UNIVERSITI TEKNOLOGI MARA
FACULTY OF INFORMATION MANAGEMENT

INDUSTRIAL TRAINING REPORT:
SALUTICA ALLIED SOLUTIONS SDN BHD
NO. 3, JALAN ZARIB 6, KAWASAN PERINDUSTRIAN ZARIB, 31500, IPOH, MALAYSIA, 31500 IPOH, PERAK

SPECIAL PROJECT: PRODUCT RELIABILITY TESTING SYSTEM

BY
MUHAMAD KHIR BIN ZAINAL AZHAR
2016725913

IM245 - BACHELOR OF SCIENCE (HONS.)
INFORMATION SYSTEM MANAGEMENT
FACULTY OF INFORMATION MANAGEMENT
UNIVERSITI TEKNOLOGI MARA KELANTAN

1 FEBRUARY 2019 – 30 JUNE 2019

INDUSTRIAL TRAINING REPORT:
SALUTICA ALLIED SOLUTIONS SDN BHD

SPECIAL PROJECT: PRODUCT RELIABILITY TESTING SYSTEM

BY
MUHAMAD KHIR BIN ZAINAL AZHAR

FACULTY SUPERVISOR
MOHD ZAFIAN BIN MOHD ZAWAWI

REPORT SUBMITTED IN FULFILLMENT OF THE
REQUIREMENT FOR THE INDUSTRIAL TRAINING
FACULTY OF INFORMATION MANAGEMENT
UNIVERSITI TEKNOLOGI MARA KELANTAN

1 FEBRUARY 2019 – 30 JUNE 2019

DECLARATION

I hereby declare that this is my original work. I have not copied from any other student's work or from other sources. I am also declare that no part of this report has been published or submitted for publication except where due to reference or acknowledgement is made explicitly in text, nor has any part been written for me by another person. I confirm that I have read and understood the UiTM regulations about plagiarism and will be penalized by the university if found guilty.

Signed by

Date of submission: 4/7/2019

ABSTRACT

As usually, the trainee are enable to fulfill the requirement procedure by faculty in order to completed industrial training (IMC690). The industrial training period had taken by the trainee about five month started from 1 February 2019 until 30 June 2019. The trainee has been placed in Reliability Lab where sub-department under Research & Design (R&D) Development of Salutica Allied Solutions Sdn Bhd. The faculty are required for the trainee to complete industrial report to describe and illustrate that consist of organization information, functional organization, industrial activities, special project, application of knowledge, personal thought and opinion, learnt lesson, limitation and recommendation. The output overcoming in industrial for the trainee where the trainee gained many of valuable skills and new experiences for the trainee where the industrial activities doing are more to practical, which is out of area for the trainee. The trainee also gain new skills where did not learn and practice in faculty.

***Keywords**: information system management, product reliability testing system, logitech , wireless mouse*

ACKNOWLEDGEMENT

During the industrial training for five (5) months, I had been assigned my industrial training which is Reliability Lab where sub-department Research & Design Department of Salutica Allied Solutions Sdn Bhd. Here, I was taken opportunity to gain new knowledge the fill are out of my area (Information System Management) where the environment of duties are more to hardware (Mechanical Engineering). It very tough and challenges for me and I challenges myself to keep motivate and understanding the working environment.

I would like to grateful to Allah S.W.T for giving spirit to completed all the requirement by faculty and thanks to my family and friends who had been keep me for tough during industrial training.

I also like to thank to Faculty of Information Management, Universiti Teknologi MARA Kampus Machang and to my faculty supervisor, Mohd Zafian Bin Mohd Zawawi that had supports and giving opinion in order to complete the task.

Besides, I also like to thank my industrial supervisor during industrial period in Reliability Lab, Abdul Halim Bin Din and for other staff that more guide and provide supports to me to do the task and completed at the right time.

Lastly, again I would to thank to all members and community that had been supporting to me to complete industrial training without helping from them I cannot stand where I am right now.

Thank you.

