DATABASE FOR POTENTIAL FAILURE MODE AND EFFECT ANALYSIS

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Supervisor's name : PN AZDIANA BINTO MD YUSOP

Date   : 3rd MAY 2011

DEDICATION

Dedicated to my parents, family, my mentor, supervisor and all my beloved person

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Bismillahirramanirrahim.

Alhamdulillah thanks to Allah SWT with His Blessing, and I also want to express my deepest gratitude to my supervisor Madam Azdiana Binti Md Yusop for support and guidance throughout this project running and completion of this report. With all of her motivation and guidance, finally my project which called as Database for Potential Failure Mode and Effect Analysis successfully done and function as planned.

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ABSTRACT

The purpose of this project is to provide the proper and systematic system of Failure Mode and Effect Analysis (FMEA). With all of my studies before, I have seen that the FMEA System before have a lot of weakness and not in proper method. As the results, when I realize that this system need to be improve especially in term of safety which all of the information in FMEA are confidential, hence, it is good for me to provide one system that more proper and safe. After having some discussion especially during my internship program, I have learned indirectly about FMEA. This system is to control the failure of the products. FMEA is the documents that will revise by the engineers to identify the problems that happen on the products and then how to overcome and encounter the problems. With the old system, engineers only review the datasheet of FMEA from the files which are keep in the rack which not safely yet. All of FMEA information are confidential and cannot be exposed to any unauthorized person. These are to keep the quality of the products in that company. With this database system of FMEA produced, it will be easier for the engineers to do their work in term of the failure control.

ABSTRAK

Tujuan projek ini dijalankan adalah untuk menyediakan satu system yang lebih teratur dan sistematik bagi system "Failure Mode and Effect Analysis" (FMEA). Setalah apa yang telah saya pelajari sebelum ini, saya dapati bahawa system FMEA sebelum ini banyak kekurangan dan tidak teratur. Oleh yang demikian, menyedari hakikat bahawa system ini perlu panambahbaikan terutama dari segi keselamatan yang mana segala butiran maklumat yang terdapat di dalama FMEA itu adalah sulit, maka wajarlah bagi saya untuk menyediakan satu system yang lebih teratur dan juga selamat. Setelah beberapa perbinangan dilakaukan, terutama ketika saya menjalani Latihan Industri, yang mana dari situ saya telah dapat belajar secara tidak langsung mengenai FMEA ini. Sistem ini adalah untuk mengawal kegagalan satu-satu produk yang dihasilkan. FMEA ini adalah dokumen yang akan dirujuk oleh para jurutera bagi mengenalpasti masalah-masalah yang dihadapi oleh satu-satu produk itu, dan juga bagaimana cara untuk mengatasi masalah-masalah ini. Melalui system yang lama, para jurutera hanya akan merujuk lempira-lampiran data FMEA ini didalam fail yang disediakan dan disimpan di dalam peti yang masih belum terjamin keselamatan maklumat-maklumat ini. Maklumat-maklumat FMEA ini adalah sulit dan tidak patut didehkan kepada pihak yang tidak berkaitan. Ini adalah bagi menjamin kualiti produk dalam syarikat tersebut. Dengan terhasilnya system pengkalan data FMEA ini, bagi nyata ianya telah memudahkan dan juga menyenangkan lagi kerja-kerja yang dilakukan oleh para jurutera.

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FMEA   -   Failure Mode and Effect Analysis

VB   -   Visual Basic

PFMEA   -   Potential Failure Mode and Effect Analysis

CHAPTER 1

INTRODUCTION

1.1   Project Introduction

Potential Failure Mode and Effects Analysis (PFMEA), is one of the method to control the errors or any damaged of the product. This method was widely use in the industrial field. But, in industries, they only review the document in order to control the error of any human mistake. This project trains us to understand the potential failure and also their effects before us running the product in the production. This project includes the understanding of the process especially in term of the manufacturing process. By this database, it will directly help the industries to identify the potential failure of the manufacturing product.

The database is used, as the guidance to the engineers to control the error and minimize the failure of the product in order to reduce the cost. There are a lot of benefits by applying this method especially to the industries.

