IMPROVING PERMIT TO WORK REGISTRATION SYSTEM AT PT. X USING VISUAL BASIC FOR APPLICATION

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A Thesis presented the
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THESIS ADVISOR
RECOMMENDATION LETTER

This thesis entitled **"Improving Permit to Work Registration System at PT. X Using Visual Basic for Application"** prepared and submitted by **Gusti Ayu Dewi Puspa Kartikasari** in partial fulfillment of the requirements for the degree of Bachelor Degree in the Faculty of Engineering has been reviewed and found to have satisfied the requirements for a thesis fit to be examined. I therefore recommend this thesis for Oral Defense.

Cikarang, Indonesia, February 27th, 2017

Ir. Hery Hamdi Azwir, M.T.

DECLARATION OF ORIGINALITY

I declare that this thesis, entitled **"Improving Permit to Work Registration System at PT. X Using Visual Basic for Application"** is, to the best of knowledge and belief, an original piece of work that has not been submitted, either in whole or in part, to another university to obtain a degree.

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LIST OF TERMINOLOGIES

UMR : The lowest monthly wage consists of basic salary and allowances that applied in a province.

Software : Intangible component of computer, it can be programs and other operating information used in a computer.

Applications : Is a part of software that can be executed to do specific task or range of tasks.

EHS : Environmental Health and Safety.

ABSTRACT

PT. X have two procedure to control and monitor any work held inside the company area. One of them is Work Permit or known well as Permit to Work (PTW). As identified during its direct observation in quantitative approach by flow process chart and document flow diagram, there are several problems in the system. The previous system also identified as running ineffectively. Management of PT X approved application development for the system as the problem solution. By following guidance of SDLC phases, two customized applications were developed using visual basic for application. At last, further observation was carried out following their implementation to the system. The final result of this research show that the applications are successfully improve the system.

Keywords: system improvement, document flow diagram, flow process chat, applications, SDLC, visual basic for application.

CHAPTER I

INTRODUCTION

1.1 Problem Background

PT. X is one of child toy manufacturer in Indonesia, it having more than four thousand employees and two plants in Indonesia. Accordance with it, the company required to have good safety management to ensure the safety of each workers are assured. In order to fulfill the requirement, the company implements and keep improving existing system and its procedure, one of them is procedure that used to control and monitor any work inside the company area. That works can be classified into two, which are as routine work or non-routine work.

In order to data tracking and monitor both routine and non-routine activities, the company have Risk Assessment and Permit to Work. Risk Assessment is a form that contain all process that carried out to complete a work included the risk or hazard that appear along them, it is created when the work can be included as routine work to avoid multiple permit document created for exactly the same works in a long term. The other system procedure is Working Permit or also known as Permit to Work. It is a procedure that used to propose a non-routine work. This procedure requires users to fill certain documents with descriptions of the work by users who propose it, before registered, evaluated and approved by EHS staffs.

In this permit to work procedure there are four type of documents that must be filled when propose a work according to its type. First is Permit to Work (PTW) form that required to propose all type works, the second is hot work permit form to propose works with high risk of hazard such as work with the usage of heat or fire such as welding, drilling, and grinding, the third is work at height form for work that work at height more than 1.2 m and the last is Job Safety and Environmental Analysis (JSEA) form that used to identify any risk that may coming from work environment. PTW, height work, and hot work only valid for a day, but JSEA valid

for 7 days. It means for one-day duration works, the users need to register almost 4 documents to EHS department and for two days duration of works, the user need to register up to 7 documents.

The registration process itself contains repetitive action such as writing or typing in each of the document, transport the documents to EHS department, typing and copy pasting data on the log book, take unregistered number for each of the document, and writing them on the documents. This repetitive action occurred every time users propose a work permit. Moreover, it is rare for a user to only have one-day duration work, usually they have six days of work durations and almost six until eight users that propose their work in a day especially in weekends it can increased until seven to ten. Which if calculated in number of document that have to be registered in a day there will be around 40 documents each day in first four workdays and 151 documents on Friday. The mentioned repetitive actions have short time to be done. But in accordance with the number of documents that should processed, it multiplied and generates problems in the system.

From direct observation, several problems are identified in the system. The major problem is delays. In order to eliminate or reduce the problems, an application development and implementation in the system is offered to the company. This application is designed to do registration automatically in any computer that connected to company's server and functioned to synchronize all 4 documents required. Then, after its implementation, an evaluation will be carried out to measure the effect for the system.

1.2 Problem Statement

The backgrounds of this research are:

1. How to identify problems that exist in current Permit to Work registration system?
2. How does system management decrease or eliminate the problems of current Permit to Work registration system?
3. What kind of applications that should be developed?

1.3 Objectives

The objectives that could be achieved by this research are:

1. Identifying the problems that happened in current.
2. Reduce or eliminate the problems of current Permit to Work registration system by system management.
3. Develop and implement a suitable application according to the problems found in the system to eliminate them.

1.4 Scope

Due to limited time and resources to observe wide implementation area, there will be some scopes in this research:

1. The applications will be made by using Macro VBA on Microsoft Excel.
2. The applications development project is ended on its launching on Oct 27th 2016.
3. The applications are only developed for PTW registration in PT. X.

1.5 Assumption

Some assumptions have to be made in order to run this model properly.

1. There is no manual submission and the usage of old system after the applications developed and implemented.
2. There is only single registration process in the application at all the time.
3. There is only single day duration work and all type of registration are used in every work.
4. The document transport time are equal with transport time between department in the nearest office to EHS department.

1.6 Research Outline

Chapter I **Introduction**

This chapter consists of the background of the thesis, problem statement, objective, assumption, and scope of the study.

Chapter II **Literature Study**

This chapter deliveries the previous study about SDLC, flow process chart, document flow diagram and data flow diagrams.

Chapter III **Research Methodology**

The flow of this thesis is described in this chapter.

Chapter IV **Data Analysis**

The data observation is processed and analyzed in this chapter. The result of data analysis is a design of developed flow of information for PTW Registration System.

Chapter V **Conclusion and Recomendation**

This chapter will give the conclusion result of this thesis and also recommendation for future research.

The literature of this study will be used to improve the current system and will be elaborated on the next pages.

CHAPTER II

LITERATURE STUDY

2.1 Work Permit Registration

Work permit registration is a procedure that implemented in PT. X in order to track all non-routine work happened in its area. It is an alignment between EHS department of PT. X and their corporate standard about work permit registration. The actual purposes of this process are:

1. To set out the minimum requirements and responsibilities for the control of the risks associated with non-routine tasks and tasks that are identified as high risk.
2. To set out the minimum requirement and responsibilities for the control of the risks associated with routine task.
3. To ensure vendor / contractor that have a plan to work on PT.X plant and dormitory has a permit from respective parties on PT.X.
4. Ensure vendor / contractor understand and follow safety and security regulation on PT.X

On its procedure, work permit registration are focused on non-routine and critical task. A task can be classified as a non-routine task when it is performed infrequently (less than once per month), outside of normal duties, does not have a documented procedure, performed in a different way from documented procedure, or has never been performed before. There are also task types that can be classified as critical task which are confined space entry, hot work, energized electrical work, work at heights, crane and lifting work, excavation work, fire system impairment work, installation of major modifications to equipment, removal or demolition of equipment, and inspections / testing of high hazard systems (compressed gas or high pressure). Along with the process there are documents that have their own role in the system, they are permit to work, work at height, specific work, and JSEA. Permit to work is a new form adopted from corporate standard and it is used for all non-routine work.

The other form is JSEA which is form that have valid period for 7 days for a same work, it contains identified risk that may come from environment around work area. Then, there are also work at height that applied when the work is carried out at height more than 1.2 meter and specific work for grinding, hot work and drilling. All of those forms contain the work description such as explanation of the work, where it conducted, which date it is, list of the trained worker, supervisor, user, needed personal protective equipment, work equipment and also hazards that may appear along the work. (PERMIT TO WORK, 2016)

2.2 Flow Process Chart

This chart shown the sequence of continuance of process for a product or any component of it. This chart is created by record the process using symbols. The symbols are available for operations, inspection, storage, delay, and transportation. (S.B. Patil, 2008)

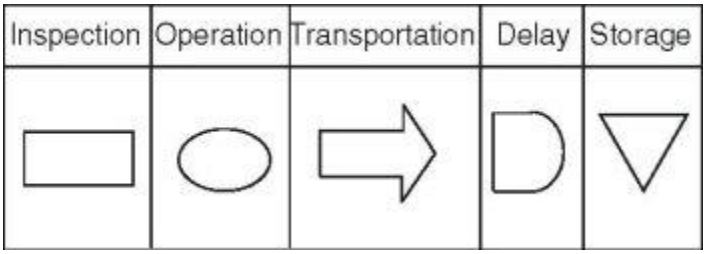
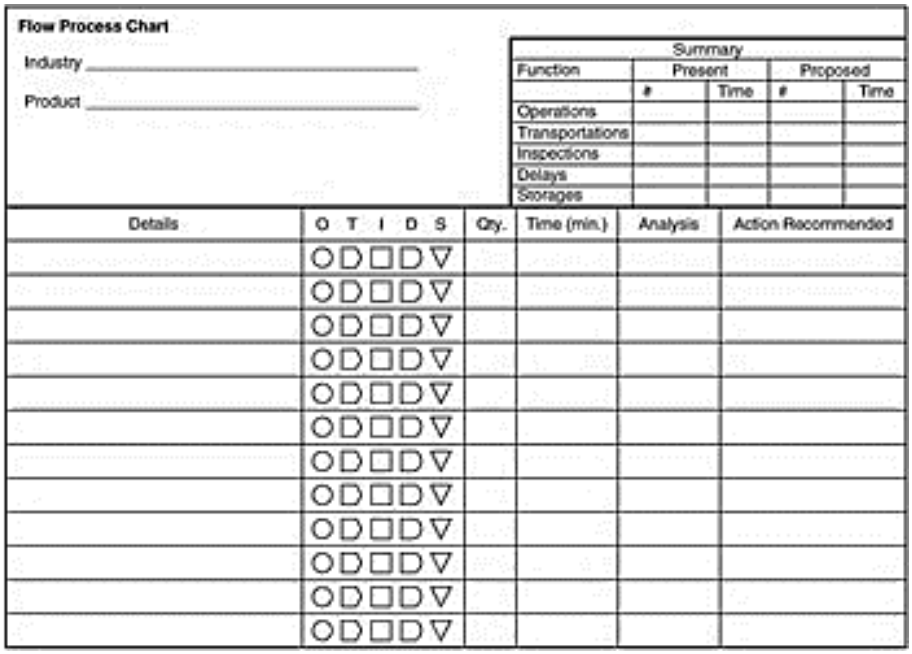


Figure 2.1 Flow Process Chart Symbols

Source:http://www.indmedica.com/journals.php?journalid=6&issueid=104&articleid=1437&action=article

The figure above shown each symbol for each process type in flow process chart, process in the system will be recorded by using symbols connected to another in sequence.



Flow Process Chart

Industry _____

Product _____

Summary				
Function	Present		Proposed	
	#	Time	#	Time
Operations				
Transportations				
Inspections				
Delays				
Storages				

Details	O T I D S	Qty.	Time (min.)	Analysis	Action Recommended
	○⇨□D▽				
	○⇨□D▽				
	○⇨□D▽				
	○⇨□D▽				
	○⇨□D▽				
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	○⇨□D▽				
	○⇨□D▽				
	○⇨□D▽				

Figure 2.2 Example of Flow Process Chart Form

Source: http://flylib.com/books/en/3.194.1.151/1/

In this figure, can be seen that each of process details will have 5 symbols that will be selected to the other selected symbol next process detail and form a line of process flow. In another column, there are analysis and action recommended where the result of observation and solutions of problems are written.

2.3 Data Flow Diagram (DFD)

Data flow diagram visualized the relationship between various elements in the program or system. DFD are useful method in visualization of a system in high level detail by showing the way input data processed to output result through sequences of process. DFD used by system designer and others when initial analysis stages to envision the current system or another that may be essential to meet the new necessity. Systems analysts select working with DFD, mostly when they need a rich understanding of the boundary among present systems and suggested systems. DFD consist of four major components: entities, process, data stores, and flow of data.

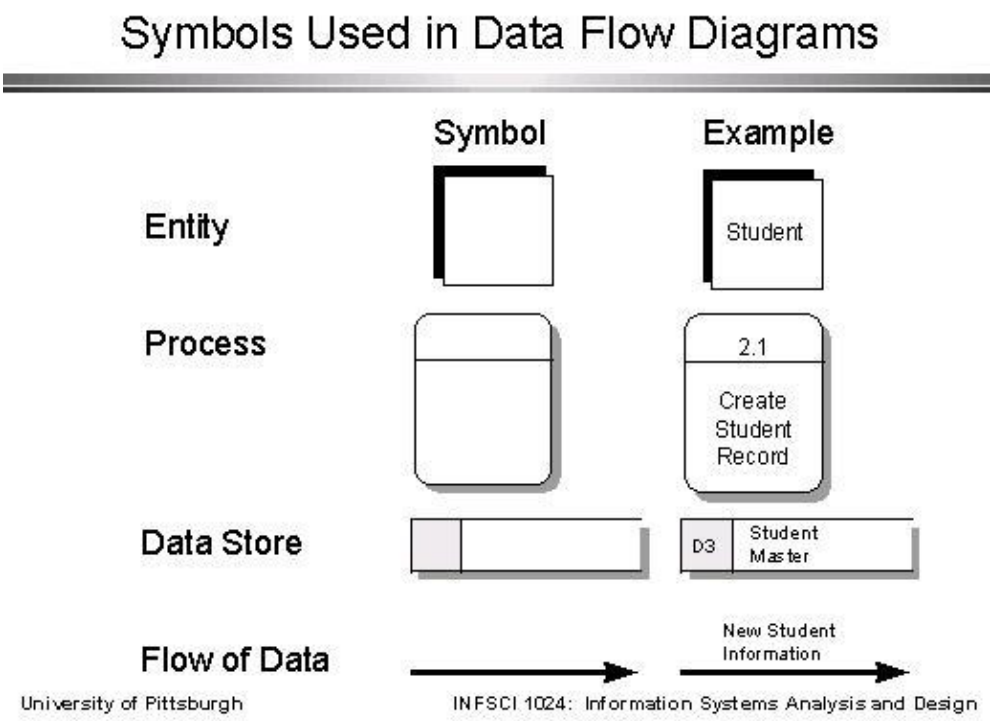


Figure 2.3 Data Flow Diagram Symbols with Example

Source: http://www.pitt.edu/~laudato/DATAFLOW/sld003.htm

The figure above show DFD symbols and the example of each of them, these are the explanation:

a. Entity: is the source or destination of data, in the other words it is the one that supply the data to the system or accept data from the system.
b. Process: is the operation or work that converts data, do the calculation, decisions making, or directing data flows based on corporate guidelines.
c. Data Store: is the place where a process save data among process to be retrieved later for the same process or another.
d. Data Flow: is the visualization of data movement between the entity, process, and data store.

DFD generally composed by a context level, level 1, and level 2 DFD. Below are the examples of each levels of DFD.

Figure 2.4 Context Level DFD Example

Source: http://www.slideshare.net/mohit4192/dfd-examples

At the context level DFD components in the system scope are connected to one process in the DFD. The data flow arrows will give visualization how the system interact with its environment.

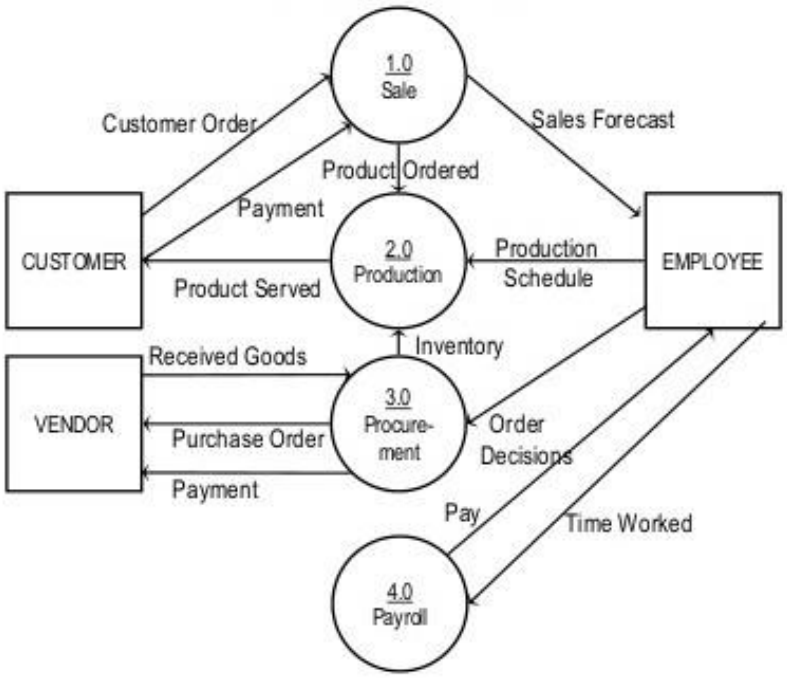


Figure 2.5 Level 1 DFD

Source: http://www.slideshare.net/mohit4192/dfd-examples

The Level 1 DFD give higher details of the system that identify major processes and data stores with inflow and outflow of data to a related process that receives or coverts data. (Le Vie, 2009)

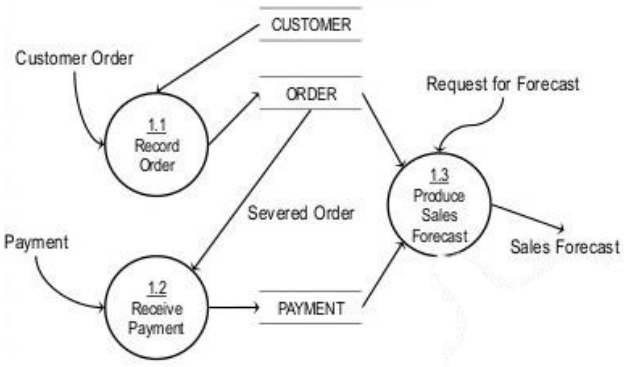


Figure 2.6 Level 2 DFD

Source: http://www.slideshare.net/mohit4192/dfd-examples

Level 2 DFD is specified or detailed version of certain single process that identified at level 1. This level DFD gives a real, detail and accurate visualization of the system in a single process. (Anderson, 2002)

2.4 SDLC (System Development Life Cycle)

System Development Life Cycle define the process and functions that every system developer completes without consider the method they use. In the waterfall mode, deliverable or end product is the result from each phase that will flow to the nest phase. There is disadvantages that found by some analyst where the waterfall mode does not affirm the interaction within phases. Nevertheless, the phases that close to another usually do interactions and interaction between some phase is common.

The SDLC usually includes five phases which are system planning, system analysis, system design, system implementation, and system support and security. Each of phase will be explained below nest figure.

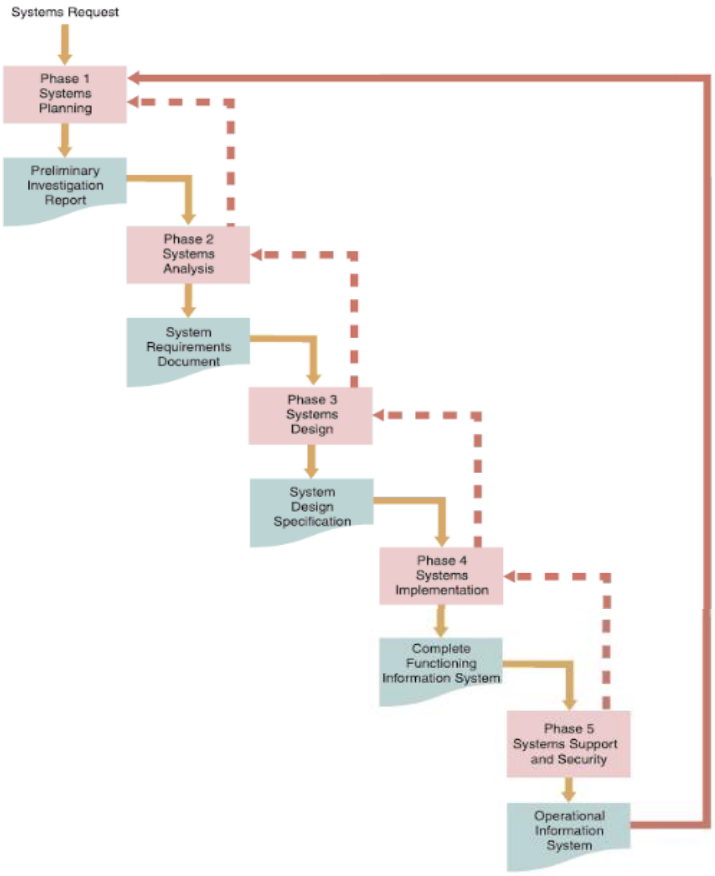


Figure 2.7 SDLC Phases

Source: Shelly, 2010

a. System Planning

This phase commonly start by a formal request for IT department, this is called as system request which define the problems or changes in an information system or business process that aimed. The objective of this phase is to carried out a preliminary investigation in order to evaluate the business opportunity or problem. This step is an important step, because the result of this step will affect a whole of development process. The deliverable of this phase is preliminary investigation report.

b. System Analysis

The objective of this phase is to create a logical model for the developing system. The activity in this phase is investigates the business process and record the solutions over user requirements. In order to understand the

system there are some techniques that can be used which are interviews, surveys, document review, observation, and sampling. The deliverable of this system is system requirements document.

c. System Design

The objective of this phase is to generate physical model that will fulfill all of the documented requirements from previous phase. It also where the user interface is created and output, input, and processes are identified.

d. System Implementation

This phase is where the new system is build, it is also including created, tested, documented, and system installation. The deliverable of this phase is complete functioning information system.

