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.

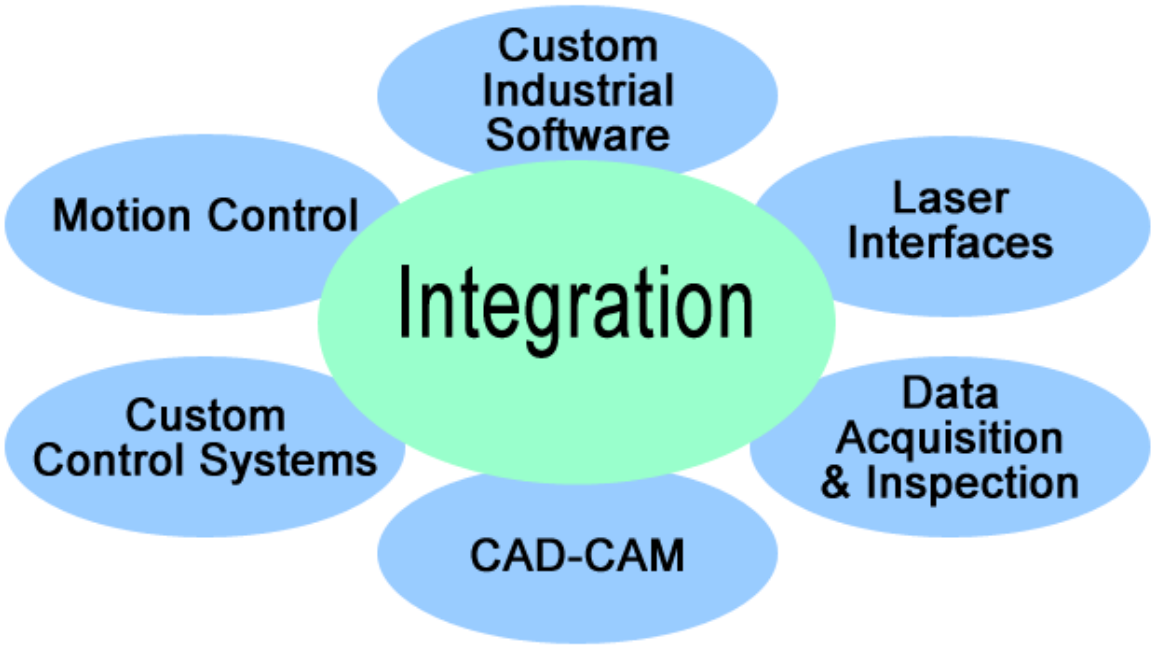

Figure 1.2: Example CIM of Dave Cimma Company.(17)

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

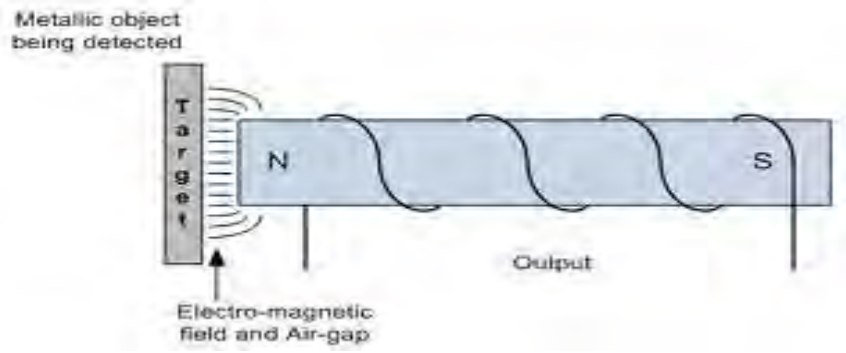

Figure 2.2: Electronic proximity diagram(3)