So, to make the customer trust at us, the better products need to be replaced to them. So, the cost automatically up. This will be effects to the company finance and also the performance. The name of the company also has the bad view to customers. So, this is as one of the method how to control the damage of the product, increase performance, and reduce cost.

When the project was developed by the students, this is as the part of the contribution from the university to the industries sector. Even community are the important one to help, but, to increase competitions amongst of the other higher institute especially from abroad, we need something new to be design and help our industries to move one step forward to compete with the other outsiders industries.

1.2   Project Objective

Before design the system of this database, the clear objective need to be understand to make sure that, the real objective are follow. So that, the problems during the development of project can be minimize. The objectives are:

a. To provide the better method for industries to control the errors while the products on the process.

1.3   Problems Statement.

Even FMEA just based on the documents and to control the errors, but the way to determine the ranking of the errors is one of the problems that need to be faced in designing this database system. Besides that, the proper and the best software need to be chosen to ensure the applications are suitable to be used in the industries. Not just design, but it's useless to the industries. In designing this system, user friendly software is preferable.

Besides that, this design of the database system need to be referred on how much of the process involves. The more of the process, the database will be larger. The coding of the system also need to be decide which what of the software need to use. The coding for risk Priority Number (RPN) to decide of the ranking for each elements of the FMEA; named as the Severity, Occurrence and Detection. These 3 elements need to be deciding by the ranking to make sure that the steps of controlling the errors can be done.

1.4   Scope of Work

In designing the database system, the software that consider is Visual Basic. There are several edition of Visual Basic. What we need to do is to choose the best edition to create the user friendly database. In visual basic, there are several of special functions which can make the database look more users friendly and easy to handle it. This will give a lot of advantages while using it.

Besides that, this project will also focus onto the process that involves detecting the error. Failure Mode and Effect Analysis (FMEA) is the best references to reduce or eliminate the error or failures on the products. But, the process should be understood first. In industries, this matter was under the Process Engineers. They should know deeply all the process that involves start from A until Z. So, the Detail information should be know and understanding to make sure that, the error can be control wisely by using this database.

The next step is to determine the 3 elements; Severity, Occurrences and Detection. This 3 elements will brings us to the how to control the error by using FMEA. Visual Basic (VB) is the suitable one to use in this project.

1.5 Methodology

This project contains of three (3) main parts. The first part is about the register the project name. Once which has been agreed with supervisor, and then it have been confirm, will be register with the faculty. So, proceed to the next step.

Second part is about the literature review which need to understanding and finding information of PFMEA which are related to the process in the industries. By understanding the PFMEA, the contents of PFMEA and also the way to provide of the proper report of PFMEA, the task to create the database will be easier to us. Besides that, finding some Information about what is the software or any important things that need to be used in this project. Even this project just involve software, without any hardware, but, to make sure the successful of this project, the more research of this project should be done.

Last but not least, project work and trying session especially about the coding. With this project involve about to display, so, the Interface should be give more attention on how to