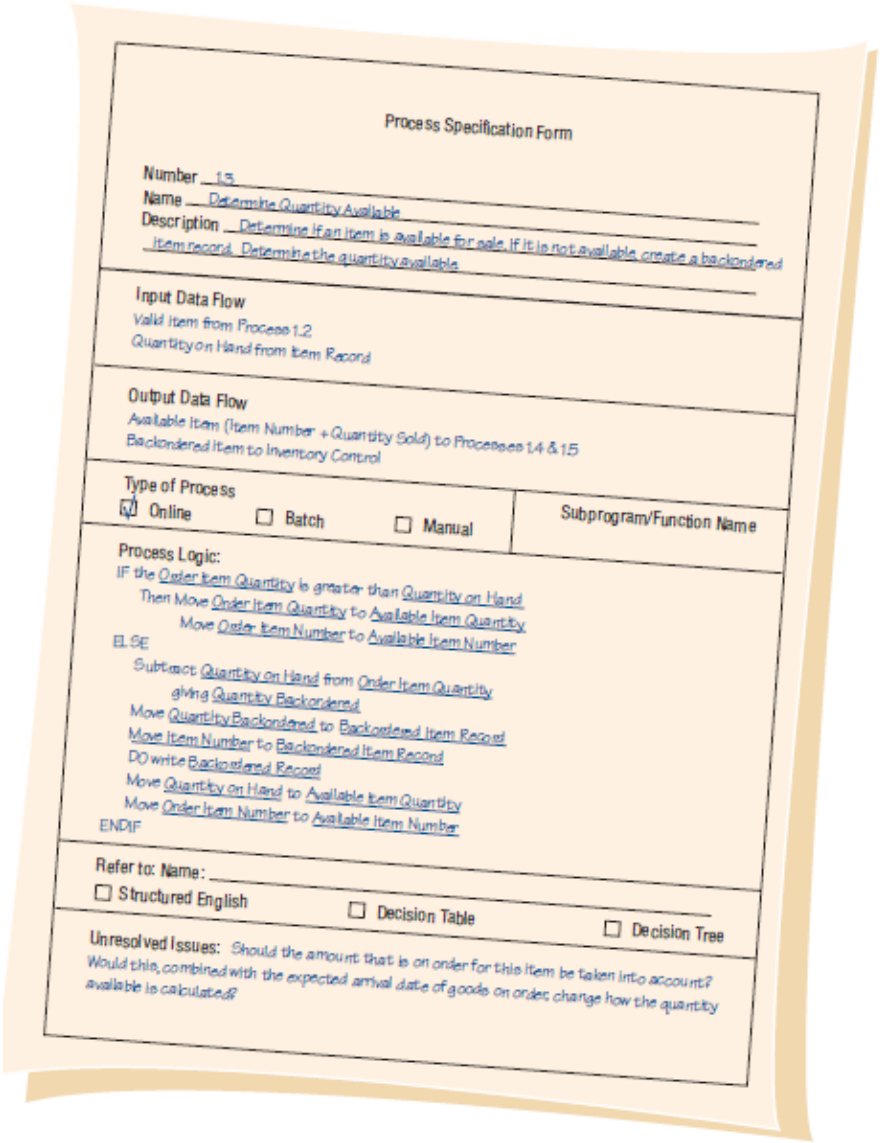
e. System Support and Security

This phase is where the system maintained to do correction over errors and modified toward future changes, improved to provide new features and benefits, and protected from threats continuously by IT staff. (Shelly, 2010)

2.5 Process Specification

Process specification is also known as minispecs, because it is typically a small portion of overall project specification. Whereas they are generated for specify the process in data flow diagram, class method in object oriented design and other common logic. These specifications specify the logic and formulas that convert the data from input process into output data. There are 3 objectives of creating process specifications, they are: to prevent double meaning, to gain a detailed specification for what is accomplished in the process, and to confirm the system design.

In order to give clearer guidance here are the example of process specification:



Process Specification Form

Number 1.3
Name Determine Quantity Available
Description Determine if an item is available for sale. If it is not available create a backordered item record. Determine the quantity available

Input Data Flow
Valid item from Process 1.2
Quantity on Hand from Item Record

Output Data Flow
Available Item (Item Number + Quantity Sold) to Processes 1.4 & 1.5
Backordered Item to Inventory Control

Type of Process
☑ Online ☐ Batch ☐ Manual

Subprogram/Function Name

Process Logic:
IF the Order Item Quantity is greater than Quantity on Hand
Then Move Order Item Quantity to Available Item Quantity
Move Order Item Number to Available Item Number
ELSE
Subtract Quantity on Hand from Order Item Quantity
giving Quantity Backordered
Move Quantity Backordered to Backordered Item Record
Move Item Number to Backordered Item Record
DO write Backordered Record
Move Quantity on Hand to Available Item Quantity
Move Order Item Number to Available Item Number
ENDIF

Refer to: Name:
☐ Structured English ☐ Decision Table ☐ Decision Tree

Unresolved Issues: Should the amount that is on order for this item be taken into account? Would this, combined with the expected arrival date of goods on order, change how the quantity available is calculated?

Figure 2.8 Example of Process Specification

Source: Kendal, 2011

In this figure, can be seen that there are elements that should be filled to make process specifications, they are: the process number which is the process ID right the same in the data flow diagram, the process name that obtained from data flow diagram based on the one displayed in the process symbol, a short description of what is done by the process, a list of output and input data flows as the same names on the data flow diagrams and names on data dictionary specifically in data structure, and a short description of the process logic that written not in computer language but in everyday language. (Kendal, 2011)

2.6 Data Structure

Data structure is a method that enable the analyst to create details of data structure elements together with information about the elements. The analyst will symbolize if there are some elements that same with other elements (a repeating group) or two elements are exist equally exclusive to the other. The data structure generally defined in algebraic notation that also use symbols such as:

a. (=) equal sign means 'composed of'
b. (+) plus sign means 'and'
c. { } Braces specify repeating group or repetitive elements
d. [ ] Brackets denote either/or situation
e. ( ) Parentheses denote an optional element

Figure 2.9 Example of Data Structure

Source: Kendal, 2011

The figure above is the example of adding customer order at world's trend catalog division. Every new customer contains customer name, address, and telephone and then those set will be defined or broken down into their component elements. (Kendal, 2011)

2.7 User Interface

The user interface is correlation between system or device with the user which enable the two interact to each other. The connection itself can be in physical or logical form. In computer, the user interface generally consists of display device, mouse and keyboard. Furthermore, there are 2 categories of user interface in display device which are command line interface (CLI) that only consist of text and graphical user interface (GUI) that consist of images.

User interface designing is a very critical part of product planning because it is one of the main factor in usability, it also affects the security and commercial success of the product. It also a very challenging part because it is difficult to create suitable user interface for all or most user. This is caused by human variability and difference between required skills set and the one that used in other aspect of product development. (Linux Information Project, 2005)

2.8 Black Box Testing

Software testing is a critical method to assess the quality of some software product. Its detect the deviation between actual and expected condition and also to evaluate the features of the software. There are two main categories of software testing which are:

a. Black box testing: testing that focused on the output that triggered over certain inputs and conditions.
b. White box testing: testing that focused on the internal process or component.

Black box testing is also known as functional testing and behavioral testing, this testing focused on identify whether the program does the purposed functions or it does not. This testing pursuit to find errors that happened in the output based on

following categories: incorrect function, interface errors, interface data structure errors, performance errors, and termination errors.

Test ID	Description	Expected Results	Actual Results

Figure 2.10 Black Box Testing Templates

Source: Laurie, 2006

To do the test the user can used templates like the one shown in the figure above. The first column is the test identifier. Then in the second column is here steps and or input for a certain condition that wanted to test. Next in the third column is where the expected output or result from input in the second column. Finally, in the last column record the actual result after carried out the test. (Laurie, 2006)

2.9 Visual Basic for Application (VBA)

Visual for application is a collaboration between Microsoft's event driven programming language Visual Basic with Microsoft office applications. Those applications are Microsoft Excel, Microsoft Word, Microsoft Power Point and others. By executing Visual Basic IDE in Microsoft Office application, the creator able to create a modified solution and program in order to boost the ability of the application.

Within all VBA, the most common among users is Microsoft Excel VBA. The reason is the user does not have to purchase a copy of Microsoft Visual Basic software to learn the basic of Visual Basic programming. There are two ways to start VBA programming in Microsoft Excel, clicking the created command button to access the VBA editor for that button and the other is accessing the VBA through tools menu-macro-visual basic editor.

```
Private Sub CommandButton1_Click ()

        Range ("A1:A10).Value="Visual Basic "

        Range ("C11").Value=Range ("A11").Value +Range ("B11").Value

End Sub
```

Figure 2.11 Examples of VBA Commands

Source: Liew, 2009

This is the example of VBA commands where by clicking the command button, the commands that running are fill cell A1 until A10 with statement 'Visual Basic' and fill cell C11 with value in cell A11 added by value in cell B11. (Liew, 2009)

CHAPTER III

RESEARCH METHODOLOGY

3.1 Research Flowchart

The following section determines the methodology used for analyzing this research.

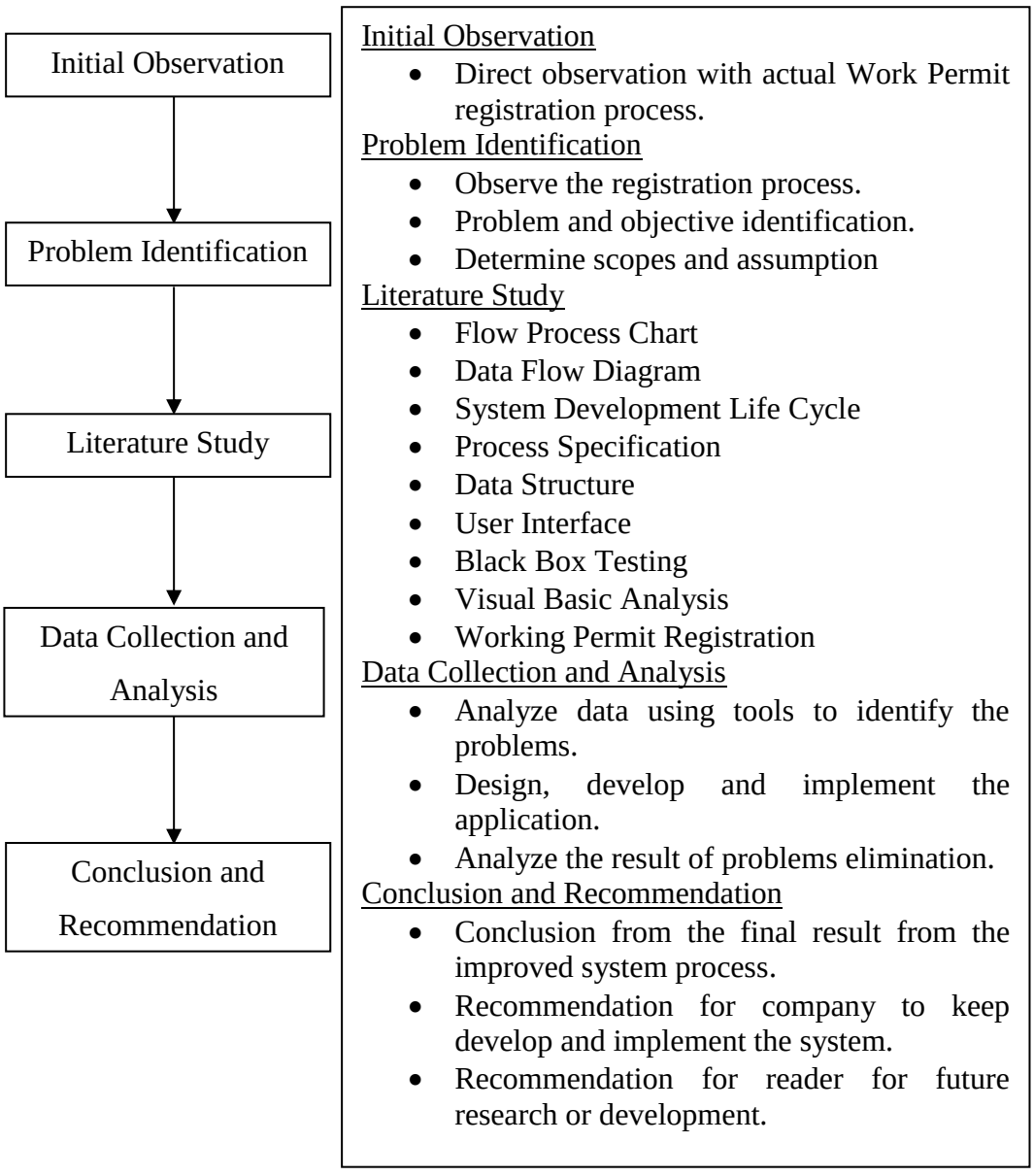


Figure 3.1 Research Flowchart

3.1.1 Initial Observation

The observation is conducted in PT. X especially in Environmental Health and Safety department. PT. X have procedure in order to tracking all work that conducted inside the company every day. The documents must to go through all the process in order to be registered. In the other side, the observation began by identifying the possible problems which is the root of inefficiency of the system. Following process flow that stated, the problem exists analyzed by using document flow diagram and flow process chart.

3.1.2 Problem Identification

Problems are identified based on the finding problem on flow process chart of the current system. The system has high processing time caused by repetitive action and it multiplied by the number of documents that should be registered. In the stages of system those action that indicated are filling the documents with work description, high delay caused by waiting time, transport the document to EHS department, typing and copy pasting data in the log book, also take unregistered number for each document.

3.1.3 Literature Study

Literature study is done as a theoritical base from problem solving to related issue faced by the company. Literature study is also as the basic of this research execution. The literature study is collected from books, journals, and other resources to analyze the problem and find the solution to answer the questions. The explanantion of literature study include:

- Description of working permit registration
- The indicator tools flow process chart
- Basic design tools of the application data flow diagram
- Phases of system development life cycle
- Guidance in generating process specification
- Data specification tools data structure
- Definition of user interface
- Guidance for black box testing

- Microsoft feature visual basic for application

3.1.4 Data Collection

To analyze and improve the work permit registration system process, the data should be collected. The data is collected through:

- Direct observation in EHS department where the system run.
- The data related to current and improved system that can be observed and measured. The data itself are document flow, required process, entity of the system, data flow, and time needed to complete each action. All data taken along the development of the applications.

3.1.5 Data Analysis

After the data is gathered, the data could be analyzed. This research analyzed the current system by using document flow diagram and flow process chart, then making improvement by develop an application that be able to make registration automatically carried out using existing company's server. The development will start from creating entity relationship diagram and data flow diagram, then continued by realization of the application using Microsoft Visual Basic for Application. Then, the next steps are doing black box testing and observe improved system and compare the result with diagram and chart in previous system to identify how much the system improvement done by developing applications. Conclusion reffering to achieved improvement.

3.1.6 Conclusion and Recommendation

This is the last phase of this research which will consist of conclusion of the improvement. It refers to the research objectives, how optimal the method achive the objectives. In addition, the recommendation also includes in this phase. The recommendation is addressed for both the company and the readers. It is recommended that the company makes a continuous improvement since there is still limitations in doing this research.

3.2 Research Framework

In general, this research can be visualized in framework below. The framework is begin from identifying the problem and observe the current process and its method.

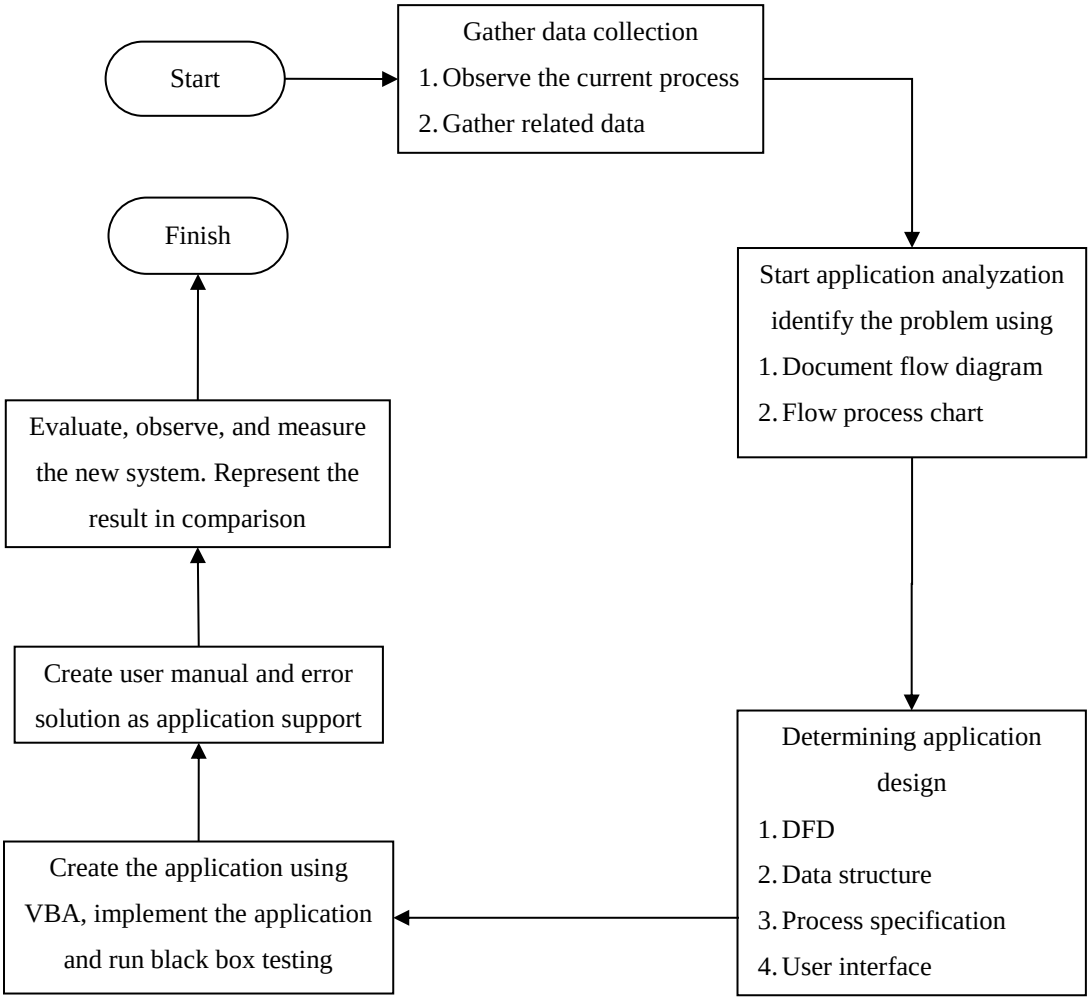


Figure 3.2 Research Framework

In the figure above, can be seen the steps of this research from the beginning until the end where the results are presented in percentage and then it will decided to reject the hypotheses or accept it.

In this research the null hypotheses is that implementation of developed application will not improve the work permit registration system at PT. X.

CHAPTER IV

DATA COLLECTION AND ANALYSIS

4.1 Analyze

The purpose of this stage is to understand how the system work, to determine how the system should run and find alternative solutions over problems that predicted to occurred during the runs.

4.1.1 Document Flow Diagram of Previous System

In order to give proper visualization of the document flow diagram of the previous system, flow charts are created. In the picture below, can be seen the document flow in the system, this diagram also explains the process inside the system for every component. The components that contributes in the system are user, PTW administrator, and EHS engineer. User is PT X staffs from any department who requested or lead a non-routine work inside the company area, administrator is the secretary of EHS department, and EHS engineer are engineer under EHS department. Here is the diagram.

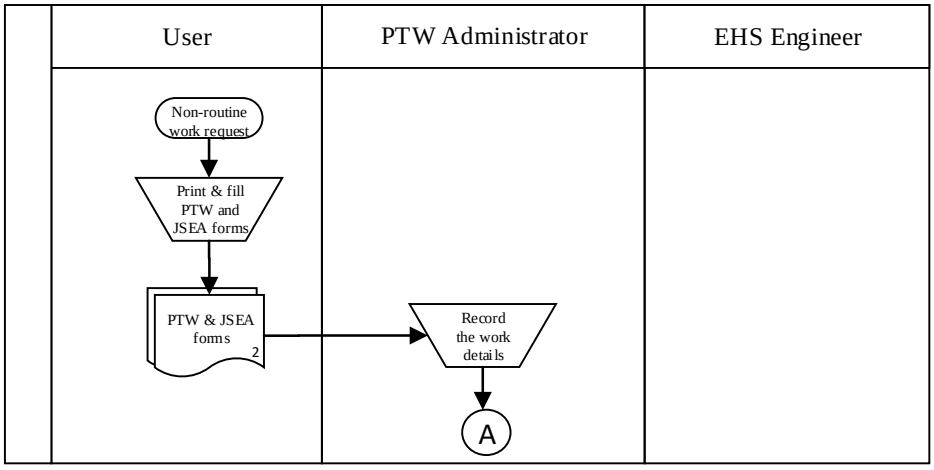


Figure 4.1 Document Flow Diagram of Previous System

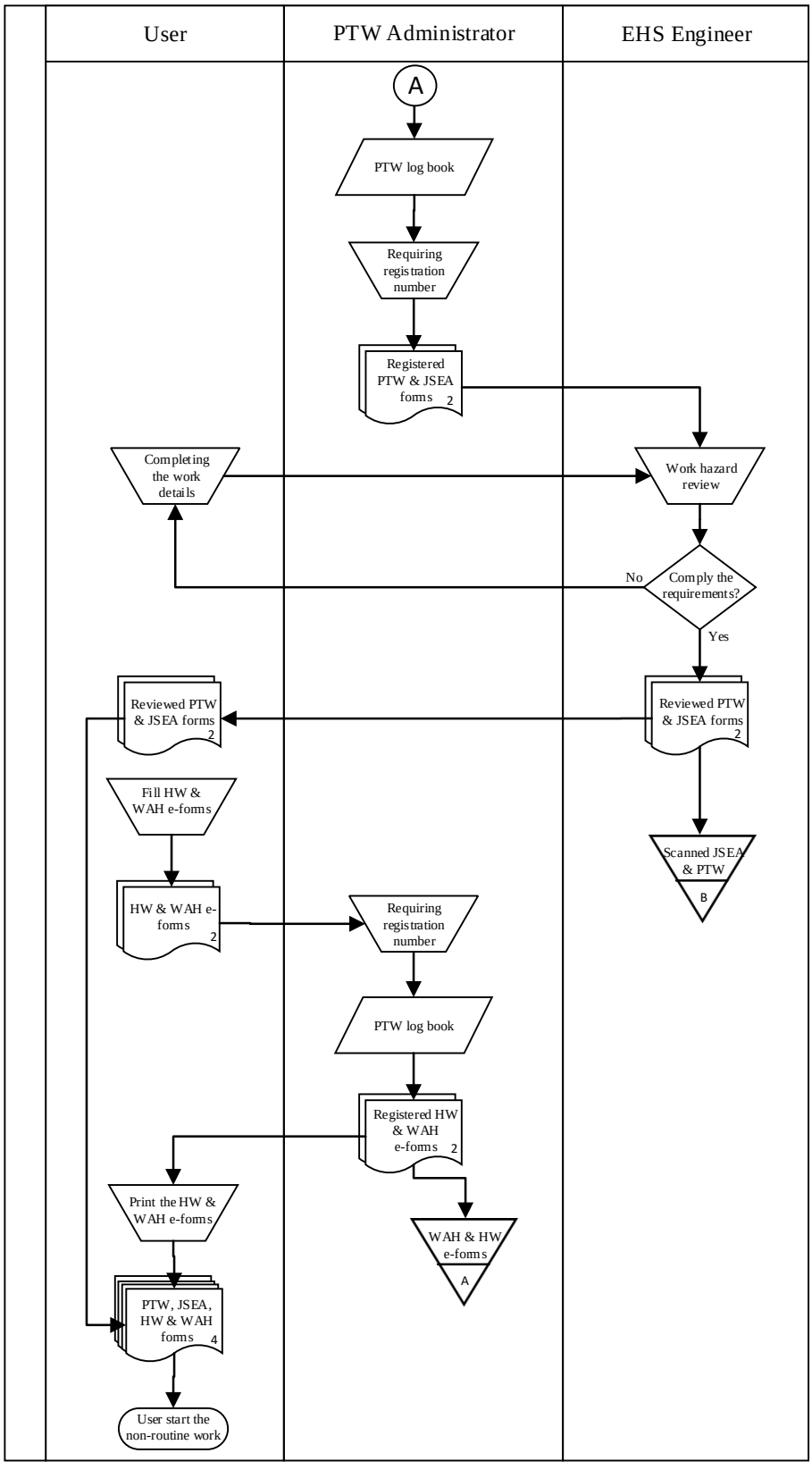


Figure 4.1 (Continued) Document Flow Diagram of Previous System

The diagram before shown the flow of process and documents in each component which are user, PTW administrator and EHS engineer. The first process are in the user, they fill hard copy PTW and JSEA forms and then send them to PTW administrator to be registered and obtain registration number for each forms. After that, the forms will be send to EHS engineer to get hazard review for the non-routine requested in those forms. After reviewed, the document will be taken by user and used as reference for work at height and hot work e-form registration. Then, after the e-forms filled, the second registration start by send them to PTW administrator. In PTW administrator, the forms will get their own number related to PTW form number and sent back to user. After received by the user, the e-form is printed and bundled with two previous forms and it finished the registration process.

4.1.2 Flow Process Chart of Previous System

After system visualization, a time measurement is done and presented using flow process chart. In this chart, each process is categorized as operation, inspection, transportation, delay, and storage.

No	Process Description	Symbols					Time Measured (s)
		Operation	Inspection	Transport	Delay	Storage	
1	Access the forms file	○	□	⇨	D	▽	21
2	Print the form	○	□	⇨	D	▽	84
3	Write job details	○	□	⇨	D	▽	182
4	Transport the forms to EHS dept	○	□	⇨	D	▽	75
5	Wait for administrator to be available	○	□	⇨	D	▽	98

Figure 4.2 Flow Process Chart of Previous System

No	Process Description	Symbols					Time Measured (s)
		Operation	Inspection	Transport	Delay	Storage	
6	Register the works on the log	○	□	⇨	D	▽	57
7	Requiring new register number	○	□	⇨	D	▽	18
8	Write the register number on the forms	○	□	⇨	D	▽	21
9	Move the forms to EHS Engineer	○	□	⇨	D	▽	10
10	Wait for EHS Engineer to be available	○	□	⇨	D	▽	86
11	Hazard review by EHS Engineer	○	□	⇨	D	▽	151
12	The forms stored in the PTW map	○	□	⇨	D	▽	77
13	Wait for users to get the form back	○	□	⇨	D	▽	76
14	The forms searched by user	○	□	⇨	D	▽	28
15	The forms back to users table	○	□	⇨	D	▽	61
16	Access Electronic forms	○	□	⇨	D	▽	25
17	Typing to fill the electronic forms	○	□	⇨	D	▽	293

Figure 4.2 (Continued) Flow Process Chart of Previous System

No	Process Description	Symbols					Time Measured (s)
		Operation	Inspection	Transport	Delay	Storage	
18	Send the doc through the email to EHS dept	○	□	⇨	D	▽	45
19	Requiring new serial number for e-form	○	□	⇨	D	▽	63
20	Typing the serial number on the document	○	□	⇨	D	▽	107
21	Store the forms in the server	○	□	⇨	D	▽	26
22	Send the forms to users through email	○	□	⇨	D	▽	50
23	Print the forms	○	□	⇨	D	▽	117
TOTAL TIME (s)							1771

Figure 4.2 (Continued) Flow Process Chart of Previous System

From figure 4.2, it can be seen that there are 23 process that should be done to complete overall process. The total processing time of the system is 1771 seconds or 29 minutes and 31 seconds with 1 inspection, 11 operation, 5 transportation, 4 delays and 2 storage process.

4.1.3 Problem Identification

After document flow diagram and flow process chart are created from data gathered during direct observation, some analyzations are carried out to identify the problem. Those analyzations are from the data in both diagram and chart and the other one is problems that identified from direct observation.

A. Diagram analyzation

In order to identify the problems that exist in the system from data in two diagrams above, an analyzation is carried out. This table is the combined summary from them.

Table 4.1 Processing Time for Process Type in Each Components

Component / Process Type	Operation	Inspection	Transport	Delay	Storage	Total
User	722 s	0 s	181 s	104 s	0 s	1007 s
Administrator	266 s	0 s	60 s	98 s	0 s	424 s
EHS Engineer	0 s	151 s	0 s	86 s	77 s	314 s

This table shown time required to do each process type in each component. The highlighted number is the total time for delay in each component of the system. If viewed from the flow chart, the source of delay in user are wait for users to get the form back and the forms searched by user, for administrator is waiting the administrator to be available, and for EHS engineer is wait for engineer to be available. All components inside the system have their own delay, this identify the system run ineffectively.

B. Direct observation analyzation

In the system of permit to work registration system there are several problem subjects that exist. From that identification, causes are analyzed and become consideration to be reduced or eliminated in system improvement. These are the analyzation of the system problems:

1. Complains from users for the process of the documents is too complex and taking their time to look after the documents throughout the registration process.

    a. High number of documents movement in the system makes the user should look after the registration status and contacts the administrator or EHS engineer to follow up their documents progress. This requires their time on the phone or just to stop by EHS department to check it.

b. Hot work and working at height forms are registered separated through different method after PTW and JSEA registered. Those methods are PTW and JSEA registered by directly sending the hardcopy of documents to administrator, and hot work and working at height forms are registered by sending the soft copy of the forms through e-mail to administrator. This cause double work for the user, cause high involvement and spend higher work time in the system than it should be if the registration done once.

2. High possibility of long delays occurred when documents transition from one component to another.

   a. Unavailable employee

      Each person who involved inside the system whether it is as user, administrator or as EHS engineer, have other job in other system or project as well. A case comes up along, where the transition between each component has a possibility that document receiver is unavailable because of other schedule such as meetings and audits.

      In analyzing main factor that contribute highest possibility of delay in the system, the number of person in each component also should be considered. The user has partners in related project who can be asked to temporarily handle the role, and there are 4 or more EHS engineer that be able to do the hazard review. But in the PTW administrator component, there is only one person that handle the role. As if that person is unavailable, the process should be delayed until unspecified time. This indicate process in administrator has the highest possibility of delays and one of the factor is number of person who handle the role.

b. Lack of coordination

- When the form that sent is being unnoticed and there is no received verification by receiving components, the forms are accidentally being ignored. This case sometimes occurs and the forms are just be processed when the user do follow up the registration progress.

- There are some cases when the user had a sudden non-routine job for their project. This cannot be handled well and cause delay when the office hour is nearly end and the forms should have to wait until the next day.

c. Technical issue (computer or broken printer)

- PT X have one printer in some office area that can be used by every employee near it. Sometimes problems occur when the printer is broken and should wait for its maintenance, or a long queue when printing the forms also may cause delays.

- The computer processing time also affect the system. Sometimes when the server down or the capacity of computer is full, the process will become slow and may cause delays in the system.

3. Documents in some cases become missing while processed in the system.

a. Lack of coordination in documents transition

There are cases where the forms are being missing because of there is lack of coordination during documents transition and its position is ended up being unknown.

b. Improper documents placement / arrangement.

When the receiver is unavailable, the documents usually placed on the receiver's table to be processed. The problem occurs when the documents placement is improper or in random place on the table. It is

possible the documents being stacked or mixed with another documents and end up missing.

4.1.4 Proposed Solution

There are two problems solutions that capable to be implemented in PT X. The first one is train one of EHS team member to be able to cover the job of the administrator, and the other is develop an application to be implemented inside the system.

Table 4.2 Problem Solution

No	Problems	Action	Solution
1	Complains for complex process and spending more time to monitor the process		
	High number of documents movement in the system	Yes	Enable the user to do self-registration by developing application. This will eliminate the document movement to administrator.
	Separated registration method for different forms	Yes	Enable all four documents registration at once in the application.
2	High possibility of long delays		
	Possibility that document receiver is unavailable	No	-
	Unnoticed forms	No	-
	Sudden request	Yes	Enable user to do registration at any time in any computer connected to company's server
	Technical issue (computer or broken printer)	No	-
3	Missing Documents		
	Lack of coordination in documents transition	No	-
	Improper documents placement / arrangement	Yes	Reduce the possibility of forms storage by unable user to directly continue the process to one of EHS engineers.

After discussion with the EHS manager with table 4.2 to present recommended solution based on existing problem, the option that chosen is developing an application for the system. It is because it does not give another workload to any EHS team member to handle administrator's job when she/he away, enable the system to run with minimum human force to minimize human uncertainty and error

and enable the process to run anywhere and anytime from any computer connected to server even after the office hour is over.

The application is mainly purposed to fully handling the registration process, the processes that will be eliminated are mostly inside the administrator's role. These are the proposed application requirements:

a. The application will be in charge to do registration automatically for all the four documents. It is included record the work details in PTW log book for yearly record and obtain registration number for each document.
b. It will enable the user to specify which documents that they require for the works.
c. It generates new registration number for each registration process automatically, but it is based on the required documents that specified by user.
d. After the registration, its open and fill all of the four documents automatically with work details also based on the required documents that specified by user.
e. Have data search ability that enable access to data in PTW log book for PTW audit material. The search itself are based on work date, submission date and the PTW registration number categories.
f. Have ability to generate and register a new registration number over an existing data in PTW log book.

The application does not require to handle all the system process because PT X management have consideration for maintaining the hazard review to be done manually. The reason is the review should be done by considering wide variety of work condition, there are various factors that might affect the work hazard and its risk. This complex process is better left in human ability that be able to combine and identify the factors and give preventions for them.

4.2 Design

To create a physical model that will cover the design of user interface that include outputs and the inputs, those applications reach their design phase. In this phase, the internal and external controls including features design and determining process specification into code, and modules are developed.

4.2.1 Data Flow Diagram

To describing flow of the data in the application, a data flow diagram is required. It will be quite helpful for those whose involved in the system whether it is user, developer, or administrator to understand the logic of the application in more details. The DFD itself divided into three stage which are context level, level 1 and level 2.

A. Context Level

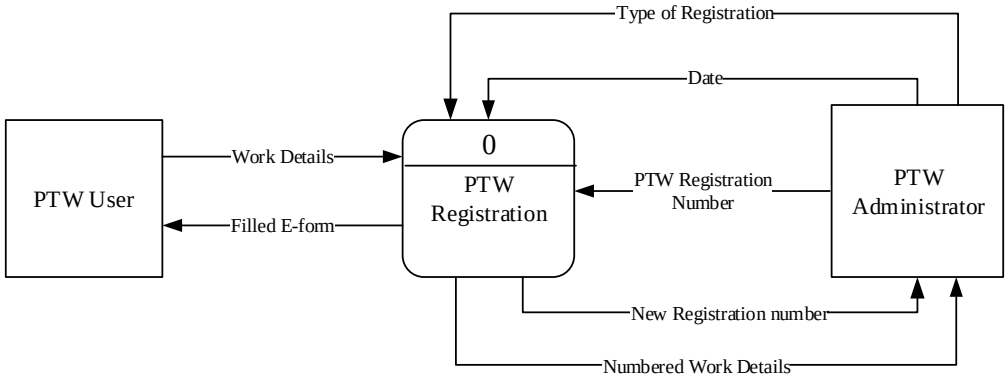


Figure 4.3 Context Level DFD

From this context level of DFD above, it can be seen all of the data inflow and outflow from both user and the administrator to the application which is PTW Registration system. Furthermore, caused by each entity have different data flows, this DFD separate the flow into two which is for administrator and user. From the side of user has less data flow than the administrator caused by the administrator have the varieties of role in the system. In simple word, user is the one who creates the data and administrator is who monitor, edit and controlling the system. This also a consideration to create different application for each entity, to ensure that user do

not have the ability to edit the database that may cause higher chance of the data being disorganized.

B. Level 1

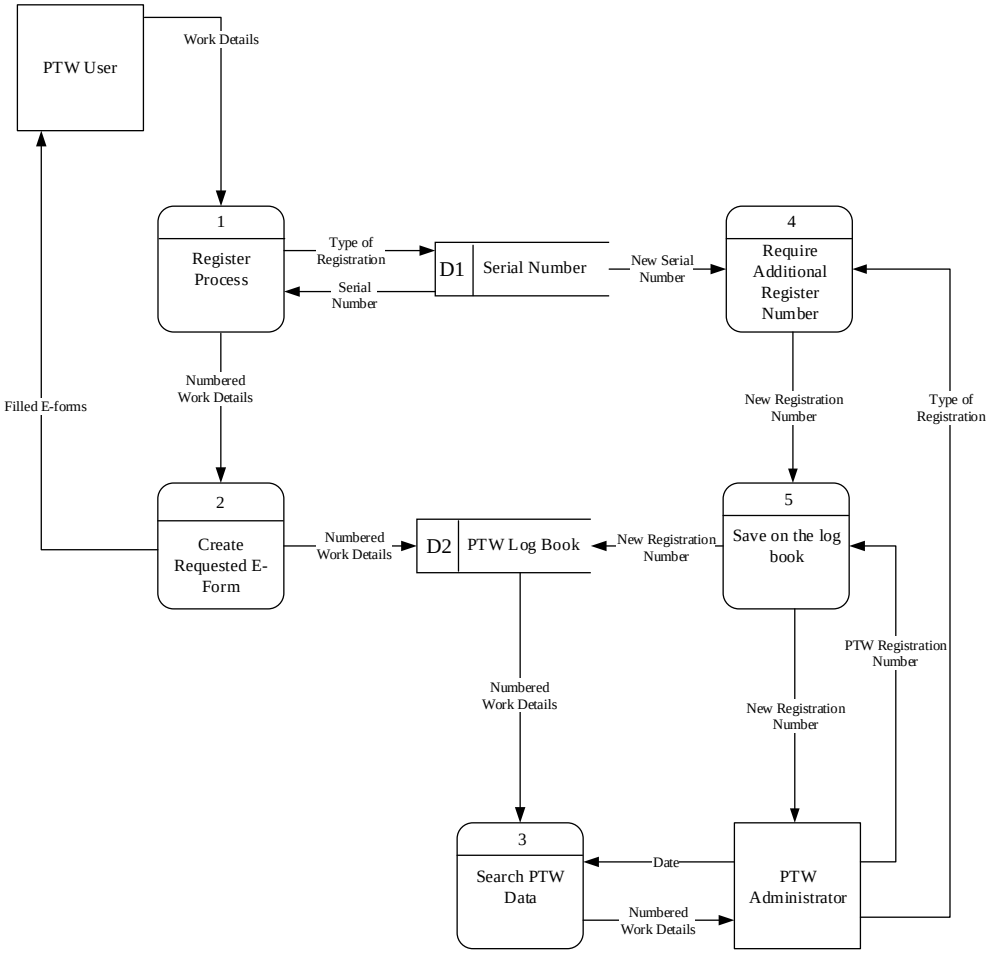


Figure 4.4 Level 1 DFD

This figure is the breakdown data flow inside the PTW Registration System. The system itself divided into 5 main process and each of data flow in context level is directed to each of process based on what process it is required. Those data will be processed become different information that send toward another process or as a search criteria just like in process 5. In that process PTW registration number is the search criteria, it means the new registration number will be saved based on the row where the criteria founded.

C. Level 2

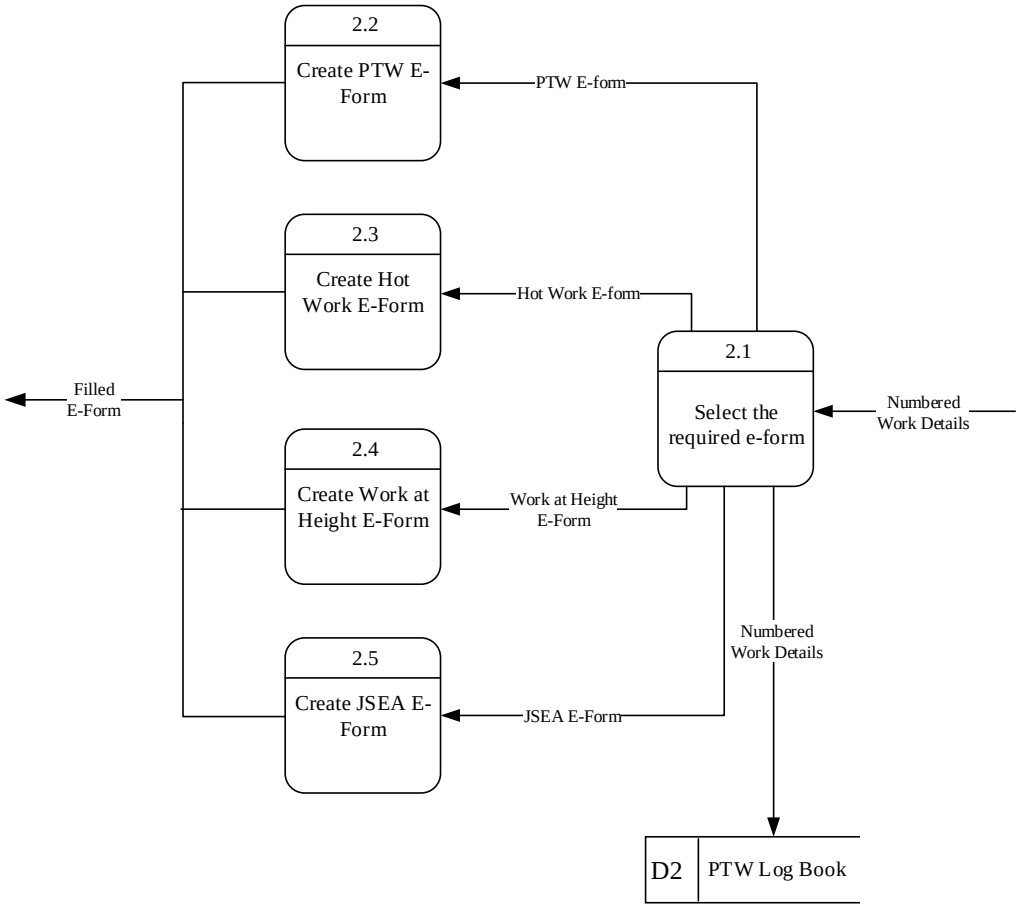


Figure 4.5 Level 2 DFD

This figure is the process breakdown of process number 2 in previous level 1 DFD which is create requested e-form. It can be seen that the system is designed to create the e-forms depends on registration number in numbered work details. If its contains hot work registration number, then the system will open and fill the hot-work e-from depends on assigned content control.

4.2.2 Data Structure

In order to specified the data flow shown in DFD, a data dictionary is created by specified the data object of each data flow. This purposed to help application creator to know all the object which exist in the data flow and in what process it needed. The table of data structure can be seen in appendix 9.

The table defines objects that include in each data flow in DFD. For example, in serial number data that flow from serial number database into process 1: Register Process, it contains PTW number, Hot work number, Work at height number and JSEA number. This also can be identified if those object is obtained from serial number database for process number 1 is a 4 digit number used to indicate the form order number.

4.2.3 Process Specification

After defining the data flow of the system, a process specification is created on order to specifies the functions of each application, both for user and admin. As mentioned in context level of DFD, the two entity, user and administrator have different data flow and role in the system. By reason of user is prohibited to have the role of the admin, consideration of making 2 different application is accepted. For user, the application will be named as PTW Register which will accommodate user for auto-register their proposed Permit to Work (PTW) and record the result in the database. This application will be equipped with features such as e-form creator, looping from date to another date, date picker and error identifier. For admin, the application will be named as PTW Access which will provide the ability to search, monitor, editing and controlling the system. This application has a password to ensure that not anyone can use it and will be automatically closed if a wrong password is submitted. All of the process specification form can be found at appendix 10 until 14.

A. PTW Register

The figure on appendix 10 explains the process specification of process number 1 in DFD level 1 which is register process. In the beginning of the process can be seen that there are some constrains that should be met in order to begin the registration process such as the work duration is within 1 until 7 days long, the proposed date is not behind today's date (submission date) and all the required entry is filled. The registration process is also specified as in the figure. The registration process start by doing its process Serial Number Database by obtaining the current

serial number, add year-code and generating new serial number for the next registration process.

The figure on appendix 11 explains the process specification of process number 2 in DFD level 1 which is create requested e-form. This process is also the continuation of process number 1. If ‘create e-form’ checkbox checked, the process start by open required e-forms based on check box value given by the user except PTW e-form. Either PTW register number or PTW e-form is a must to be created in the process. In another rout, if ‘create e-form’ checkbox unchecked, the process will go straight to process in PTW Database without creating any e-form. Moreover, if there some registration days left, a selection of next process is offered to the user. There are 3 buttons with different functions, skip button to skip the shown date, stop to stop all the process and continue to start the loop. The loop itself will start from ‘Do’ from process specification number 1.

A. PTW Access

The figure on appendix 12 explains the process specification of process number 3 in DFD level 1 which is search PTW Data. This process start the process by open the PTW Database and search based on search indicator which is date entry in program’s sheet. This result will be displayed on determined space on the program’s sheet.

The figure on appendix 13 explains the process specification of process number 4 in DFD level 1 which is require new register number. This process consists of open the serial number database, obtain the serial number based on checkbox value on user form and generating new serial number for the next process and save the database.

The figure on appendix 14 explains the process specification of process number 5 in DFD level 1 which is search require new register number. This process is the continuation of process number 4, and it is when the obtained new registration number saved on PTW registration number’s row in the database.

4.2.4 User Interface

User interface is the way the application interacts with its user. All of the things that shown in computer monitor, all that can be read and changed by using input hardware is user interface. As in this system, it consists of user forms, message box, the application display and also the databases.