give the Best display for the user for them to understand this database system. In Figure 1.1 show the methodology of the project.
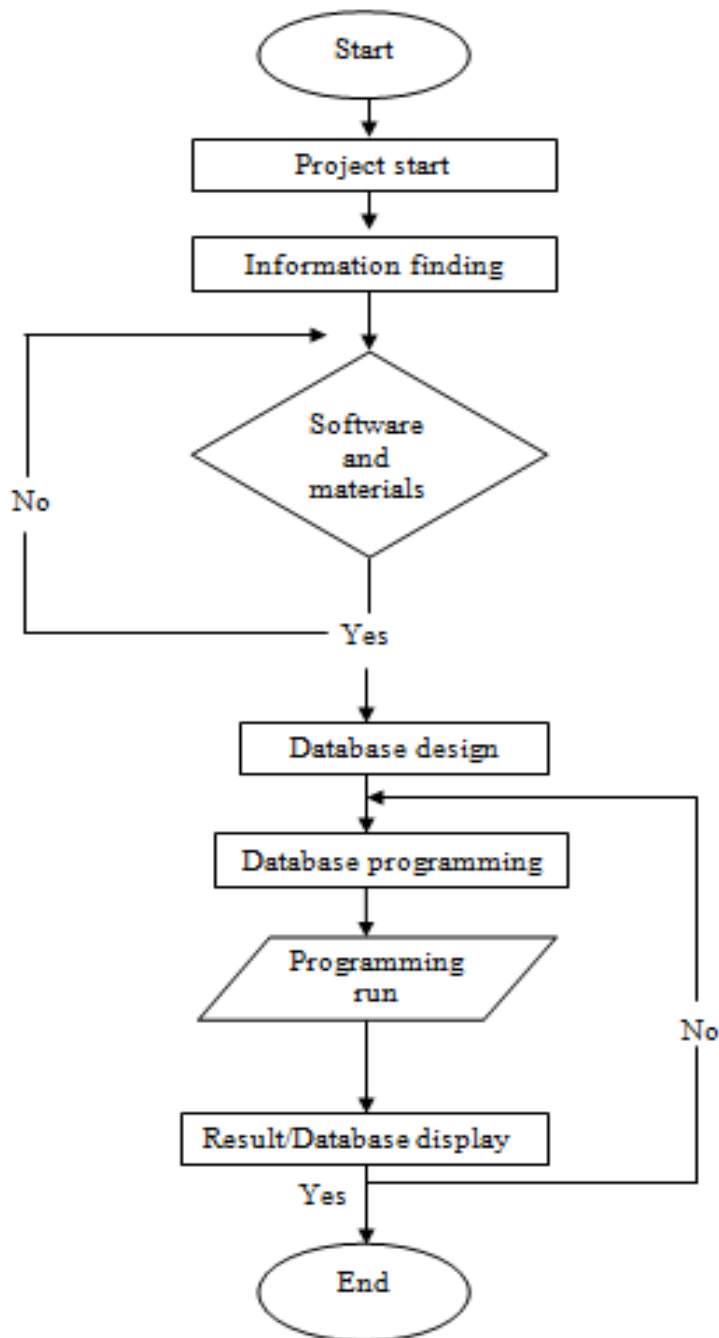

Figure 1.1: Project Flow Chart

1.6   Report Structure

This report shall explain the first part of the final year project, which is the research. What is done thus far is compiled in this report. This report is going to be the reference point

with which it is going to be used in the next part of this project. All of contents of this report are useful to fast pacing this project to the next level.

Chapter 1: introduces the project as a whole. The early and basic explanations are mentioned in this chapter. This chapter consists of the project's objectives, statements of problems, scope of work, and the simplified methodology.

Chapter 2 is literature review. Past projects or researches are taken into consideration when completing this chapter. The ways those projects and researches are done are compared with what this project is all about. These comparisons are done to understand what this project is all about and where it stands.

Chapter 3 explains how this project came to be. It is the methodology. The procedures in which this project is done. This chapter will enlighten the part most important of all, the flow this project. What is researched and what needs to be done is explained in this chapter.

Chapter 4 concentrates on the result and discussion of this project. What has been done thus far is explained in diagrams and written programs. Why the results are like so will also be explained. The reasons and setbacks that cause the project to be halted are discussed in this chapter. The expected results will also be mentioned in this chapter.

Chapter 5 is the final chapter in this report. The conclusions and recommendations are placed in this chapter. The conclusion is the final overview of this project. In other words, the conclusion is the summary of what has been done throughout this project. After the project is done, recommendations are made for the betterment of this project or any expansions or upgrades that might be done in the future.

CHAPTER 2

LITERATURE REVIEW

2.1 Potential Failure Mode and Effects Analysis

Potential Failure Mode is defined as the manner in which the process could potentially fail to meet the process requirements and/or design intent as described in the Process Function/Requirements column. It is a description of the nonconformance at that specific operation. It can be a Cause associated with a potential Failure Mode in a subsequent (downstream) operation or an effect associated with a potential failure in a previous (upstream) operation. However, in preparation of the FMEA, the assumption may be made that the incoming part(s)/material(s) are correct. Exception can be made by the FMEA team where historical data indicates deficiencies in incoming part quality.

2.2 How to identify failure mode types

Four types of Failure Modes occur. The first and second types apply often and are the most commonly seen, and the third and fourth types are typically missed when performing the FMEA:

No Function: Process operation is totally non-functional or inoperative.

Partial/Over Function/Degraded over Time: Degraded performance. Meets some of the specifications or some combination of the specifications but does not fully comply with all attributes or characteristics. This category includes over function. A degraded function over time is not generally a Failure Mode type in a PFMEA.