A. PTW Register

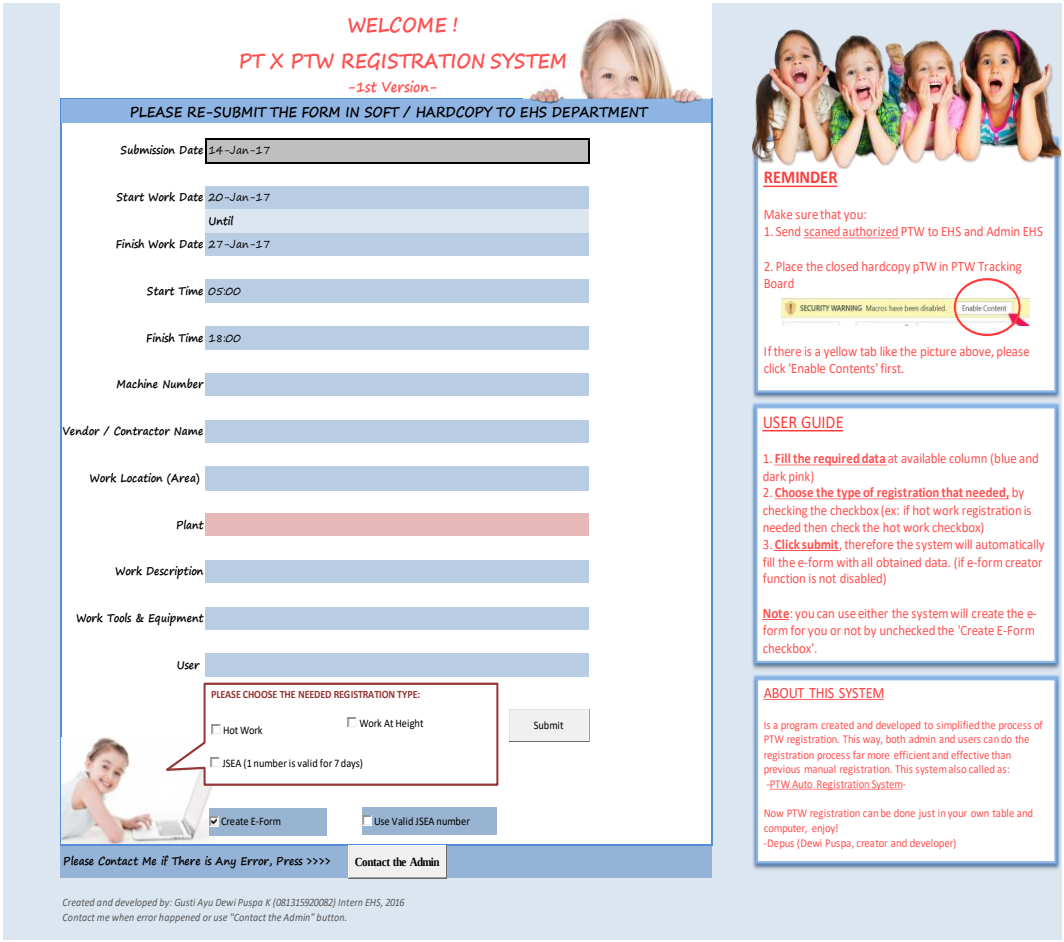
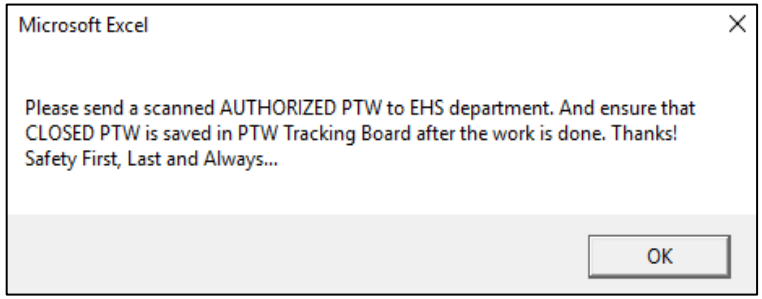
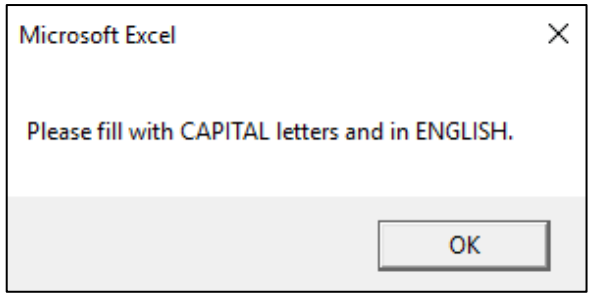
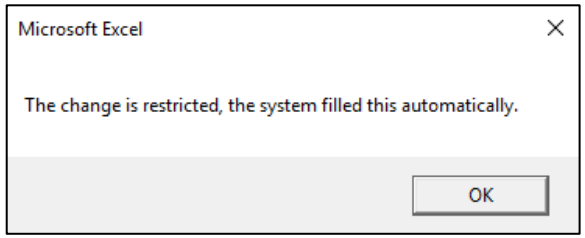


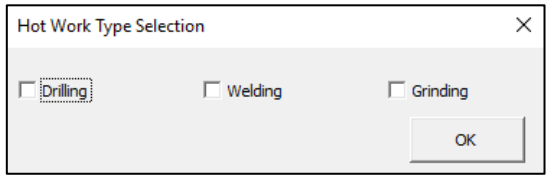
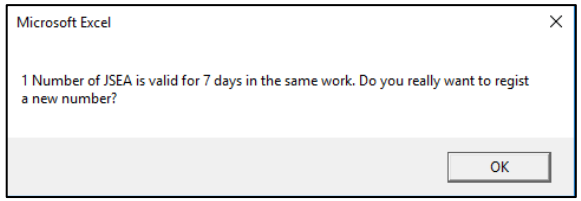
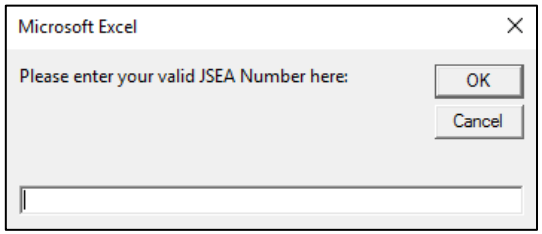
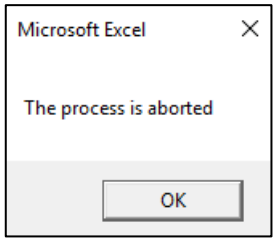
Figure 4.6 PTW Register Design

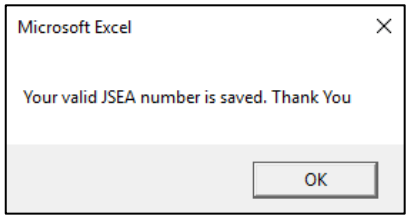
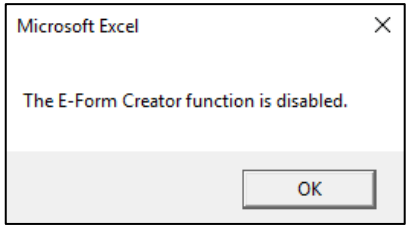
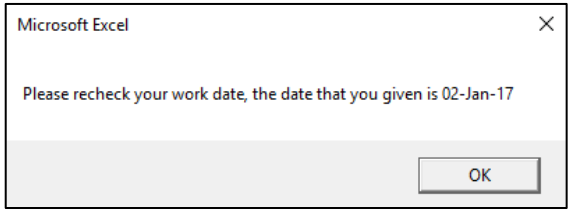
This figure is the display of PTW Register main view. As shown in the figure the gray cell is the submission date that automatically filled by the system, blue and red cell is the required entry and there are check boxes inside red lined box which is the indicator of each registration type that requested by user. In the right sides of entries are reminder, simple user guide and short description of the system.

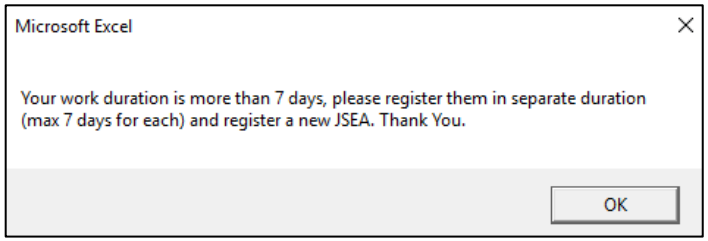
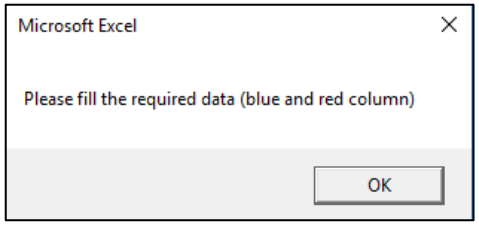
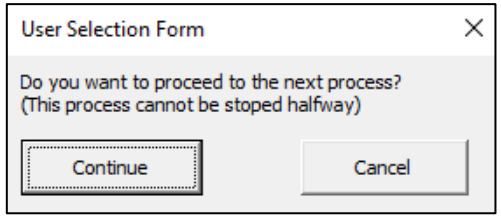
Table 4.3 Input Output User Interface of PTW Register

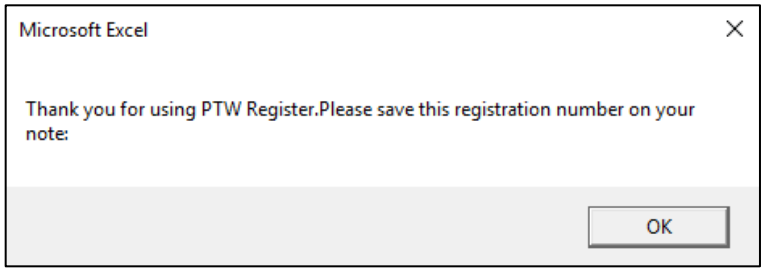
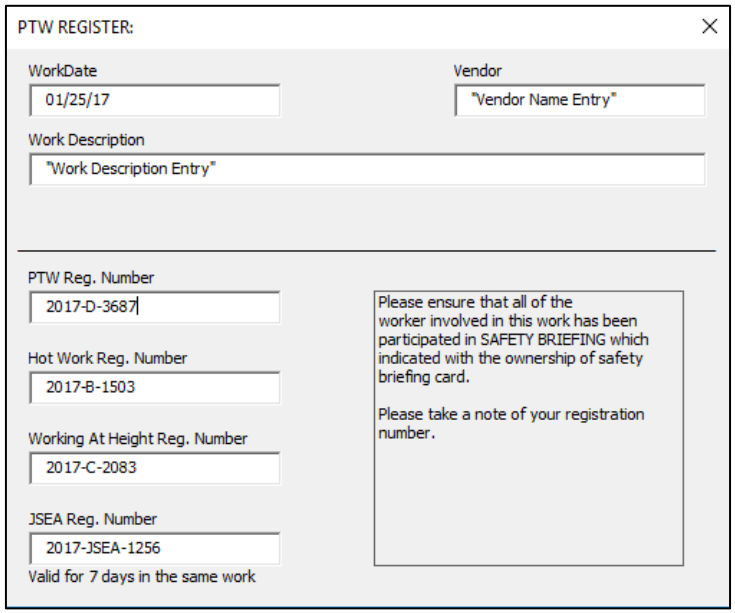
Num	Input	Notes	Output
1		Triggered if PTW Register accessed by the user. Welcoming message and a reminder shown.	 

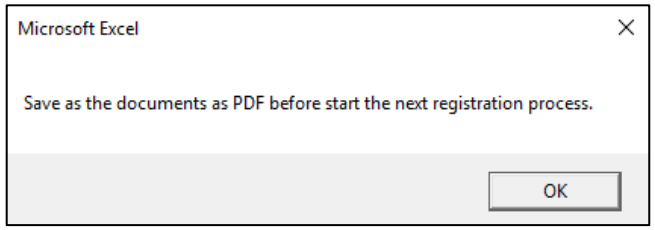
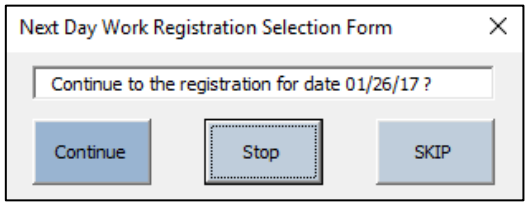
Num	Input	Notes	Output
2		Submission date cell selected. Change restriction message shown.	
3		If start work date or finish work date cell selected, date picker user form shown.	

Num	Input	Notes	Output
4		Triggered by hot work check box checked.	
5		Triggered by JSEA check box checked.	
6		If cancel button clicked, userform closed or blank entry is submitted	

Num	Input	Notes	Output
		If an entry is submitted.	
7		Triggered by Create E-Form check box unchecked.	
8		Triggered if work date smaller than submission date and submit button clicked.	

Num	Input	Notes	Output
9		Triggered if work duration is more than 7 days and submit button clicked.	
10		Triggered if one or more required entry left blank and submit button clicked.	
11		If cancel button clicked, the process aborted. But if continue button clicked,	Appendix 3, Appendix 4, Appendix 5 and Appendix 6

Num	Input	Notes	Output
		the registration process begin and the first show up is the message box on the top. Then, followed by a userform that contain the registration result data. And after the user from closed, a reminder to save the created e-form as PDF	 

Num	Input	Notes	Output
		before continue to next date registration shown.	
12		This selection form will be shown only if work date – finish work date is more than 0. It is to trigger the looping function.	

This table shown all the input output in the PTW Register, either as input box, user form or message box. This table also arranged them in one row if the output is the response or the result of this system, there are also a short note that explain conditions that triggered the output beside input. For example, output in row number 1 do not have input in table but in notes written ‘Triggered if PTW Register accessed by the user. Welcoming message and a reminder shown.’ It means that those output does not need physical input but can be triggered by open or accessing the application. Then everytime this application opened by the user, those ouput will shown consecutively.

B. PTW Access

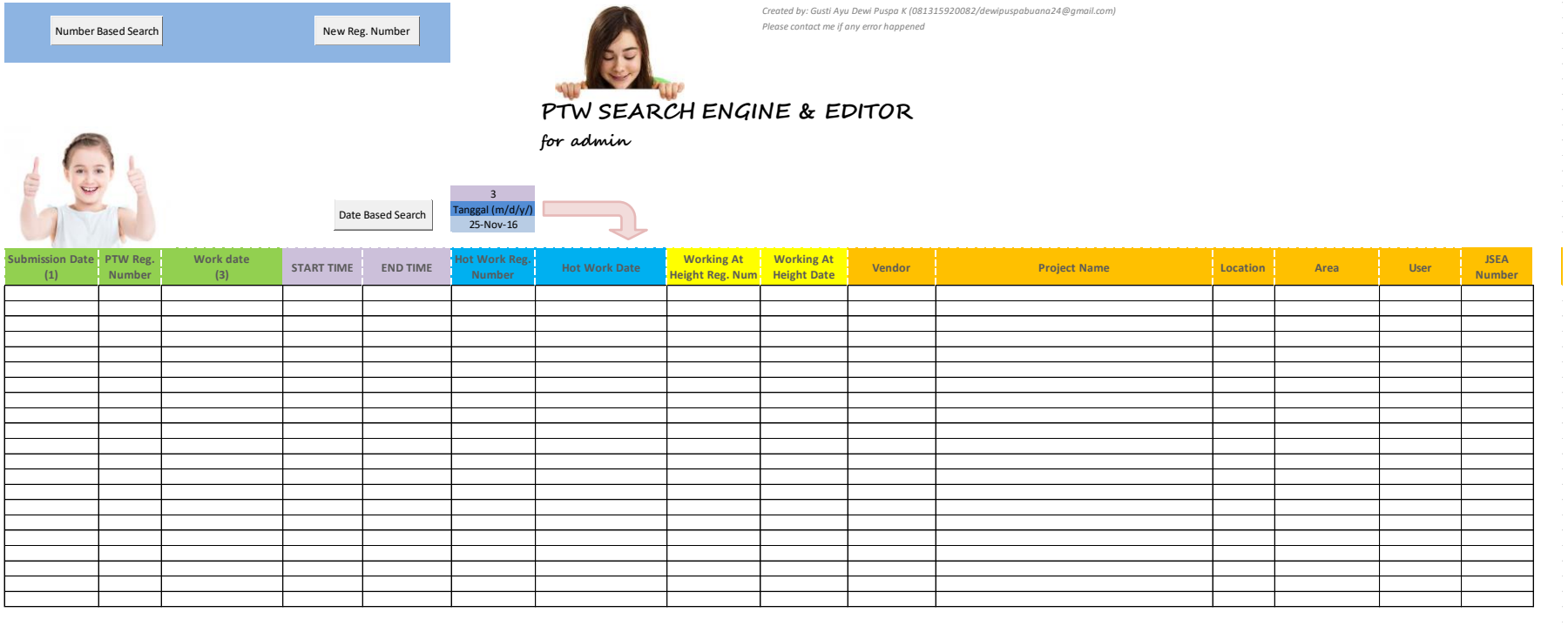
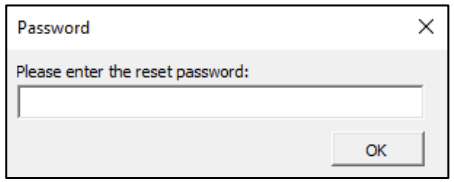
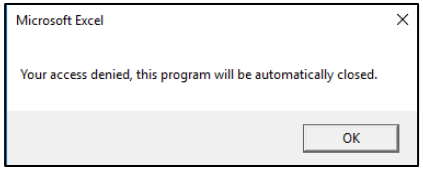
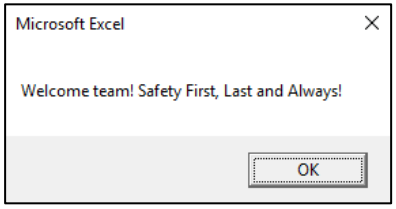


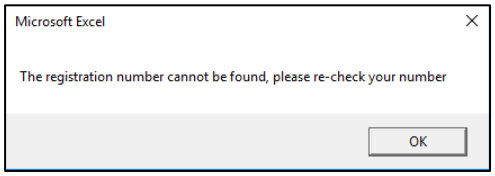
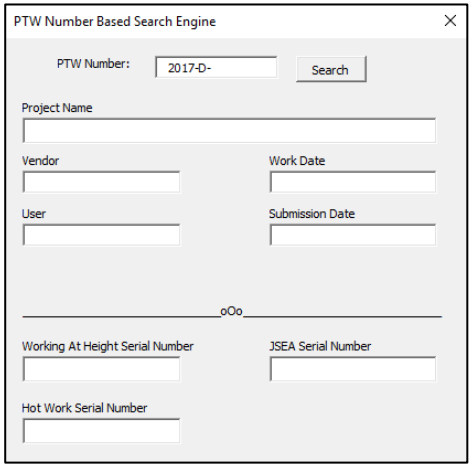
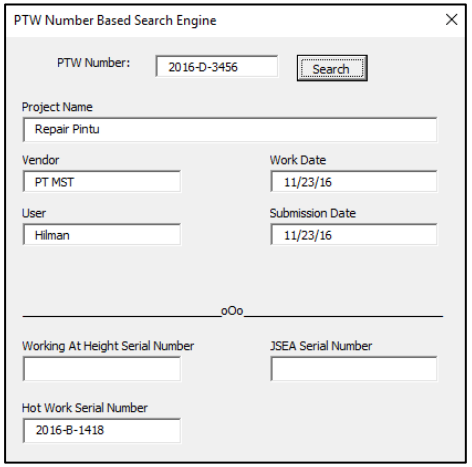
Figure 4.7 PTW Access Design

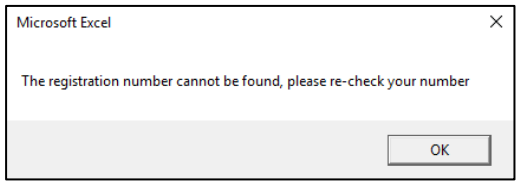
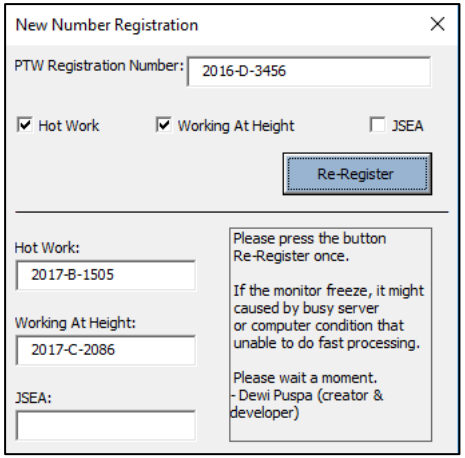
From figure above can be seen the design of PTW Access where displayed 3 buttons, which the upper left button is number based search buttons, at upper middle is new reg. number button, and the one in the center is date based search. For the date based search process, the

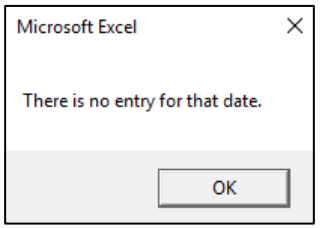
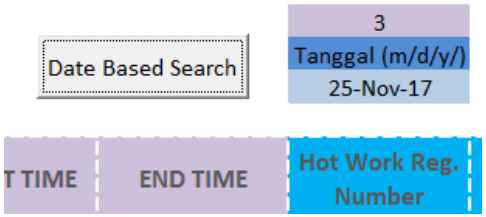
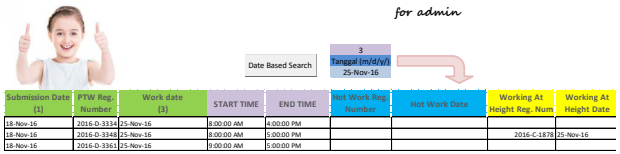
results are not shown in a user form, but in the tables shown in the lower part of this figure. The columns itself can be adjusted along the amount that data that identified during the process.

Table 4.4 Input Output User Interface of PTW Access

Num	Input	Details	Output
1		If wrong password submited.	
		If right password submitted.	

Num	Input	Details	Output
2		If unregistered or wrong ptw registration number submited.	
		If registered or right ptw registration number submited.	

Num	Input	Details	Output
3		If unregistered or wrong ptw registration number submited.	
		If registered or right ptw registration number submited.	

Num	Input	Details	Output
4		If there is no data with the same date founded in the database.	
		If there are data with the same date founded in the database.	

This table shown all the input output in the PTW Access, either as input box, user form or message box. This table also arranged them in one row if the output is the response or the result of this system, there are also a short note that explain conditions that triggered the output beside input. For example, as in process number 1, the input is password input box. If wrong input entered, the output is message box of access denied and the application will be automatically closed. But on the other way, of the password is correct, the output will be welcoming messages box

4.3 Implementation

In implementation stage, the applications are created and implemented. In this stage also, the applications are tested and recorded; operational procedures and documentation are done; and implementation approval is obtained. The purpose of this stage is to implement a fully functioned information system that already reviewed and tested.

4.3.1 Application coding

All process specifications from analyze phase are transformed into application coding by using Microsoft Excel VBA Macro. The applications itself developed to use lot of user forms and message boxes as there are lot of possibility route taken by both user and admin. The coding itself is attached in appendix 1 and appendix 2.

4.3.2 Black Box Testing

Black box is a test to observe the execution result by data and functional testing of the applications. This testing evaluates the applications only from the input and output without knowing what really happened inside the process. Strategy that used in this research is boundary values to reduce the number of cases that should be tested. In the table below, there are several columns consist of the testing description, the expected result, actual result and the test result.

From the table in appendix 7 can be seen there are 26 test cases, the number of cases itself is numerous caused by the application flexibilities towards human errors. Hence, it makes the application have numerous possibilities of cases. The result of PTW registration black box testing is all of the testing cases have passed the test.

From the table in appendix 8 can be seen there are 20 test cases, where the test itself is done to test 4 different functions of the application. Those functions are application password, number based search, new registration number and date based search. The result of PTW access black box testing is all of the testing cases have passed the test.

4.3.3 Document Flow Diagram of Improved System

After the implementation, registration system itself changed and the document flow will be different from the previous system. In order to know the change, here is the document flow diagram.

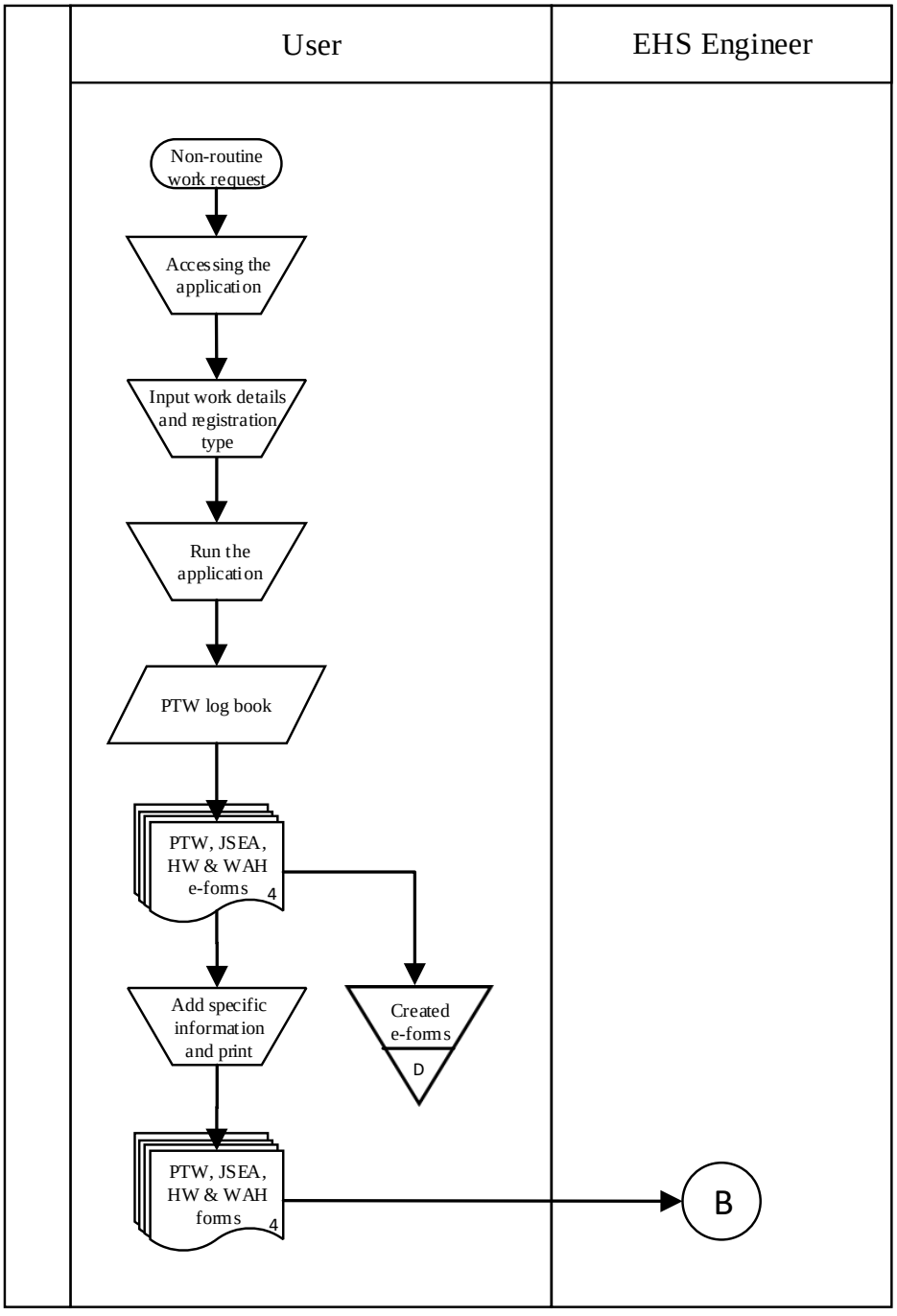


Figure 4.8 Document Flow Diagram of Improved System

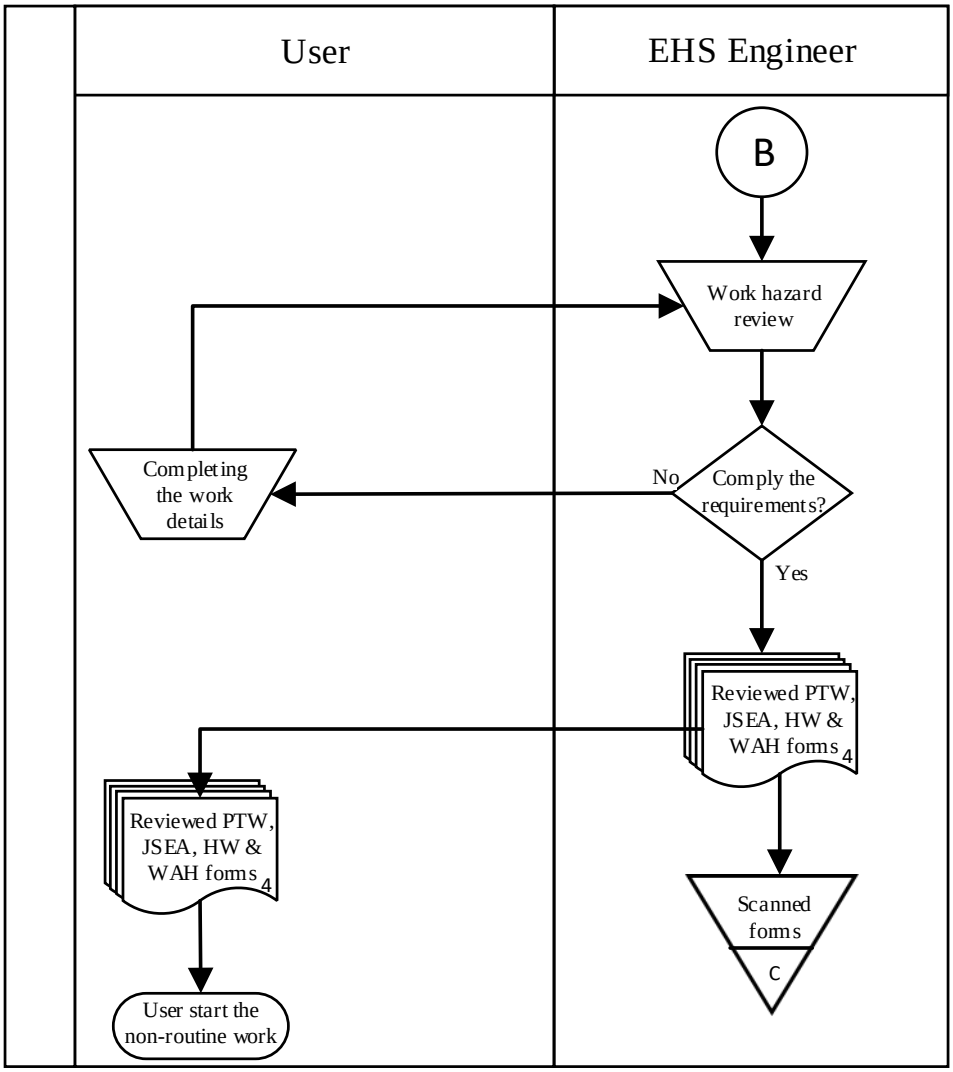


Figure 4.8 (Continued) Document Flow Diagram of Improved System

From the diagram above, can be indicated that the system only has two components with the implementation of registration application in it. The process inside the improved system are the user register the work through application, adding specific information after obtaining the auto generated e-forms, print the document and send it to EHS engineer. In EHS engineer, the forms will be reviewed for work hazard. After that, the form can be immediately taken by user and it finish the process.

4.3.4 Flow Process Chart of Improved System

If the flow of documents is different from previous system, the change may also happened in the total processing time also. In order to measure the improved system, a time study are done one more time. The result is presented in flow process below.

No	Process Description	Symbols					Time Measured (s)
		Operation	Inspection	Transport	Delay	Storage	
1	Access PTW Register (software)	○	□	⇨	D	▽	25
2	Type the work description	○	□	⇨	D	▽	56
3	Choose the type of registration	○	□	⇨	D	▽	8
4	Run the software (registering PTW and forms)	○	□	⇨	D	▽	13
5	Adding specific information to the forms	○	□	⇨	D	▽	109
6	Save the forms to the server	○	□	⇨	D	▽	199
7	Print all of the forms	○	□	⇨	D	▽	161
8	Move the forms to EHS Engineer	○	□	⇨	D	▽	72
9	Wait for EHS Engineer to be	○	□	⇨	D	▽	75
10	Hazard review by EHS Engineer	○	□	⇨	D	▽	203
11	The forms taken by users	○	□	⇨	D	▽	65
TOTAL TIME (s)							986

Figure 4.9 Flow Process Chart of Improved System

From figure 4.9, can be seen the improved flow process chart has 11 process with 1 inspection, 6 operation, 3 transport process, 1 delay, and 1 storage process. The delay that remained is ‘wait for EHS Engineer to be available’ because consideration auto reviewing may cause misdirection in the safety review. It also can be seen the total processing time is 980 seconds or 16 minutes and 26 seconds.

4.3.5 System Comparison

After the observation done, the result is compared between the previous system with the improved system. These comparisons will indicate the role of the two application in PTW registration system improvement, the effect and identify the success of the improvement itself.

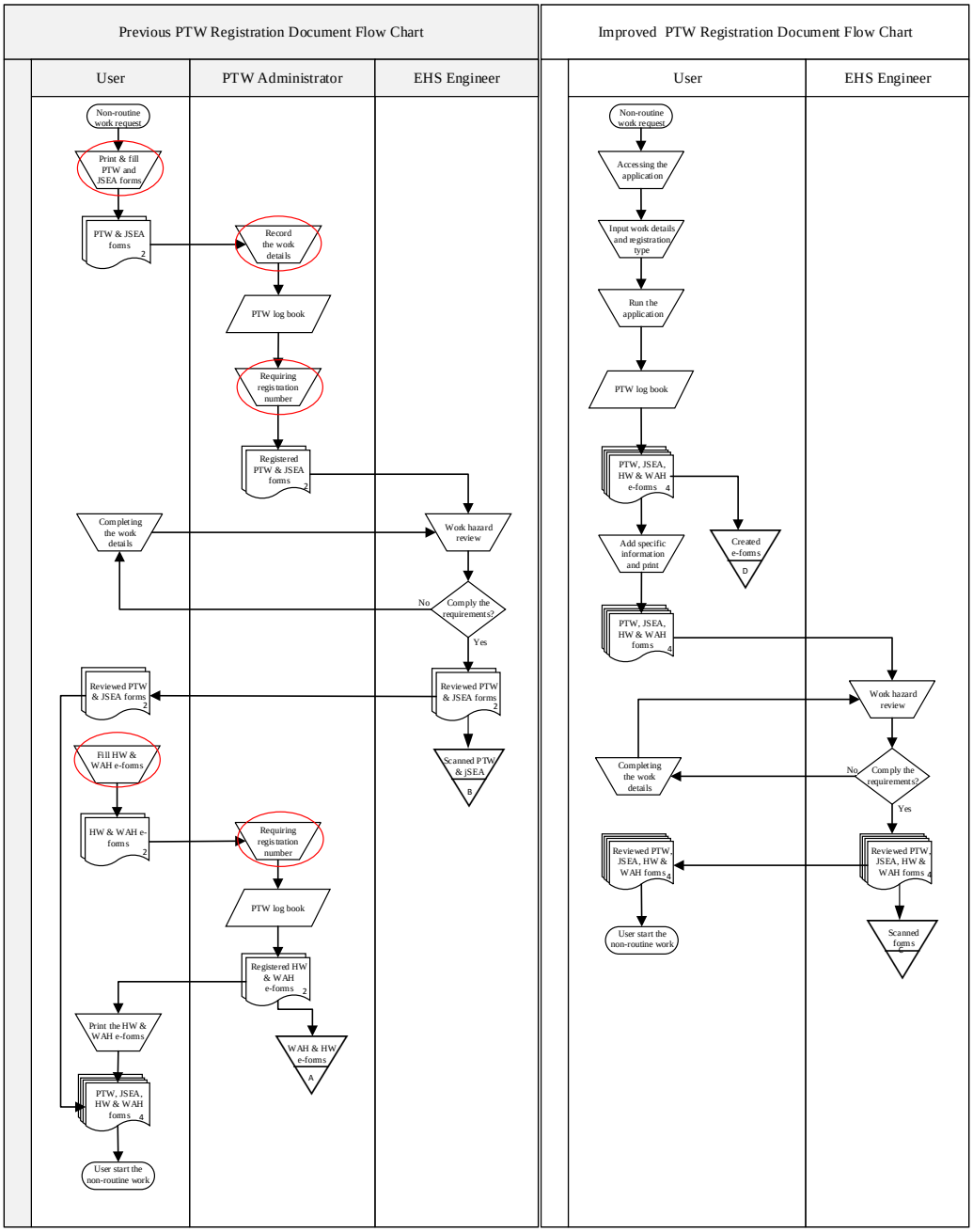


Figure 4.10 Document Flow Diagram of Previous vs Improved System

In figure 4.10, red circles in previous system are indicating processes that eliminated in the improved system. This comparison diagram also shown that in improved system, the role of administrator and difference registration method for certain forms are eliminated from the system. This solution indirectly reduces the factors that may cause delay. The role of administrator is eliminated by replacing manual registration through administrator become auto registration through an application.

Furthermore, here is the data comparison from the flow chart between previous and improved system.

Table 4.5 Flow Process Chart Comparison Summary

	Previous System			Improved System	
No	Process Description	Time Measured (s)		Process Description	Time Measured (s)
1	Access the forms file	21		Access PTW Register (application)	25
2				Type the work description	56
3				Choose the type of registration	8
4				Run the application (registering PTW and forms)	13
5				Adding specific information to the forms	109
6				Save the forms to the server	199
7	Print the forms	84		Print all of the forms	161
8	Write job details	182			
9	Transport the forms to EHS department	75		Move the forms to EHS Engineer	72
10	Wait for administrator to be available	98			
11	Register the works on the log	57			
12	Requiring new register number	18			
13	Write the register number on the forms	21			
14	Move the forms to EHS Engineer	10			

Table 4.5 (Continued) Flow Process Chart Comparison Summary

	Previous System			Improved System	
No	Process Description	Time Measured (s)		Process Description	Time Measured (s)
15	Wait for EHS Engineer to be available	86		Wait for EHS Engineer to be available	75
16	Hazard review by EHS Engineer	151		Hazard review by EHS Engineer	203
17	The forms stored in the PTW map	77			
18	Wait for users to get the form back	76			
19	The forms searched by user	28			
20	The forms back to users table	61		The forms taken by users	65
21	Access Electronic forms	25			
22	Typing to fill the electronic forms	293			
23	Send the doc through the email to EHS dept	45			
24	Requiring new serial number for e-form	63			
25	Typing the serial number on the document	107			
26	Store the forms in the server	26			
27	Send the forms to users through email	50			
28	Print the forms	117			
	TOTAL TIME (s)	1771		TOTAL TIME (s)	986

The table 4.6 shown process that eliminated in gray shading by implementation of applications inside the improved system. In the improved system, there are also several addition processes (process number 2 until 6) which are added for running the application. In the other side, process in the administrator are fully eliminated and this enable user to directly send the document to EHS engineer. This diagram also shown the users are being able to wait for the form to be reviewed by one of EHS engineers because it only need a short time and after that they obtain the forms and finish the process of non-routine work request. With the application, the number of forms transition reduced, which it is one of the factor in complicated

process, delays and missing forms problems occurred in previous system. Not only that, by this comparison can be identified that process complexity is reduced, decreased components (administrator), decreased forms transition, decreased delays and also decreased possibility of missing forms.

Through both system comparisons from flow process chart and document flow diagram can be seen that the application is reduced problems that exist inside the previous system.

4.3.6 System Advantages and Disadvantages

In the implementation of the applications, there are some advantages and disadvantages appear along with that. Here is the summary.

Table 4.6 Improved System Advantages and Disadvantages

	Advantages	Disadvantages
1	Process in the system is simplified	The applications need annual maintenance, update in certain condition, and future development along with company growth.
2	PTW administrator's role are eliminated from registration process component.	The databases are not available to be directly opened all the time
3	The document movement is more efficient to EHS Engineer for work hazard review and back to user only.	A simple training is needed for the new user of the application.
4	Each form is automatically filled with the same data obtained from the process, this ensure data synchronization between each document	
5	Manual document filling is eliminated in crucial data element such as document serial number and work details.	
6	All four documents are processed and obtained through short process in the application in the same time.	

Table 4.6 (Continued) Improved System Advantages and Disadvantages

	Advantages	Disadvantages
7	The registration process can be done in any computer that connected to PT.X server at any time.	
8	Data management is completed by the application.	

Although the improved system has so many advantages along its running, there are still some disadvantages inside the system. Almost all of the disadvantages are caused by limitation of the applications capability. The company keep growing and there must be some changed over the forms format, policy and others. The applications are unable to automatically adapt with those, the coding should be adapted with the new requirements. That's why it still need control and monitoring from IT department or relevant department. The other disadvantage, closed access of database appears because of the traffic of the system itself. It is used by anyone inside the PT X that request a non-routine work. If a registration process run when the database is open, the running registration will not be recorded in the database and the system in application will come up with error notification.

This is the advantage of time reduction based on cost spend in component wage. The calculation using UMR 2016 in Bekasi retrieved from http://www.gajiumrumkterbaru.xyz/2016/06/umr-bekasi-2016.html which is IDR 3,261,375 per month.

Table 4.7 Calculation of Cost Saving

COST CALCULATION		
A. Time Reduction		
Processing time of previous system (s)		1771
Processing time of improved system (s)		986
Time reduction (s)		785
B. Total Time Reduction		
Number of forms set in a week (5 work days)		164
Number of forms set in a month (22 work days)		721.6
Time reduction in a month (s) (Time reduction* Number of document in a month)		566456
C. Cost Spend per seconds		
UMR Bekasi	IDR	3,261,375.00
Cost per second (UMR/ 22 days/ 8 hours/ 3600 s)	IDR	5.15
D. Cost Saving in a Year		
Improvement saving in cost unit in a month (time saving in month * cost per second)	IDR	2,915,759.84
Improvement saving in cost unit in a year	IDR	34,989,118.13
*this calculation is not included: Cost effect on reduced number of delayed work Electricity cost on reduced standby period of printer and computer Cost reduction spend on admin's role in the system		

The calculation start from time reduction in one overall process, by reduce the previous processing time by improved processing time. Next, find the total time reduction in a month by multiply time reduction with the number of document set in a month. The number of document set are the same with number of processing time because every document has to process through all process in the system. Then, cost in wages per second is calculated. Finally, the cost saving a year is obtained from cost per second times time reduction in a month (s) times 12. The final result obtained is the system reduced the operational cost with IDR 34,989,118.13 in a year compared previous system by implement those applications.

4.4 Support

After implementation, there are several things that should be ready during system operations which are maintenance and enhancements that may requested by the system's user to solve problems or error identified by them. Maintenance includes changes that done to corrects problems or fulfilling the management request or user. In enhancements side, there is modifications to enhance the capability of the system.

4.4.1 User Manual

To ensure all user and administrator get a proper usage instruction, a user manual is created for each application.

PTW Register User Manual
1. Open PTW Register file. 2. Close all welcoming message box. 3. Fill all required data in available spaces (in blue and red column). 4. In the red lined box, choose registration type needed for the work. Ex: if the work is a hot work and work at height, click on hot work and work at height check box. 5. If you prefer to use a registered valid JSEA, check Use Valid JSEA Number checkbox, enter the valid JSEA number in the input box, and click OK button. 6. If you prefer to disable e-form creator function, check 'Create E-Form' check box and close the warning message box. 7. Click submit button. 8. Click cancel button for canceling the process, click continue button to begin the registration process. 9. Wait a while until all needed e-form are filled by the system (if the e-form creator is not disabled). 10. Save all of the e-form in pdf. 11. Back to PTW Register. a. Close the message boxes that appear. b. You can take a note of information in the next message box that appear or just ignore it. c. If a message box state that the registration process is done shown, close the message box and close PTW Register and all of the e-form. d. If a Next Day Selection Registration Form shown, chose one of the options. Continue: to begin the registration process for the next date shown in the user form. Stop : to stop all the process. Skip : to skip the date shown in the user form, and show options for the next date.

Figure 4.11 User Manual of PTW Register

This figure contains user manual PTW Register that will guide the user in doing their proposed work registration from the beginning until the end of process. On the

last part of the SOP can be seen there are 3 options for the user. Their selection will determine the next process of the registration itself. As the feature of this application, it will do a looping if 'continue' button clicked and begin the registration process for the next date shown in the user form. This application doesn't have password to give access to all user inside PT. X for use the register.

PTW Access User Manual
1. Open the file. 2. Enter the password "14001ehs". 3. Click OK.
Number Based Search
1. Click Number Based Search button. 2. Enter the PTW registration number. 3. Click Search button.
New Registration Number
1. Click New Reg. Number button. 2. Enter the PTW registration number. 3. Choose the registration type for the new number. Ex: if the number that needed is a hot work and work at height, click on hot work and work at height check box. 4. Click Re-Register button.
Date Based Search
1. Enter the date that wanted to be searched in blue cell below Date (m/d/y) cell. 2. Enter the date code in purple cell above Date (m/d/y) cell. "1" for search the date as submission date and "3" as work date. 3. Click Date Based Search button.

Figure 4.12 User Manual of PTW Access

This figure contains user manual that contain 4 parts, it means each function of the PTW Access have their own steps and different button. In this figure, also can be seen that PTW Access have a password purposed to limit the access in this application because its database editing ability.

4.4.2 System Control and Monitoring

Beside creating application user manuals for

A. System Control

The improved PTW registration system, the control are mainly done by the application. It has constraints that ensure all work registered are met the requirements set by the company. But there are still some requirements that should be understood by the user itself such as the type of work they want to request. To understood the requirements, there are a weekly update done by EHS department. In this system, EHS engineer also have its role on system control that occurred when doing the hazard review. If the forms do not meet the requirement of requested work, it will direct the user to complete them. After the forms are complete, hazard review will be repeated.

B. System Monitoring

In the PTW access application, there is date based search feature. Aside from its main function as audit material search engine, this feature is also designed for system monitoring. With this feature the administrator will be able to review all registration record from specified date. The indicator of system error is the PTW registration number. If the registration number are displayed not in order, it can be diagnosed as error in the serial number database. But this problem is very rarely occurred after last application improvement.

4.4.3 Frequent Error Handling

After system implementation, there are some frequent problems that found. Some of them are solved by modifying the applications by avoid using code which is the source of problems. But some of them still occurred until the applications are fully implemented. To counter them, a list of solution for each error is created.

Table 4.8 Errors Handling

Error Indication	Solution
Error notification in the beginning of PTW Register activation	Replace PTW Register with its master application
The E-forms are opened but they are not automatically filled by the system	Ask user to change their Microsoft Word document setting by open a blank document - file - options - general - open email attachments and unchecked ‘other uneditable files in reading view check box’ - click ok.
The user is forgotten to choose one of required registration number	Guide the user to contact administrator to use new registration number function that available in PTW access

This table will guide administrator in identify and facing the frequent error problem. From this table, also can be seen that almost the frequent problems come from untechnical issue that happened outside of coding ability.

CHAPTER V

CONCLUSIONS AND RECOMMENDATIONS

5.1 Conclusion

Several conclusions can be drawn after completing this research. The conclusions are explained as follows:

1. In previous system, there are several problems that exist. Those problems are complicated process, long process delays and missing forms.
2. Improvement is successfully accomplished by system management using implementation of two customized applications in PTW registration system.
3. Both of the applications are successfully meet the requirement and implemented in PT. X as procedure in PTW registration system.

5.2 Recommendation

Since the research has limitation, such as times and areas, this research is still need further research and development.

The recommendations explanations are as follow:

1. Further research is need to be done to discover detailed profit measurement of PT. X towards the improvement in aspects of wage, electricity, time, material, and administrator role reduction.
2. Future developments and continuous improvements are necessary to enhance the application to be better in the future. Enhance the application into web based application will be a good consideration to protect the record backup and ensure all computer capable to run the application.