Intermittent Function: Complies but loses some functionality or becomes inoperative often due to external impacts such as temperature, moisture and environmental. This Failure

Mode provides the condition of: on, suddenly off, recovered to on again function or starts/stops/starts again series of events.

Unintended Function: This means that the interaction of several elements whose independent performance is correct, adversely impacts the product or process. This will result in an unwanted outcome or consequence by the product, and hence the expression "unintended function". This type of failure mode is not common in PFMEA.

Each Failure Mode must have an associated function. A good check to discover "hidden" functions is to match all possible failures with the appropriate functions. Review the Design FMEA to identify the function or purpose of the item being produced and the characteristics that define performance.

Note any YC or YS on the Design FMEA. Review historical problems with processes of similar or surrogate parts. Also, review warranty data, concern reports and other applicable documents. Identify all known historical Failure Modes.

Examine the process flow diagram using no function, partial/over/degraded over time function, intermittent function and unintended function definitions to ask:

a. Why would the item be rejected at this process operation?
b. How would the item not conform to specification at this process operation?
c. What would the next operator, or subsequent operators, consider unacceptable?
d. What would the ultimate customer find unacceptable?
e. Is there a possibility to fail regulatory compliance?

In general, process Failure Modes can be categorized as follows:

Manufacturing : Dimensional (out of tolerance), surface finish
Assembly : Relational, part missing, disoriented
Receiving/Inspection : Accept bad purchased part, reject good parts when received
Testing/Inspection : Accept bad part, reject good part

Identify potential Failure Modes. Consider the input to, and the output from, each process step. Remember, a Failure Mode at one operation can be an effect of a Failure Mode in a previous (upstream) operation.

Effect	*Criteria: Severity of effect on Product (Customer Effect)*	*Rank*	*Criteria: Severity of Effect on Process(Manufacturing/Assembly Effect)*	*Effect*	*3rd ed. Rank*

List each potential Failure Mode for the particular operation in terms of a component, subsystem, system, or process characteristic. The assumption is made that the failure could occur, but may not necessarily occur. The process engineer/team should be able to pose and answer the following questions:

a. *How can the process/part fail to meet specifications?*
b. *Regardless of engineering specifications, what would a customer (end user, subsequent operations, or service) consider objectionable?*

The Failure Mode may also be the reason for variation around a desired process parameter. The description should be in terms of a part or process characteristic. Do not enter trivial Failure Modes (modes that do not impact product or process performance).

2.3 Severity

Severity is the rank associated with the most serious effect from the previous column. Severity is a relative ranking, within the scope of the individual FMEA. A reduction in Severity ranking index can be effected through a design change to system, sub-system or component, or a redesign of the process.

Table 2.1: Suggested Severity in FMEA

Failure to Meet Safety and/or Regulatory Requirements	Potential failure mode affect safe vehicle operation and/or involves noncompliance with government regulation without warning.	10	May endanger operator (machine or assembly) without warning.	Failure to meet Safety and/or Regulatory Requireme nts	10
	Potential failure mode affects safe vehicle operation and/or involves noncompliance with government regulation with warning.	9	May endanger operator (machine or assembly) with warning.		9
Loss or degradation of primary function	Loss of primary function (vehicle inoperable, does not affect safe vehicle operation)	8	100% of product may have to be scrapped, line shutdown or stop ship	Major disruption	8
	Degradation of primary function (Vehicle operable but at reduced level of performance).	7	A portion of the product run may have to be scrapped. Deviation from primary process including decreased line speed or added manpower	Significant disruption	7.6
Loss or degradation of Secondary function	Loss of secondary function (vehicle operable, but comfort/convenie nce function inoperable	6	100% of production run May have to be reworked offline and accepted.		5
	Degradation of secondary function (Vehicle operable but comfort/convenie nce function operable at a reduced level of performance)	5	A portion of the production run may have to be reworked offline and accepted.	Moderate disruption	4
Annoyance	Appearance or audible noise, vehicle operable, item does not conform and noticed by most customers (>75%)	4	100% of production run may have to be reworked in station before it is processed		-
	Appearance or audible noise,	3	A portion of production run may	Moderate disruption	3.2