REFERENCES

Anderson, H., & Yull, S. (2002). BTEC nationals - *IT practitioners: core units for computing and IT*. Oxford: Butterworth-Heinemann.

Laurie, W. (2006). *Testing Overview and Black-Box Testing Techniques*.

Le Vie, D. S., Jr. (2000). *Understanding Data Flow Diagrams* [PDF].

Liew, V. K. (2009). Excel VBA made easy: a concise guide for beginners. Lexington, KY: Liew Voon Kiong.

Kendall, K. E., & Kendall, J. E. (2011). Systems analysis and design. Upper Saddle River, NJ: Pearson Prentice Hall. pp 231-232. 259-262

PERMIT TO WORK (IMPROVING THE IMPLEMENTATION SYSTEM) [Powerpoint]. (2016). West Java, Indonesia: PT. X.

Patil, S.B. (2008). Industrial Engineering and Management (1st ed.). India: Technical Publications Pune.

Shelly, G. B., & Rosenblatt, H. J. (2010). Systems analysis and design. Boston: Course Technology. pp.19-21

The Linux Information Project. (2005). *User Interface Definition*. Retrieved January 23, 2017, from http://www.linfo.org/user_interface.html

APPENDIX

Appendix 1: PTW Register Coding

```
Private Sub Workbook_Open()

Sheets("Perijinan").Select
Range("C14:C26").ClearContents

MsgBox "Please send a scanned AUTHORIZED PTW to EHS department. And ensure
that CLOSED PTW is saved in PTW Tracking Board after the work is done. Thanks!
Safety First, Last and Always..."
Range("C4").Value = Format(Now(), "MM/DD/YY")

ActiveSheet.WorkingAtHeightCB.Value = False
ActiveSheet.HotWorkCB.Value = False
ActiveSheet.JSEACB.Value = False
ActiveSheet.EFormCreatorCB.Value = True
ActiveSheet.ValidJSEACB.Value = False

With Range("C20").Validation
   .Delete
   .Add Type:=xlValidateList, AlertStyle:=xlValidAlertStop, Operator:= _
      xlBetween, Formula1:="=place"
   .IgnoreBlank = True
   .InCellDropdown = True
   .ShowInput = True
   .ShowError = True
   .ErrorMessage = "Please fill with available options."
End With

Range("A1").Select
MsgBox "Please fill with CAPITAL letters and in ENGLISH."

End Sub
```

```
Private Sub Workbook_SheetSelectionChange(ByVal Sh As Object, ByVal Target As
Range)
If Target.Address = Range("C4").Address Then
   MsgBox "The change is restricted, the system filled this automatically."
   Range("C5").Select
End If
End Sub
```

```
Private Sub Worksheet_SelectionChange(ByVal Target As Range)
If Target.Address = Range("C6").Address Then
   CalendarForm.Show
End If

If Target.Address = Range("C8").Address Then
```

```
    CalendarForm.Show
End If

End Sub
```

```
Private Sub HotWorkCB_Click()

Range("B190:B192").ClearContents
If HotWorkCB.Value = False Then
    Exit Sub
End If

HotWorkTypeSelection.Show

If Range("B190") = "" And Range("B191") = "" And Range("B192") = "" Then
    HotWorkCB.Value = False
End If

End Sub
```

```
Private Sub HWTSOKbutton_Click()
If DrillCB.Value = True Then
        Range("B190") = "Drilling"
    ElseIf DrillCB.Value = False Then
        Range("B190") = ""
End If

If WeldCB.Value = True Then
        Range("B191") = "Welding"
    ElseIf WeldCB.Value = False Then
        Range("B191") = ""
End If

If GrindCB.Value = True Then
        Range("B192") = "Grinding"
    ElseIf GrindCB.Value = False Then
        Range("B192") = ""
End If

GrindCB.Value = False
DrillCB.Value = False
WeldCB.Value = False

HotWorkTypeSelection.Hide
End Sub
```

```
Private Sub JSEACB_Click()
If JSEACB.Value = False Then
    Exit Sub
End If

If ValidJSEACB.Value = True Then
```

```
    ValidJSEACB.Value = False
End If

MsgBox "1 Number of JSEA is valid for 7 days in the same work. Do you really want to regist a new number?"
End Sub
```

```
Private Sub EFormCreatorCB_Click()
If EFormCreatorCB.Value = True Then
    Exit Sub
End If

MsgBox "The E-Form Creator function is enabled."
End Sub
```

```
Private Sub ContacttheAdminbutton_Click()
Dim OutApp As Object
Dim OutMail As Object

With Application
    .EnableEvents = False
    .ScreenUpdating = False
End With

Set OutApp = CreateObject("Outlook.Application")
Set OutMail = OutApp.CreateItem(0)
On Error Resume Next
    With OutMail
        .To = "dewipuspabuana24@gmail.com"
        .CC = ""
        .BCC = ""
        .Subject = "PTW Register mail problem"
        .HTMLBody = "Thank you for contacting us. Please describe the problems here:"
        .Display
    End With
On Error GoTo 0

 With Application
        .EnableEvents = True
        .ScreenUpdating = True
    End With

    Set OutMail = Nothing
    Set OutApp = Nothing

End Sub
```

```
Private Sub ValidJSEACB_Click()
If ValidJSEACB.Value = False Then
    Exit Sub
End If
```

```
If JSEACB.Value = True Then
   JSEACB.Value = False
End If

JSEAoke = InputBox("Please enter your valid JSEA Number here:")
If JSEAoke = "" Then GoTo Canceltheprocess
       Range("B201").Value = JSEAoke
       MsgBox "Your valid JSEA number is saved. Thank You"
   Exit Sub

Canceltheprocess:     MsgBox "The process is aborted"
   ValidJSEACB.Value = False
   Exit Sub
End Sub
```

```
Private Sub Continuebutton_Click()
Range("C27") = "Next"
NextProcessSelectionForm.Hide
End Sub
```

```
Private Sub Cancelbutton_Click()
Range("C27") = "Stop"
NextProcessSelectionForm.Hide
End Sub
```

```
Private Sub Submissionbutton_Click()

'start constraints
'Stop if any of the constraint is met
Range("B173") = Format(Now(), "MM/DD/YY")
WorkDay = Range("C6").Text
   If Range("C6") - Range("B173") < 0 Then
      MsgBox "Please recheck your work date, the date that you given is " & WorkDay
      Exit Sub
   End If

   'stop if more than 7 days
   If Range("C8") - Range("C6") > 6 Then
      MsgBox "Your work duration is more than 7 days, please register them in separate
duration (max 7 days for each) and register a new JSEA. Thank You."
      Exit Sub
   End If

   'stop if less than 1 day
   If Range("C8") - Range("C6") < 0 Then
      MsgBox "Your work duration is less than 1 day, please recheck your date."
      Exit Sub
   End If

   'Stop if there is a blank entry
   If Range("C16") = "" Or Range("C18") = "" Or Range("C20") = "" Or Range("C22")
= "" Or Range("C24") = "" Or Range("C26") = "" Then
```

```
        MsgBox "Please fill the required data (blue and red column)"
        Exit Sub
    End If

NextProcessSelectionForm.Show

    If Range("C27") = "Stop" Then
        Exit Sub
    End If

Dim wdapp As Object, PTWdoc As Object, HotWorkdoc As Object, JSEAdoc As
Object, WorkingAtHeightdoc As Object
Dim Submissiondate As String
Dim WorkDate As String
Dim StartTime As String
Dim FinishTime As String
Dim MachineNumber As String
Dim VendorName As String
Dim WorkLocation As String
Dim Plant As String
Dim WorkDescription As String
Dim WorkTools As String
Dim user As String


Range("C27") = "Stop"
Do
    Worksheets("perijinan").Select
    Submissiondate = Range("C4")
    StartWorkDate = Range("C6")
    WorkDate = Range("C6")
    FinishWorkDate = Range("C8")
    StartTime = Range("C10")
    FinishTime = Range("C12")
    MachineNumber = Range("C14")
    VendorName = Range("C16")
    WorkLocation = Range("C18")
    Plant = Range("C20")
    WorkDescription = Range("C22")
    WorkTools = Range("C24")
    user = Range("C26")
    ValidJSEA = Range("B201")
    YearFormat = Format(Now(), "YYYY")

    'open numbering database
    Application.EnableEvents = False
    Application.ScreenUpdating = False

    Set SerialNumberDatabase = Workbooks.Open("D:\PTW
REGISTER\Database\SERIAL NUMBER DATABASE.xlsx")
        SerialNumberDatabase.Activate
        Sheets("Num").Select
        PTWSN = Worksheets("Num").Cells(2, 1)
```

```
    HotWorkSN = Worksheets("Num").Cells(2, 2)
    WorkingAtHeightSN = Worksheets("Num").Cells(2, 3)
    JSEASN = Worksheets("Num").Cells(2, 4)

  Worksheets("Num").Cells(2, 1) = PTWSN + 1
  If HotWorkCB.Value = True Then
    Worksheets("Num").Cells(2, 2) = HotWorkSN + 1
  End If

  If WorkingAtHeightCB.Value = True Then
    Worksheets("Num").Cells(2, 3) = WorkingAtHeightSN + 1
  End If

  If JSEACB.Value = True Then
    Worksheets("Num").Cells(2, 4) = JSEASN + 1
  End If

  PTWNextNum = Worksheets("Num").Range("A2")
  HotWorkNextNum = Worksheets("Num").Range("B2")
  WorkingAtHeightNextNum = Worksheets("Num").Range("C2")
  JSEANextNum = Worksheets("Num").Range("D2")

  'penambahan 0 setiap angka dibawah 1000
  If Worksheets("Num").Range("A2") > 99 And Worksheets("Num").Range("A2") <
1000 Then
      Worksheets("Num").Cells(2, 1) = "'0" & PTWNextNum + 0
    ElseIf Worksheets("Num").Range("A2") > 9 And
Worksheets("Num").Range("A2") < 100 Then
      Worksheets("Num").Cells(2, 1) = "'00" & PTWNextNum + 0
    ElseIf Worksheets("Num").Range("A2") > 0 And
Worksheets("Num").Range("A2") < 10 Then
      Worksheets("Num").Cells(2, 1) = "'000" & PTWNextNum + 0
  End If


  If Worksheets("Num").Range("B2") > 99 And Worksheets("Num").Range("B2") <
1000 Then
    Worksheets("Num").Cells(2, 2) = "'0" & HotWorkNextNum + 0
  ElseIf Worksheets("Num").Range("B2") > 9 And Worksheets("Num").Range("B2")
< 100 Then
    Worksheets("Num").Cells(2, 2) = "'00" & HotWorkNextNum + 0
  ElseIf Worksheets("Num").Range("B2") > 0 And Worksheets("Num").Range("B2")
< 10 Then
    Worksheets("Num").Cells(2, 2) = "'000" & HotWorkNextNum + 0
  End If

  If Worksheets("Num").Range("C2") > 99 And Worksheets("Num").Range("C2") <
1000 Then
    Worksheets("Num").Cells(2, 3) = "'0" & WorkingAtHeightNextNum + 0
  ElseIf Worksheets("Num").Range("C2") > 9 And Worksheets("Num").Range("C2")
< 100 Then
    Worksheets("Num").Cells(2, 3) = "'00" & WorkingAtHeightNextNum + 0
```

```
   ElseIf Worksheets("Num").Range("C2") > 0 And Worksheets("Num").Range("C2") < 10 Then
      Worksheets("Num").Cells(2, 3) = "'000" & WorkingAtHeightNextNum + 0
   End If

   If Worksheets("Num").Range("D2") > 99 And Worksheets("Num").Range("D2") < 1000 Then
         Worksheets("Num").Cells(2, 4) = "'0" & JSEANextNum + 0
      ElseIf Worksheets("Num").Range("D2") > 9 And Worksheets("Num").Range("D2") < 100 Then
         Worksheets("Num").Cells(2, 4) = "'00" & JSEANextNum + 0
      ElseIf Worksheets("Num").Range("D2") > 0 And Worksheets("Num").Range("D2") < 10 Then
         Worksheets("Num").Cells(2, 4) = "'000" & JSEANextNum + 0
   End If

   SerialNumberDatabase.Save
   SerialNumberDatabase.Close

   'open PTW DOC
   If EFormCreatorCB.Value = True Then
      On Error Resume Next
      Set wdapp = GetObject(, "Word.Application")

      If Err.Number = 429 Then
         Err.Clear
         Set wdapp = CreateObject("Word.Application")
      End If

      wdapp.Visible = True
      PTWEForm = "D:\PTW REGISTER\Form\Nomor seri-PERMIT TO WORK-[NAMA VENDOR]-[TANGGAL PEKERJAAN]-[NAMA PEKERJAAN]-[USER].docx"

      If Dir(PTWEForm) = "" Then
         MsgBox "The file was not found"
         Exit Sub
      End If

      wdapp.Activate
      Set PTWdoc = wdapp.documents(PTWEForm)

      If PTWdoc Is Nothing Then Set PTWdoc = wdapp.documents.Open(PTWEForm)
      PTWdoc.Activate
      PTWdoc.contentcontrols(1).Range.Text = YearFormat & "-D-" & PTWSN
      PTWdoc.contentcontrols(2).Range.Text = WorkDate
      PTWdoc.contentcontrols(3).Range.Text = StartTime
      PTWdoc.contentcontrols(4).Range.Text = FinishTime
      PTWdoc.contentcontrols(7).Range.Text = VendorName
      PTWdoc.contentcontrols(8).Range.Text = WorkLocation
      PTWdoc.contentcontrols(9).Range.Text = Plant
      PTWdoc.contentcontrols(10).Range.Text = MachineNumber
      PTWdoc.contentcontrols(11).Range.Text = WorkTools
```

```
        PTWdoc.contentcontrols(12).Range.Text = WorkDescription
        PTWdoc.contentcontrols(51).Range.Text = user

        'open doc khusus
        If HotWorkCB.Value = True Then
            On Error Resume Next
            Set wdapp = GetObject(, "Word.Application")

            If Err.Number = 429 Then
                Err.Clear
                Set wdapp = CreateObject("Word.Application")
            End If

            wdapp.Visible = True
            HotWorkEForm = "D:\PTW REGISTER\Form\Nomor Seri - IJIN KHUSUS-
[NAMA VENDOR]-[TGL PEKERJAAN]-[NAMA PEKERJAAN]-[USER].docx"

            If Dir(HotWorkEForm) = "" Then
                MsgBox "The file was not found"
                Exit Sub
            End If

            Drillcrit = Range("B190").Value
            Weldingcrit = Range("B191").Value
            Grindcrit = Range("B192").Value

            wdapp.Activate
            Set HotWorkdoc = wdapp.documents(HotWorkEForm)

            If HotWorkdoc Is Nothing Then Set HotWorkdoc =
wdapp.documents.Open(HotWorkEForm)
            HotWorkdoc.Activate
            HotWorkdoc.contentcontrols(1).Range.Text = YearFormat & "-D-" & PTWSN
            HotWorkdoc.contentcontrols(2).Range.Text = YearFormat & "-B-" &
HotWorkSN
            HotWorkdoc.contentcontrols(3).Range.Text = Submissiondate
            HotWorkdoc.contentcontrols(4).Range.Text = WorkDate
            HotWorkdoc.contentcontrols(5).Range.Text = VendorName
            HotWorkdoc.contentcontrols(6).Range.Text = WorkDescription
            HotWorkdoc.contentcontrols(7).Range.Text = WorkLocation
            HotWorkdoc.contentcontrols(8).Range.Text = "," & Plant
            HotWorkdoc.contentcontrols(10).Range.Text = user

            If Drillcrit > 0 Then
                HotWorkdoc.DrillCB.Value = True
            End If
                If Weldingcrit > 0 Then
                HotWorkdoc.WeldCB.Value = True
            End If
                If Grindcrit > 0 Then
                HotWorkdoc.GrindCB.Value = True
            End If
        End If
```

```
    'open doc JSEA
    If JSEACB.Value = True Then
       On Error Resume Next
       Set wdapp = GetObject(, "Word.Application")

       If Err.Number = 429 Then
          Err.Clear
          Set wdapp = CreateObject("Word.Application")
       End If

       wdapp.Visible = True
       JSEAEForm = "D:\PTW REGISTER\Form\Nomor Seri-[USER].docx"

       If Dir(JSEAEForm) = "" Then
          MsgBox "The file was not found"
          Exit Sub
       End If

       wdapp.Activate
       Set JSEAdoc = wdapp.documents(JSEAEForm)

       If JSEAdoc Is Nothing Then Set JSEAdoc =
wdapp.documents.Open(JSEAEForm)
       JSEAdoc.Activate
       JSEAdoc.contentcontrols(1).Range.Text = YearFormat & "-JSEA-" & JSEASN
       JSEAdoc.contentcontrols(2).Range.Text = WorkDescription
       JSEAdoc.contentcontrols(3).Range.Text = WorkLocation
       JSEAdoc.contentcontrols(4).Range.Text = Plant
       JSEAdoc.contentcontrols(5).Range.Text = YearFormat & "-D-" & PTWSN
       JSEAdoc.contentcontrols(6).Range.Text = StartWorkDate
       JSEAdoc.contentcontrols(7).Range.Text = WorkDate
       JSEAdoc.contentcontrols(8).Range.Text = FinishWorkDate
       JSEAdoc.contentcontrols(9).Range.Text = user
    End If

    'open doc ketinggian
    If WorkingAtHeightCB.Value = True Then
       On Error Resume Next
       Set wdapp = GetObject(, "Word.Application")

       If Err.Number = 429 Then
          Err.Clear
          Set wdapp = CreateObject("Word.Application")
       End If

       wdapp.Visible = True
       WorkingAtHeightEForm = "D:\PTW REGISTER\Form\Nomor Seri- IJIN
KETINGGIAN-[NAMA VENDOR]-[TGL PEKERJAAN]-[NAMA PEKERJAAN]-
[USER].docx"

       If Dir(WorkingAtHeightEForm) = "" Then
          MsgBox "The file was not found"
```

```
            Exit Sub
        End If

        wdapp.Activate
        Set WorkingAtHeightdoc = wdapp.documents(WorkingAtHeightEForm)

        If WorkingAtHeightdoc Is Nothing Then Set WorkingAtHeightdoc =
wdapp.documents.Open(WorkingAtHeightEForm)
        WorkingAtHeightdoc.Activate
        WorkingAtHeightdoc.contentcontrols(1).Range.Text = YearFormat & "-D-" &
PTWSN
        WorkingAtHeightdoc.contentcontrols(2).Range.Text = YearFormat & "-C-" &
WorkingAtHeightSN
        WorkingAtHeightdoc.contentcontrols(3).Range.Text = WorkDate
        WorkingAtHeightdoc.contentcontrols(4).Range.Text = Plant
        WorkingAtHeightdoc.contentcontrols(5).Range.Text = WorkLocation
        WorkingAtHeightdoc.contentcontrols(6).Range.Text = WorkDescription
        WorkingAtHeightdoc.contentcontrols(7).Range.Text = WorkTools
        WorkingAtHeightdoc.contentcontrols(8).Range.Text = user
      End If
   End If

   'open database
   Set PTWDatabase = Workbooks.Open("D:\PTW REGISTER\Database\PTW
DATABASE.xlsx")
   PTWDatabase.Activate
   Worksheets("LOG").Select
   Worksheets("LOG").Range("A4").Select
   RowCount = Worksheets("LOG").Range("A4").CurrentRegion.Rows.Count
   With Worksheets("LOG").Range("A4")
      .Offset(RowCount, 0) = Submissiondate
      .Offset(RowCount, 1) = YearFormat & "-D-" & PTWSN
      .Offset(RowCount, 2) = WorkDate
      .Offset(RowCount, 3) = StartTime
      .Offset(RowCount, 4) = FinishTime


   If HotWorkCB.Value = True Then
   'give new code for critical work
      .Offset(RowCount, 5) = YearFormat & "-B-" & HotWorkSN
      .Offset(RowCount, 6) = WorkDate
   End If



   If WorkingAtHeightCB.Value = True Then
   'give new code for work on height
      .Offset(RowCount, 7) = YearFormat & "-C-" & WorkingAtHeightSN
      .Offset(RowCount, 8) = WorkDate
   End If

      .Offset(RowCount, 9) = VendorName
      .Offset(RowCount, 10) = WorkDescription
```

```
        .Offset(RowCount, 11) = WorkLocation
        .Offset(RowCount, 12) = Plant
        .Offset(RowCount, 13) = user

    If JSEACB.Value = True Then
        'give new code for JSEA
        .Offset(RowCount, 14) = YearFormat & "-JSEA-" & JSEASN
    End If

    If ValidJSEACB.Value = True Then
        'Use available JSEA code
        .Offset(RowCount, 14) = ValidJSEA
    End If
    End With

    PTWDatabase.Save
    PTWDatabase.Close

    Application.EnableEvents = True
    Application.ScreenUpdating = True

    'dummy activity nyahaha...jangan dicontoh
    Worksheets("perijinan").Select
    Range("B97") = WorkDate
    Range("B98") = VendorName
    Range("B99") = WorkDescription
    Range("B100") = PTWSN
    If HotWorkCB.Value = True Then
        Range("B101") = HotWorkSN
    End If

    If WorkingAtHeightCB.Value = True Then
        Range("B102") = WorkingAtHeightSN
    End If

    If JSEACB.Value = True Then
        Range("B103") = JSEASN
    End If

    MsgBox "Thank you for using PTW Register." & "Please save this registration
number on your note: "
    ResultInformationForm.Show

    If EFormCreatorCB.Value = True Then
        MsgBox "Save as the documents as PDF before start the next registration process."
    End If

    JSEACB.Value = False
    Range("B97:B103").ClearContents

    If ValidJSEACB.Value = True Then
        ValidJSEACB.Value = False
    End If
```

```
    Range("B175").Select
    Selection.Formula = "=C8-C6"
    Range("C10").Select

    NextWorkDate = Range("C6")

    If Range("B175") = 0 Then
       MsgBox "THE REGISTRATION PROCESS IS DONE"
       Exit Sub
    End If

    Range("C6") = NextWorkDate + 1
    Range("B201").ClearContents

    If Range("B175") >= 0 Then
       NextDayWorkRegistration.Show
    End If

    If Range("B200") = "STOP" Then
       Exit Sub
    End If

    If Range("B200") = "NEXT" Then
       Range("B200") = "STOP"
    End If
Loop
End Sub
```

```
Private Sub UserForm_Activate()
NextWorkDate = Range("C6")
Me.DateDisplay.Value = "Continue to the registration for date " & NextWorkDate & "
?"
End Sub
```

```
Private Sub Continuebutton_Click()
Range("B200") = "NEXT"
NextDayWorkRegistration.Hide
End Sub
```

```
Private Sub StopButton_Click()
Range("B200") = "STOP"
NextDayWorkRegistration.Hide
End Sub
```

```
Private Sub SkipButton_Click()
NextDayWorkRegistration.Hide
ActiveSheet.Select
NextWorkDate = Range("C6")
Range("C6") = NextWorkDate + 1

Range("B175").Select
```

```
Selection.Formula = "=C8-C6"
Range("C10").Select

If Range("B175") < 0 Then
   MsgBox "THE REGISTRATION PROCESS IS DONE"
   Range("C6") = NextWorkDate
   Exit Sub
End If

NextDayWorkRegistration.Show
End Sub
```

```
Private Sub UserForm_Activate()

   YearFormat = Format(Now(), "YYYY")

   Me.WorkDateIB.Value = Worksheets("perijinan").Range("B97")
   Me.WorkDescriptionIB.Value = Worksheets("perijinan").Range("B99")
   Me.VendorIB.Value = Worksheets("perijinan").Range("B98")
   Me.PTWIB.Value = YearFormat & "-D-" & Worksheets("perijinan").Range("B100")

If Worksheets("perijinan").HotWorkCB.Value = True Then
   Me.HotWorkIB.Value = YearFormat & "-B-" & Worksheets("perijinan")
.Range("B101")
End If

If Worksheets("perijinan").WorkingAtHeightCB.Value = True Then
   Me.WorkingatHeightIB.Value = YearFormat & "-C-" & Worksheets("perijinan")
.Range("B102")
End If

If Worksheets("perijinan").JSEACB.Value = True Then
   Me.JSEAIB.Value = YearFormat & "-JSEA-" & Worksheets("perijinan")
.Range("B103")
End If

End Sub
```

Appendix 2: PTW Access Coding

```
Private Sub PasswordSubmissionButton_Click()
If Me.Pass.Value <> "14001ehs" Then GoTo Denied
   MsgBox "Welcome team! Safety First, Last and Always!"
   Range("A18:V5000").ClearContents

   Sheets("Regist").Select
   Range("C16") = "RightPassword"
   Passwordinputbox.Hide
Exit Sub

Denied: MsgBox "Your access denied, this program will be automatically closed."
   ActiveWorkbook.Close
End Sub
```

```
Private Sub Workbook_Open()
Passwordinputbox.Show

Sheets("Regist").Select
If Range("C16") = "RightPassword" Then
   Range("C16").ClearContents
   Exit Sub
End If

MsgBox "Your access denied, this program will be automatically closed."
ActiveWorkbook.Close
End Sub
```

```
Private Sub DateSearchButton_Click()
Range("A18:V5000").ClearContents
   Call DateBasedSearch
End Sub
```

```
Sub DateBasedSearch()

SearchDate = Range("F15").Value
Datecode = Range("F13").Value

Application.EnableEvents = False
Application.ScreenUpdating = False
Set PTWDatabase = Workbooks.Open("D:\PTW REGISTER\Database\PTW
DATABASE.xlsx")
   Sheets("LOG").Select
LastRow = Worksheets("LOG").Range("A" & Rows.Count).End(xlUp).Row

If Datecode = 1 Then
   For i = 5 To LastRow
      If Workbooks("PTW DATABASE.xlsx").Sheets("LOG").Cells(i, 1) = SearchDate
Then
         Workbooks("PTW DATABASE.xlsx").Activate
         Sheets("LOG").Select
         Range(Cells(i, 1), Cells(i, 21)).Copy
```

```
            Windows("PTW Access.xlsm").Activate
            Sheets("Regist").Select
            erow = ActiveSheet.Cells(Rows.Count, 1).End(xlUp).Offset(1, 0).Row
            ActiveSheet.Cells(erow, 1).Select
            ActiveSheet.Paste
            Application.CutCopyMode = False
        End If
    Next i
End If

If Datecode = 3 Then
    For i = 5 To LastRow
        If Workbooks("PTW DATABASE.xlsx").Sheets("LOG").Cells(i, 3) = SearchDate
Then
            Workbooks("PTW DATABASE.xlsx").Activate
            Sheets("LOG").Select
            Range(Cells(i, 1), Cells(i, 21)).Copy

            Windows("PTW Access.xlsm").Activate
            Sheets("Regist").Select
            erow = ActiveSheet.Cells(Rows.Count, 1).End(xlUp).Offset(1, 0).Row
            ActiveSheet.Cells(erow, 1).Select
            ActiveSheet.Paste
            Application.CutCopyMode = False
        End If
    Next i
End If

Workbooks("PTW DATABASE.xlsx").Close
    Application.EnableEvents = True
    Application.ScreenUpdating = True

If Range("A18") = "" Then
    MsgBox "There is no entry for that date."
End If

End Sub
```

```
Private Sub NewRegButton_Click()
NewRegNum.Show
End Sub
```

```
Private Sub UserForm_Activate()
YearFormat = Format(Now(), "YYYY")
    Me.PTWInputBox.Value = YearFormat & "-D-"
End Sub
```

```
Private Sub ReRegisterButton_Click()
PTWRN = Me.PTWInputBox.Value
    YearFormat = Format(Now(), "YYYY")

Application.EnableEvents = False
```

```
Application.ScreenUpdating = False
Set SerialNumberDatabase = Workbooks.Open("D:\PTW
REGISTER\Database\SERIAL NUMBER DATABASE.xlsx")
   SerialNumberDatabase.Activate
   Sheets("Num").Select
      HotWorkSN = Sheets("Num").Range("B2")
      WorkingAtHeightSN = Sheets("Num").Range("C2")
      JSEASN = Sheets("Num").Range("D2")

      'Prepare the next registration number
      WorkingAtHeightNum = Range("C2") + 1
      HotWorkNum = Range("B2") + 1
      JSEANum = Range("D2") + 1

If WorkingAtHeightCB.Value = True Then
   If WorkingAtHeightNum > 99 And WorkingAtHeightNum < 1000 Then
      Range("C2") = "'0" & WorkingAtHeightNum
   ElseIf WorkingAtHeightNum > 9 And WorkingAtHeightNum < 100 Then
      Range("C2") = "'00" & WorkingAtHeightNum
   ElseIf WorkingAtHeightNum > 0 And WorkingAtHeightNum < 10 Then
      Range("C2") = "'000" & WorkingAtHeightNum
   ElseIf WorkingAtHeightNum > 1000 Then
      Range("C2") = WorkingAtHeightNum
   End If
End If

If HotWorkCB.Value = True Then
   If HotWorkNum > 99 And HotWorkNum < 1000 Then
      Range("B2") = "'0" & HotWorkNum
   ElseIf HotWorkNum > 9 And HotWorkNum < 100 Then
      Range("B2") = "'00" & HotWorkNum
   ElseIf HotWorkNum > 0 And HotWorkNum < 10 Then
      Range("B2") = "'000" & HotWorkNum
   ElseIf HotWorkNum > 1000 Then
      Range("B2") = HotWorkNum
   End If
End If

If JSEACB.Value = True Then
   If JSEANum > 99 And JSEANum < 1000 Then
      Range("D2") = "'0" & JSEANum
   ElseIf JSEANum > 9 And JSEANum < 100 Then
      Range("D2") = "'00" & JSEANum
   ElseIf JSEANum > 0 And JSEANum < 10 Then
      Range("D2") = "'000" & JSEANum
   ElseIf JSEANum > 1000 Then
      Range("D2") = JSEANum
   End If
End If

SerialNumberDatabase.Save
SerialNumberDatabase.Close
```

```
Set PTWDatabase = Workbooks.Open("D:\PTW REGISTER\Database\PTW
DATABASE.xlsx")
PTWDatabase.Activate
   Sheets("LOG").Select

With Worksheets("LOG").Range("B:B")
Set Look = .Find(PTWRN, LookIn:=xlValues)
If Not Look Is Nothing Then
       Nextdata = Look.Row
       workdate = Worksheets("LOG").Cells(Nextdata, 3)

       If WorkingAtHeightCB Then
          Worksheets("LOG").Cells(Nextdata, 8).Value = YearFormat & "-C-" &
WorkingAtHeightSN
          Worksheets("LOG").Cells(Nextdata, 9).Value = workdate
       End If

      If HotWorkCB Then
         Worksheets("LOG").Cells(Nextdata, 6).Value = YearFormat & "-B-" &
HotWorkSN
         Worksheets("LOG").Cells(Nextdata, 7).Value = workdate
      End If

       If JSEACB Then
          Worksheets("LOG").Cells(Nextdata, 15).Value = YearFormat & "-JSEA-" &
JSEASN
       End If

       'start looking for userform data
      Sheets("LOG").Select

       If WorkingAtHeightCB Then
          Me.Workingatheightinputbox.Value = Worksheets("LOG").Cells(Nextdata,
8).Value
          Else
          Me.Workingatheightinputbox.Value = ""
       End If

       If HotWorkCB Then
          Me.Hotworkinputbox.Value = Worksheets("LOG").Cells(Nextdata, 6).Value
          Else
          Me.Hotworkinputbox.Value = ""
       End If

       If JSEACB Then
          Me.JSEAinputbox.Value = Worksheets("LOG").Cells(Nextdata, 15).Value
          Else
          Me.JSEAinputbox.Value = ""
       End If

   Else
   MsgBox "The registration number cannot be found, please re-check your number"
```

```
End If

PTWDatabase.Save
PTWDatabase.Close
   Application.EnableEvents = True
   Application.ScreenUpdating = True

End With
End Sub
```

```
Private Sub NumberSearch_Click()
   NumberBasedSearch.Show
End Sub
```

```
Private Sub UserForm_Activate()
YearFormat = Format(Now(), "YYYY")
Me.PTWInputBox.Value = YearFormat & "-D-"
End Sub
```

```
Private Sub SearchButton_Click()
Me.projectname.Value = ""
Me.vendor.Value = ""
Me.workdate.Value = ""
Me.Workingatheightinputbox.Value = ""
Me.Hotworkinputbox.Value = ""
Me.JSEAinputbox.Value = ""
Me.submissiondate.Value = ""
Me.user.Value = ""

PTWRN = Me.PTWInputBox.Value

Application.EnableEvents = False
Application.ScreenUpdating = False

Set DATABASE = Workbooks.Open("D:\PTW REGISTER\Database\PTW
DATABASE.xlsx")
   Worksheets("LOG").Select
With Worksheets("LOG").Range("B:B")
Set Look = .Find(PTWRN, LookIn:=xlValues)

If Not Look Is Nothing Then
      Nextdata = Look.Row
      Me.projectname.Value = DATABASE.Worksheets("LOG").Cells(Nextdata,
11).Value
      Me.vendor.Value = DATABASE.Worksheets("LOG").Cells(Nextdata, 10).Value
      Me.workdate.Value = DATABASE.Worksheets("LOG").Cells(Nextdata, 3).Value
      Me.Workingatheightinputbox.Value =
DATABASE.Worksheets("LOG").Cells(Nextdata, 8).Value
      Me.Hotworkinputbox.Value = DATABASE.Worksheets("LOG").Cells(Nextdata,
6).Value
      Me.JSEAinputbox.Value = DATABASE.Worksheets("LOG").Cells(Nextdata,
15).Value
```

```
        Me.submissiondate.Value = DATABASE.Worksheets("LOG").Cells(Nextdata,
1).Value
        Me.user.Value = DATABASE.Worksheets("LOG").Cells(Nextdata, 14).Value
    Else
        MsgBox "The registration number cannot be found, please re-check your number"
End If

DATABASE.Close
    Application.EnableEvents = True
    Application.ScreenUpdating = True

End With
End Sub
```

```
Private Sub ResetButton_Click()
Passwordentry = Application.InputBox("Please enter the password:")
If Passwordentry <> "newyear" Then GoTo Deny
    Call Resetalldatabase
    MsgBox "All the data has been reset, happy new year team!"
Exit Sub

Deny: MsgBox "Wrong password."
    Sheets("Regist").Select

End Sub
```

```
Sub Resetalldatabase()
YearFormat = Format(Now(), "YYYY")

Set PTWDatabase = Workbooks.Open("D:\PTW REGISTER\Database\PTW
DATABASE.xlsx")
    PTWDatabase.Sheets("LOG").Select
    Range("B2") = "PERMIT TRACKING - " & YearFormat
    Range("A5:V12000").ClearContents
PTWDatabase.Save
PTWDatabase.Close

Set SerialNumberDatabase = Workbooks.Open("D:\PTW REGISTER\Database
\SERIAL NUMBER DATABASE.xlsx")
    SerialNumberDatabase.Sheets("Num").Select
    Range("A2") = "'0001"
    Range("B2") = "'0001"
    Range("C2") = "'0001"
    Range("D2") = "'0001"
SerialNumberDatabase.Save
SerialNumberDatabase.Close
End Sub
```

```
Private Sub SNCheckButton_Click()
Application.EnableEvents = False
Application.ScreenUpdating = False
```

```
Set SerialNumberDatabase = Workbooks.Open("D:\PTW REGISTER\Database
\SERIAL NUMBER DATABASE.xlsx")
   SerialNumberDatabase.Activate
   Sheets("Num").Select
        PTWSN = Sheets("Num").Range("A2").Text
        HotWorkSN = Sheets("Num").Range("B2").Text
        WorkingAtHeightSN = Sheets("Num").Range("C2").Text
        JSEASN = Sheets("Num").Range("D2").Text
   SerialNumberDatabase.Close

Sheets("newyear").Select
   Range("F1") = PTWSN
   Range("G1") = HotWorkSN
   Range("H1") = WorkingAtHeightSN
   Range("I1") = JSEASN
NPTWMform.Show

Range("F1:I1").ClearContents
End Sub
```

```
Private Sub UserForm_Activate()
   Me.PTWInputBox.Value = Range("F1").Text
   Me.Hotworkinputbox.Value = Range("G1").Text
   Me.Workingatheightinputbox.Value = Range("H1").Text
   Me.JSEAinputbox.Value = Range("I1").Text
End Sub
```

Appendix 3: PTW E-Form Output

IJIN KERJA

No. Seri : 2017-D-3687

PTW YANG SUDAH DISAHKAN & LAMPIRAN TERKAIT HARUS DIPASANG SELAMA PEKERJAAN BERLANGSUNG

Bagian A – Informasi Umum

Tanggal Pekerjaan: 01/25/17	Waktu Pelaksanaan: 05:00	Waktu penyelesaian: 18:00
Pekerjaan dilakukan oleh: ☐ Karyawan ☐ Contractor *(Tuliskan nama perusahaan)* "Vendor Name Entry"_____	Lokasi pekerjaan: "Work Location Entry" , East Plant. "Machine Number Entry"	Perlengkapan pekerjaan: "Work Tools Entry"
	Deskripsi Pekerjaan: "Work Description Entry"	

Bagian B – Evaluasi Pekerjaan & Tindakan Pencegahan

☐ **JSEA** untuk pekerjaan ini sudah dilengkapi (terlampir), direview dan dikomunikasikan kepada pekerja yang terlibat
☐ Pemisah area (barricade) di bawah ini digunakan untuk mengidentifikasi area kerja dan mencegah aksesdari pihak yang tidak berkepentingan:
☐ Red & white danger tape ☐ Yellow & black caution tape ☐ Cones ☐ Temporary fence ☐ Welding shield
☐ Other _____

Tambahan Ijin Kerja

☐ Confined Space Entry Permit	☐ Energized Electrical Work Permit	☐ Crane or Rigging	☐ Others *(Please specify)*
☐ Work at Height Permit	☐ Excavation/ Demolition Permit	☐ Line Break	_____
☐ Hot Work Permit	☐ Fire System Impairment Notification		_____

Alat Pelindung Diri yang Dibutuhkan

☐ Arc Flash Protection	☐ Cut Resistant Gloves	☐ Hearing Protection	☐ Safety Glasses
☐ Body Harness	☐ Dust Mask	☐ Leather Gloves	☐ Safety Shoes
☐ Breathing Apparatus	☐ Face Shield	☐ Reflective Vest	☐ Others *(Please specify)*
☐ Chemical Suit	☐ Goggles	☐ Respirator	_____
☐ Chemical Gloves	☐ Hard Hat	☐ Rubber Boots	_____

Informasi Keadaan Darurat

➢ Pekerja yang melakukan pekerjaan telah ditunjukan lokasi ☐ Safety shower & eye wash ☐ Fire alarm pull box ☐ Telepon terdekat
➢ ERT Member ➔ Primary (Nama & Nomor Telepon) Secondary (Nama & Nomor Telepon)

Instruksi Khusus:

Bagian C - Review & Authorization

Permit Requester & Permit Authorizing Individual (PAI) – Dengan ini menyatakan bahwa saya telah melakukan hal-hal berikut:
➢ Mereview JSEA, area pekerjaan dan pekerjaan yang akan dilakukan.
➢ Memastikan bahwa syarat ijin kerja telah dikomunikasikan kepada individu yang melakukan pekerjaan.
➢ Memastikan bahwa proses/ area terkait telah mengetahui pekerjaan yang akan dilaksanakan.

Nama Permit Requester: "User Entry"_____ **Tanda Tangan Permit Requester:** _____

Nama Permit Authorizing Individual (PAI): _____ **Tanda Tangan PAI:** _____

Bagian D – Permit Receiver & Pernyataan Supervisor Area Kerja

Permit Receiver – Dengan ini menyatakan bahwa saya memahami ruang lingkup pekerjaan, bahaya terkait, dan syarat-syarat keselamatan dari pekerjaan tersebut. Saya akan memastikan pekerja yang ditugaskan dalam pekerjaan ini mematuhi syarat ijin kerja selama bekerja.

Nama Permit Receiver: _____ **Tanda Tangan Permit Receiver:** _____

Inisial Nama Pekerja: ___/___/___/___/___/___/___/___/___/___ **Jumlah Pekerja:** _____

Supervisor Area Kerja – Saya menyatakan bahwa saya telah diinformasikan tentang ruang lingkup kerja, bahaya terkait, dan tindakan pencegahannya. Saya akan menyampaikan tindakan pencegahan tersebut kepada pekerja yang berada dibawah pengawasan saya.

Nama Supervisor Area Kerja: _____ **Tanda Tangan Supervisor Area Kerja:** _____

Bagian E – Penutupan Permit / Pembatalan

Pekerjaan Telah Berakhir?
☐ Ya ☐ Tidak ☐ Dibatalkan (sebab : _____)

Area Kerja Sudah Kembali Normal?
☐ Ya ☐ Tidak

Tanda Tangan Permit Requester: _____ **Tanggal:** _____ **Waktu:** _____

Bagian F - Permit Audit *(Akan dilengkapi jika Permit ini diaudit)*

Nama Auditor: _____ **Tanggal:** _____ **Waktu:** _____

Catatan:

Appendix 4: Hot Work E-Form Output

IJIN KERJA KHUSUS

(PEKERJAAN BERPOTENSI BAHAYA KEBAKARAN)

Referensi No. Seri Ijin Kerja Umum : 2017-D-3687
2017-B-1503

PILIH SALAH SATU PEKERJAAN YANG AKAN DILAKUKAN

☐ PENGEBORAN ☑ PENGELASAN ☐ PENGGERINDAAN

Tanggal Pengajuan	01/14/17		
Tanggal Pekerjaan	01/25/17		
Pelaksana Pekerjaan	Kontraktor ☐	Internal PT X** ☐	
Nama Vendor / Departemen	"Vendor Name Entry"	No. Telp :	
Nama Project (Sesuai PO)	"Work Description Entry"		
Lokasi Pekerjaan	"Work Location Entry" ,East Plant		
Nama Pekerja		Sertifikasi	Ya
	- *Khusus untuk pekerjaan Pengelasan mohon cek pekerja ke **list of certified welder***		
	- *Lalu pilih apakah pekerja tersebut sertifikasi atau tidak*		

Persyaratan Pekerjaan Khusus yang harus DIPERHATIKAN dalam radius 11 meter :

(Diisi oleh user dan sudah dipastikan terpenuhi sebelum dan selama pekerjaan berlangsung)

1. Area kerja bebas dari bahan yang mudah terbakar / meledak.
2. Lantai yang mudah terbakar telah dibasahi / dilapisi pasir basah atau bahan tahan api.
3. Pengukuran gas telah dilakukan (bila pekerjaan dilakukan dalam confined space)
4. Area kerja selalu diperiksa terhadap kemungkinan timbulnya percikan api.
5. **ALAT PELINDUNG DIRI (APD)** digunakan pada saat melakukan pekerjaan.
   (Pengelasan : Hand Gloves, Safety Shoes, Welding Gloves, Welding Mask, Welding Apron)
   (Pengeboran & Penggerindaan : Hand Gloves, Safety Goggles, Safety Shoes)
6. Tabung Oxygen / Acetylene selalu dalam kondisi berdiri tegak dan dirantai kuat
7. Grounding mesin las sudah terpasang dengan benar (untuk proses las listrik)
8. Peralatan pemadam kebakaran telah tersedia (WAJIB dimiliki)

Alat pemadam yang dimiliki : TIPE : ☐ CO2 ☐ Powder | Ukuran : Kg

Diajukan Oleh, **Disetujui oleh,**

User	EHS	Facility	Security
"User Entry"			

Persetujuan penambahan waktu kerja

Click here to enter a date. Shift :

User	EHS	Facility	Security

KETERANGAN

- Surat ijin khusus hanya berlaku selama satu shift.
- User, EHS, Facility & Security akan melakukan pemantauan bahaya kebakaran (Fire Watch) selama dan setelah pekerjaan dilakukan.
- **User : Print sebanyak 2 lembar untuk vendor & security**Untuk pekerjaan yang dilakukan di luar area workshop*

Appendix 5: Work at Height E-Form Output

IJIN KERJA KETINGGIAN

Note: ***Ijin harus ditandatangani oleh seluruh pihak. Dalam situasi evakuasi semua ijin dibatalkan.***

			Referensi No. Seri Ijin Kerja : 2017-D-3687	SECTION A - CAKUPAN
			No. Seri : 2017-C-2083	
TANGGAL:	01/25/17	**PEMEGANG IJIN:**		
SITE: East Plant			**LOKASI PEKERJAAN:** "Work Location Entry"	
DESKRIPSI PEKERJAAN SPESIFIK: "Work Description Entry"				
APAKAH MELUMPUHKAN ATAU MENGHENTIKAN SISTEM KEAMANAN KRITIKAL DIBUTUHKAN? NO☐ YES☐ (Contingency Plan must be attached)				
PERALATAN YANG DIGUNAKAN: "Work Tools Entry"				

PENCEGAHAN KERJA	Diperlukan YES/NO/NA	Inisial Otoriter
PEKERJAAN KETINGGIAN – Umum		
Apakah pekerja telah membaca dan mengerti Working at Heights?		
Apakah JSEA telah disediakan kepada petugas yang telah terotorisasi?		
Apakah pekerja yang melaksanakan pekerjaan ketinggian telah disediakan dan dilatih dalam penggunaan peralatan fall protection dan alat pelindung diri?		
Apakah stabilitas permukaan yang bergerak atau bekerja telah dinilai? Apakah telah sesuai untuk mendukung pekerjaan ini?		
Dapatkah pekerjaan dilaksanakan dari permukaan tanah dengan cara menurukan pekerjaan ke permukaan tanah?		
ISOLATION, LOCK OUT AND TAG OUT		
Apakah fungsi yang tepat telah diberi tag dan diisolasi sebelum dimulainya pekerjaan di ketinggian?		
Apakah sumber energi telah terkontrol dengan baik?		
Jika isolasi dapat mempengaruhi produksi, apakah tim produksi telah diinformasikan mengenai rencana pekerjaan?		

PENCEGAHAN KERJA	Diperlukan YES/NO/NA	Inisial Otoriter
PEKERJAAN KETINGGIAN – Sampai 10 Meter		
Apakah drop zone telah dibangun dibawah dan sekitar ketinggian?		
Apakah anggota tim disekitar area kerja telah diinformasikan mengenai resiko terkait pekerjaan ketinggian?		
Apakah traffic management plan telah diterapkan untuk mengontrol lalu lintas dibawah pekerjaan ketinggian?		
EMERGENCY AWARENESS		
Apakah fall recovery plan telah disediakan kepada pekerja yang telah terotorisasi?		
Apakah semua prosedur Emegency telah diketahui oleh seluruh pihak yang terlibat dalam pekerjaan?		
Apakah semua area evakuasi telah diketahui oleh seluruh pihak yang terlibat dalam pekerjaan?		
Apakah lokasi pintu emergency telah diketahui oleh seluruh pihak yang terlibat dalam pekerjaan?		
Apakah lokasi Call Point Alarm telah diketahui oleh seluruh pihak yang terlibat dalam pekerjaan?		

SECTION B – PENCEGAHAN KERJA

Authorisation	Nama	Kompetensi Valid	Tanda Tangan	Tanggal
Pekerja Pekerjaan Ketinggian				
Supervisor	"User Entry"		**PAI**	

Appendix 6: JSEA E-Form Output

EHS/FR/003/00

Job Safety and Environmental Analysis (JSEA) JSEA No : 2017-JSEA-1256

Judul Pekerjaan :	"Work Description Entry"		**Lokasi :** "Work Location Entry"	East Plant
Kategori Ijin Kerja :	☐ Hot Work	☐ Working at Height	☐ Confined Space	☐ Lain-lain
No. Ijin Kerja Umum :	2017-D-3687	**Tanggal Pekerjaan :** 01/25/17	**Mulai :** 01/25/17	**Selesai :** 01/27/17
Penyusun JSEA :				
Diperiksa Oleh :	**Nama :**		**Tanda tangan :**	

Resiko Sisa Tertinggi :	☐ LOW	☐ MODERATE	☐ HIGH	☐ EXTREME
Disetujui Oleh :	**Nama User :** "User Entry" **Jabatan :**	**Tanggal & Tandatangan :**	**Nama EH S :** **Jabatan :**	**Tanggal & Tandatangan :**

Identifikasi Bahaya :

BAHAYA UMUM				PERBAIKAN/PERAWATAN				LINGKUNGAN			
Kurang Pencahayaan	☐	Bahan yang tajam	☐	Cairan Bertekanan	☐	Pneumatik	☐	Bekerja Sendiri	☐	Kontaminasi Air Limbah	☐
Permukaan Licin	☐	Bahan/Permukaan Panas	☐	Posisi Peralatan	☐	Bahaya Listrik	☐	Area Berbahaya	☐	Listrik	☐
Bahaya Terjepit	☐	Radiasi	☐	Tekanan Sisa	☐	Gas	☐	Emisi Udara	☐	Terhirup Debu	☐
Mesin Bergerak	☐	Manual handling	☐	Pengencangan Baut	☐	Zat Beracun	☐	Pembuangan Limbah	☐	Debu dari suatu proses	☐
Peralatan Bergerak	☐	Bahaya Ruangan Motor	☐	Cairan Panas	☐	Pengelasan	☐	Penggunaan Air	☐	Bahaya Biologi	☐
Kendaraan masuk ke dalam bangunan	☐	Kesulitan berkomunikasi	☐	Udara Terperangkap	☐	Memotong dengan Acetylene/Oksigen	☐	Kebisingan	☐	Stress Akibat Panas	☐
Benda Terjatuh	☐	Kesulitan ntuk mengakses	☐	Peralatan tidak terkontrol	☐	Bahan Mudah Terbakar	☐	Aroma/Bau	☐	Ledakan Gas	☐
Uap	☐	Kesulitan untuk penyelamatan	☐	Kesalahan pada selang	☐	Asbestos	☐	Kontaminasi Air Tanah	☐	Cuaca	☐
Bahan Kimia	☐	Resiko Kejatuhan	☐	Mengatur Katup/valve	☐	Material Berbahaya	☐	Kontaminasi Tanah/Lahan	☐		☐
Sengatan Listrik	☐	Alat dan Peralatan	☐	Pelepasan Energi Tidak Terkontrol	☐	Tegangan Tinggi	☐	Kontaminasi Air Hujan	☐		☐

Appendix 7: Black Box Testing of PTW Register

Test ID	Description	Expected Result	Actual Result
01 User	Precondition: PTW Register is in the trial mode. The user accessed PTW Register	Message box - Please send a scanned AUTHORIZED PTW to EHS department. And ensure that CLOSED PTW is saved in PTW Tracking Board after the work is done. Thanks! Safety First, Last and Always... Message box - Please fill with CAPITAL letters and in ENGLISH Contents in cell C14:C26 cleared Submission date updated Hot work check box unchecked Working at height check box unchecked JSEA check box unchecked Dropdown list added in cell C20	Pass
02 User	Precondition: User select submission date	Message box - The change is restricted, the system filled this automatically	Pass
03 User	Precondition: User select start work date or finish work date	Date picker shown	Pass
04 User	Precondition: User checked the hot work check box	Hot work type selection user form shown	Pass
05 User	Precondition: Test 04 User has successfully completed All checkbox in hot work check box are unchecked OK button clicked	Hot work type check box unchecked Hot work type selection user form hide	Pass
06 User	Precondition: Test 04 User has successfully completed All checkbox in hot work check box are checked OK button clicked	Hot work type selection user form hide Cell B190 value is "Drilling" Cell 191 value is "Welding" Cell 192 value is "Grinding"	Pass
07 User	JSEA checkbox checked	Use valid JSEA check box unchecked Msg box - 1 Number of JSEA is valid for 7 days in the same work. Do you really want to regist a new number?	Pass
08 User	Precondition: Use valid JSEA check box checked OK button clicked	Valid JSEA input box shown Input box is hidden when OK clicked Message box - Your valid JSEA number is saved. Thank You JSEA check box unchecked	Pass

Test ID	Description	Expected Result	Actual Result
09 User	Precondition: Use valid JSEA check box checked The input box closed Or the entry input box is blank OK button clicked	valid JSEA input box shown Input box is hidden when close clicked Message box - The process is aborted Use valid JSEA check box unchecked	Pass
10 User	Precondition: E-form creator checkbox unchecked	Message box - The E-Form Creator function is enabled	Pass
11 User	Precondition: Test 01 User has successfully completed One of required entry (cell C16, C18, C20, C22, C24, C26) left blank Submit button clicked	Message box - Please fill the required data (blue and red column)	Pass
12 User	Precondition: Test 01 User has successfully completed Start work date is less than submission date Submit button clicked	Message box - Please recheck your work date, the date that you given is.. Registration process aborted	Pass
13 User	Precondition: Test 01 User has successfully completed duration between start work date dan finish work date is more than 7 days Submit button clicked	Message box - Your work duration is more than 7 days or less than 1 day, please recheck your work date. Thank you Registration process aborted	Pass
14 User	Precondition: Test 01 User has successfully completed duration between start work date dan finish work date is less than 0 days Submit button clicked	Message box - Your work duration is less than 1 day, please recheck your date Registration process aborted	Pass
15 User	Precondition: Test 01 User has successfully completed All required entry is filled Submit button clicked	User selection form (cancel/continue) shown	Pass
16 User	Precondition: Test 15 User has successfully completed All required entry is filled Submit button clicked Cancel button clicked	User selection form (cancel/continue) hidden Registration process aborted	Pass

Test ID	Description	Expected Result	Actual Result
17 User	Precondition: Test 15 User has successfully completed E-form creator checkbox unchecked Submit button clicked Continue button clicked	Obtained registration number userform shown The userform filled with the registration result In serial number database, PTW serial number is added by 1 There is no e-form appears	Pass
18 User	Precondition: Test 15 User has successfully completed All required entry is filled E-form creator checkbox checked Hot work check box unchecked Working at height check box unchecked JSEA check box unchecked Submit button clicked Continue button clicked	Obtained registration number userform shown The userform filled with the registration result PTW e-form shown and filled with entries in the application and obtained registration number PTW database updated with data from the entries and obtained PTW registration number from registration process. PTW database saved and closed. PTW serial number in serial number database added by 1. Serial number database saved and closed.	Pass
19 User	Precondition: Test 15 User has successfully completed All required entry is filled E-form creator checkbox checked Hot work check box checked Working at height check box checked JSEA check box checked Submit button clicked Continue button clicked	Obtained registration number userform shown The userform filled with the registration result PTW e-form shown and filled with entries in the application and obtained registration number PTW database updated with data from the entries and obtained PTW, hot work, working at height and JSEA registration number from registration process. PTW database saved and closed. PTW, hot work, working at height and JSEA serial number in serial number database added by 1. Serial number database saved and closed.	Pass
20 User	Precondition: Test 15 User has successfully completed All required entry is filled E-form creator checkbox checked Hot work check box unchecked Working at height check box unchecked JSEA check box unchecked Use valid JSEA check box checked Submit button clicked Continue button clicked	Obtained registration number userform shown The userform filled with the registration result PTW e-form shown and filled with entries in the application and obtained registration number PTW database updated with data from the entries, obtained PTW registration number from registration process and valid JSEA number entry. PTW database saved and closed. PTW serial number in serial number database added by 1. Serial number database saved and closed.	Pass

Test ID	Description	Expected Result	Actual Result
21 User	Precondition: Test 17 User, 18 User, 19 User, and 20 User has successfully completed Finish Work Date - (Work date + 1 day) ≥ 0	Next Day Work Registration Selection userform shown	Pass
22 User	Precondition: Test 21 User has successfully completed Continue button clicked	Next Day Work Registration Selection userform hide The registration process will be lopped	Pass
23 User	Precondition: Test 21 User has successfully completed Stop button clicked	Next Day Work Registration Selection userform hide The process stopped	Pass
24 User	Precondition: Test 21 User has successfully completed Skip button clicked	NextDayWorkRegistration userform hide Work date added by 1 day NextDayWorkRegistration userform re-shown	Pass
25 User	Precondition: Test 21 User has successfully completed Finish Work Date - (Work date + 1 day) < 0	Message box - The Registration Process is done	Pass
26 User	Precondition: Contact me button clicked	Outlook opened A new email created Email receiver filled with supervisor, administrator and creator/ developer email accounts Email subject filled with 'PTW Register Problem' Email body filled with 'Thank you for contacting us. Please describe the problems here:'	Pass

Appendix 8: Black Box Testing of PTW Access

Test ID	Description	Expected Result	Actual Result
01 Admin	Precondition: PTW Access is in the trial mode. The administrator accessed PTW Access	Password input box shown	Pass
02 Admin	Precondition: Test 01 Admin has successfully completed Wrong password submitted	Message box - Your access denied, this program will be automatically closed PTW Access closed	Pass
03 Admin	Precondition: Test 01 Admin has successfully completed Right password submitted	Message box - Welcome, Safety first, last and always! All contents in big search engine result columns cleared	Pass
04 Admin	Precondition: Test 01 Admin has successfully completed Number based button clicked	PTW Number Based Search Engine form shown	Pass
05 Admin	Precondition: Test 01 Admin has successfully completed Registered PTW registration number stated Search button clicked	Information of stated PTW number shown in the determined input box	Pass
06 Admin	Precondition: Test 01 Admin has successfully completed Unregistered PTW registration number stated Search button clicked	The registration number cannot be found, please re-check your number	Pass
07 Admin	Precondition: Test 01 Admin has successfully completed New registration number button clicked	New registration number user form shown	Pass
08 Admin	Precondition: Test 04 Admin has successfully completed Registered PTW registration number is stated Hot work check box checked Working at height check box checked JSEA check box checked Re-register button clicked	PTW database updated with new obtained PTW, hot work, working at height and JSEA registration number from registration process. PTW database saved and closed. PTW, hot work, working at height and JSEA serial number in serial number database added by 1. Serial number database saved and closed.	Pass

Test ID	Description	Expected Result	Actual Result
09 Admin	Precondition: Test 04 Admin has successfully completed Unregistered PTW number registration is stated on the PTW number input box	The registration number cannot be found, please re-check your number	Pass
10 Admin	Precondition: Test 01 Admin has successfully completed Date code entry is 1 Date entry is one day after the test Date based search button clicked	Message box - There is no entry in that date	Pass
11 Admin	Precondition: Test 01 Admin has successfully completed Date code entry is 1 Date entry is registered date Date based search button clicked	All the data founded with the same submission date with the date entry in the PTW database is displayed on the date based result column	Pass
12 Admin	Precondition: Test 01 Admin has successfully completed Date code entry is 3 Date entry is unregistered date Date based search button clicked	Message box - There is no entry in that date	Pass
13 Admin	Precondition: Test 01 Admin has successfully completed Date code entry is 3 Date entry is registered date Date based search button clicked	All the data founded with the same work date with the date entry in PTW database is displayed on the date based result column	Pass
14 Admin	Precondition: Test 01 Admin has successfully completed PTW search button clicked	Search user form shown	Pass
15 Admin	Precondition: Test 10 Admin has successfully completed PTW number entry is unregistered number Search button clicked	Message box - There is no entry in that date	Pass
16 Admin	Precondition: Test 10 Admin has successfully completed PTW number entry is registered number Search button clicked	Data founded with the same registration number with the PTW number entry in the PTW database is displayed on the available textbox	Pass

Test ID	Description	Expected Result	Actual Result
17 Admin	Precondition: Reset button clicked	Reset password input box shown	Pass
18 Admin	Precondition: Test 13 Admin has successfully completed wrong password as the entry OK button clicked	Message box - Wrong password Move the view into ‘regist’ sheet	Pass
19 Admin	Precondition: Test 13 Admin has successfully completed Cancel button clicked	Message box - Wrong password Move the view into ‘regist’ sheet	Pass
20 Admin	Precondition: Test 13 Admin has successfully completed Right password as the entry OK button clicked	All data in the PTW database is cleared. PTW database saved and closed. PTW, hot work, working at height and JSEA serial number in serial number database changed back into 0001. Serial number database saved and closed. Message box - all the data has been reset, happy new year team!	Pass

Appendix 9: Data Structure

	Name	Description	Source	Destination	Data Structure	Volume/time
1	Work Details	Is the data given by user in PTW Register, it is used for registration process (process 1) and in filling blank e-forms process (process 2)	PTW User	Process 1 (Register Process)	Submission date Start work date Finish work date Work date Start time Finish time Machine number Vendor name Work area Plant Work description Work equipment and tools User name Type of registration	15 / Hour
2	Filled E-form	Are filled e-forms that obtained by user from the end of process in PTW Register	Process 2 (Create requested e-forms)	PTW User	E-forms Work details Registration number	15 / Hour
3	Type of Registration	Is the value of type of work check boxes used to determine which registration number and e-form that should be generated.	D1 (Serial Number)	Process 1 (Register Process)	Hot work check box value Work at height check box value JSEA check box value	16 / Hour
4	Serial number	Is a 4 digits' number used to indicate each form order number	Process 1 (Register Process)	D1 (Serial Number)	PTW number Hot work number Work at height number JSEA number	15 / Hour

	Name	Description	Source	Destination	Data Structure	Volume/time
5	Numbered work details	Work details with all of the coded serial number for each form used to fill e-forms or as the result of data search.	Process 2 (Create requested e-forms)	D2 (PTW Log Book)	Work details	46 / Hour
			D2 (PTW Log Book)	Process 3 (Search data PTW)	"2016-B-" hot work serial number	
					"2016-C-" work at height serial number	
			Process 1 (Register Process)	Process 2 (Create requested e-forms)	"2016-JSEA-" JSEA serial number	
					"2016-C-" PTW serial number	
6	Date	A specific date used as search indicator	PTW Administrator	Process 3 (Search data PTW)	Date	15 / Hour
7	New serial number	Is a 4 digits' number used to indicate the form order number	D1 (Serial Number)	Process 4 (Require additional register number)	Hot work serial number	1 / Hour
					Work at height serial number	
					JSEA serial number	
8	New registration number	Is all serial number that added by code "year-type" it is used to fill the e-forms, and registration process.	Process 5 (Save on the log book)	PTW Administrator	"2016-B-" hot work serial number	3 / Hour
			Process 4 (Require additional register number)	Process 5 (Save on the log book)	"2016-C-" work at height serial number	
			Process 5 (Save on the log book)	D2 (PTW Log Book)	"2016-JSEA-" JSEA serial number	
9	PTW registration number	Is the serial number of PTW added by "year-D"	PTW Administrator	Process 5 (Save on the log book)	"2016-D-" PTW serial number	1 / Hour
10	PTW e-form	Is the e-form with numbered work details used to create filled e-form	Process 2.1 (Select the required e-form)	Process 2.2 (Create PTW e-form)	PTW e-form	15 / Hour
					Numbered work details	
11	Hot Work e-form	Is the e-form with numbered work details used to create filled e-form	Process 2.1 (Select the required e-form)	Process 2.3 (Create Hot Work e-form)	Hot Work e-form	15 / Hour
					Numbered work details	

	Name	Description	Source	Destination	Data Structure	Volume/time
12	Work at height e-form	Is the e-form with numbered work details used to create filled e-form	Process 2.1 (Select the required e-form)	Process 2.4 (Create Work at Height e-form)	Work at height e-form Numbered work details	15 / Hour
13	JSEA e-from	Is the e-form with numbered work details used to create filled e-form	Process 2.1 (Select the required e-form)	Process 2.5 (Create JSEA e-form)	JSEA e-from Numbered work details	15 / Hour

Appendix 10: Process Specification Number 1 for PTW Register

Process Specification Form
Number 1 Name: Register Process Description: Register the work, attain the registration number, fill the required e-form and save the work details and the registration number in the database.
Input Data Flow: Work Details Serial Number
Output Data Flow Type of Registration Numbered Work Details

Show message box of welcoming message
Fill submission date column by today's date
 	
If the start work day < earlier than submission date
Then show message box "Please check your date, the date that you submit is for 'work date' " & start date
Exit sub
End if
 	
If the finish work day – start work day > 7 days or < 0 days
Then show message box "Your work duration is more than 7 days or less than 1 day, please recheck your work date. Thank you"
Exit Sub
End If
 	
If one of the required data is blank
Then show message box "Please complete the required data in blue and red column"
Exit Sub
End If
 	
If review button chosen
Then
Exit Sub
End If
 	
Do (start loop here)
 	
Obtain all data in work details column and type of registration (check box value) on the application
 	
Open Serial Number Database
 	
Obtain PTW serial number and generate new number for next registration
Create PTW registration number by adding 'year-code-' to the serial number
Generate new serial number for next registration (PTW serial number + 1)
 	
If the new serial numbers < 1000 then
Generate additional 0 in front of the new serial number
End if

```
Save and close Serial Number Database
If hot work checkbox value = True
   Then obtain hot work serial number
   Create hot work registration number by adding ‘year-code-‘ to the serial number
   Generate new serial number for next registration (Hot work serial number + 1)
End If

If work at height checkbox value = True
   Then obtain work at height serial number
   Create work at height registration number by adding ‘year-code-‘ to the serial number
   Generate new serial number for next registration (Work at height serial number + 1)
End If

If JSEA checkbox value = True
   Then obtain JSEA serial number
   Create JSEA registration number by adding ‘year-code-‘ to the serial number
   Generate new serial number for next registration (JSEA serial number + 1)
End If
```

Appendix 11: Process Specification Number 2 for PTW Register

Process Specification Form
Number 2 Name: Create Requested E-Form Description: Fill requested documents, saving the numbered work details on the database and loop the back to process number 1.
Input Data Flow: Numbered Work Details
Output Data Flow: Filled E-Form Numbered Work Details
If E-Form creator checkbox value =True Then open PTW e-form Insert the work details and registration number to the determined content controls in the document If hot work checkbox value = True Then open hot work e-form Insert the work details and registration number to the determined content controls in the document End If If work at height checkbox value = True Then open work at height e-form Insert the work details and registration number to the determined content controls in the document End If If JSEA checkbox value = True Then open JSEA e-form Insert the work details and registration number to the determined content controls in the document End If End If Open PTW Database Insert data of work details and registration number on a new row Save and close PTW Database Add 1 day to start work day If the finish work day – start work < 0 days Then show message box “The work registration is finished.” Exit Sub End If Show next process selection user form

```
If ‘Skip’ button is chosen
   Then add 1 day to start work day
   Show next day process selection user form
End if

If ‘Stop’ button is chosen
   Then
   Exit sub
End if

If ‘Next’ button is chosen
   Then
   Do Loop
End if
```

Appendix 12: Process Specification Number 3 for PTW Access

Process Specification Form
Number 3 Name: Search PTW Data Description: Search the numbered PTW details on the database based on the submission date or work date.
Input Data Flow: Numbered Work Details Date
Output Data Flow: Numbered Work Details
Indicate the date entry as search indicator Open PTW Database If the date code = 1 For i = 5th Row To LastRow Then search row by search indicator in the submission date column Copy indicated row from cell A until cell U Paste the result to the blank row on the determined program's sheet Next i End If If the date code = 3 For i = 5th Row To LastRow Then search row by search indicator in the work date column Copy indicated row from cell A until cell U Paste the result to the blank row on the determined program's sheet Next i End If Close PTW Database If there is no indicated data on the determined program's sheet Then show message box "There is no entry for that date." End If

Appendix 13: Process Specification Number 4 for PTW Access

Process Specification Form
Number 4 Name: Require New Register Number Description: Create new registration number based on the chosen type of work.
Input Data Flow: Type of Registration New Serial Number
Output Data Flow: New Registration Number

Obtain type of registration (checkbox value) on the PTW editor user form
 	
Open Serial Number Database
 	
If hot work checkbox value = True
Then obtain hot work serial number
Create hot work registration number by adding 'year-registration code-' to the serial number
Generate new serial number for next registration (Hot work serial number + 1)
End If
 	
If work at height checkbox value = True
Then obtain work at height serial number
Create work at height registration number by adding 'year-registration code-' to the serial number
Generate new serial number for next registration (Work at height serial number + 1)
End If
 	
If JSEA checkbox value = True
Then obtain JSEA serial number
Create JSEA registration number by adding 'year-registration code-' to the serial number
Generate new serial number for next registration (JSEA serial number + 1)
End If
 	
If the new serial number < 1000 then
Generate additional 0 in front of the new serial number
End if
 	
Save and close Serial Number Database

Appendix 14: Process Specification Number 5 for PTW Access

Process Specification Form
Number 5 Name: Save on The Database Description: Save the new registration number obtained from process number 4 to the row of PTW registration number on the database.
Input Data Flow: New Registration Number PTW Registration Number
Output Data Flow: New Registration Number

Set the PTW registration number on the PTW editor user form as search indicator
 	
Open PTW Database
 	
Search the row with the same PTW registration number on the database
If the row is not found
  Then message box “The program cannot found the data on the database.”
  Exit sub
End if
 	
If hot work checkbox value = True
  Then insert the hot work registration number to its cell within the row.
  Copy the work date from the row
  Paste the work date on the hot work date cell
End If
 	
If work at height checkbox value = True
  Then insert the work at height registration number to its cell within the row.
  Copy the work date from the row
  Paste the work date on the work at height date cell
End If
 	
If JSEA checkbox value = True
  Then insert the JSEA registration number to its cell within the row.
End If
 	
Save and close PTW Database
 	
Show the result obtained on the PTW editor user form