PRELIMINARIES

Contents

TABLE OF CONTENTS

Table of Contents

LIST OF FIGURES

CHAPTER 1: INTRODUCTION

The Industrial Training subject IMC690 provides pre-professional work experience with specific assignments and responsibilities. This paper involve 480-hour equivalent work placement, paid or unpaid, located in an approved industrial site, working under the supervision of an experienced Information Professional.

During the industrial training, the student is expected to contribute to the activities of the workplace and to meet the same demands of work production and responsibility expected by the organization of its regular employees. An Industrial Training programmed is relevant to a student's personal career interests and improve their marketability after graduation.

1.1 Background of the Organization

Figure 1: Company Logo

Salutica Berhad, through its 100% wholly owned subsidiary Salutica Allied Solution Sdn. Bhd. is a Malaysian vertically integrated electronics manufacturing company headquartered in city of Ipoh, Perak with its history starting way back in 1990. Salutica specializes in designing, developing and manufacturing consumer and business electronic product development like Bluetooth stereo headsets, smart watches and precision light guides for optical touch screen system. Salutica is primarily an original design manufacturer and its clients include Major American, European, and Japanese electronics and information technology companies.

Salutica offers 'one stop' vertically integrated solutions for electronics and plastic manufacturing. Its in-house services span from product design, precision engineering plastics injection, high quality secondary cosmetic treatment, PCBA to high volume manufacturing of complete electronics products, especially Bluetooth consumer electronics products.

Salutica has successfully launched a series of patent pending products under its own brand "FOBO". FOBO is an acronym for For Our Better wOrld. FOBO products such as the world's first all Bluetooth Smart TPMS FOBO Tire and FOBO Bike, FOBO Tag/Max are designed to enhance ways of living and to help preserve the environment. Developed and manufactured by Salutica, FOBO products are being sold in 28 countries across Europe, Americas, Middle East, Asia, Africa and Oceania.

VISION

To be an excellent global provider in the field of ICT and related.

MISSION

- Provide service to the customer related technology, quality, cost and delivery
- Ensure a good and reasonable returns to shareholders, customers, suppliers and employees
- Sure, all of the above can be accessed through the company's employees. Will continue to invest in training related directly or indirectly.

1.1.1 Firm Policy

1.2.1. Policy Quality

i. We emphasize quality in all that we do

ii. We collaborate closely with our customers to provide products and services that meet the needs and expectations of customers.

iii. We consider our suppliers as part of our business processes.

iv. We enhance the effectiveness of our quality management system on an ongoing basis through our full Involvement: and effective communication.

v. Upgrade the skills of employees.

vi. Evaluation of the satisfaction of our employees and customers.

vii. Performance measurement process and comparison.

1.1.2 Policy Statement

Salutica Berhad ("the company") together with its subsidiaries under the Group ("the group") is committed to the highest standards of integrity, openness and accountability in the conduct of the business and its operations and promoting and support a culture of honest and ethical behaviour, corporate compliance and good corporate governance. Aware of the above values, the company provides the opportunity to all employees and other stakeholders of the company report or disclose without fear of reprisal in any misconduct or wrongdoing within the group.

1.1.3 Policy Objectives

This policy is to provide employees and other stakeholders such as suppliers, contractors and customers to report the administrative process or disclose any misconduct or wrongdoing in accordance with the policy and procedures set up to give protection to employees and other stakeholders who reported the allegations.

1.1.4 Scope Objectives

i. This policy is designed to facilitate employees and other stakeholders to disclose any misconduct or wrongdoing through internal channels. improper conduct or misconduct including, but not limited to the following:

ii. Fraud

iii. Fraud assets

iv. Criminal breach of trust

v. Illegal practices and corruption

vi. Dubious or improper accounting

vii. Illegal or criminal offence

viii. Conflict of interest without disclosure

ix. Abuse of company property or confidential information

x. The threat of employees ' or public health and safety

xi. Previous acts or omissions which are considered contrary to the interests of the company, the rules of law or public policy; concealment intentionally any of the above or misconduct.

1.1.5 Location Company

Figure 1: Company Building

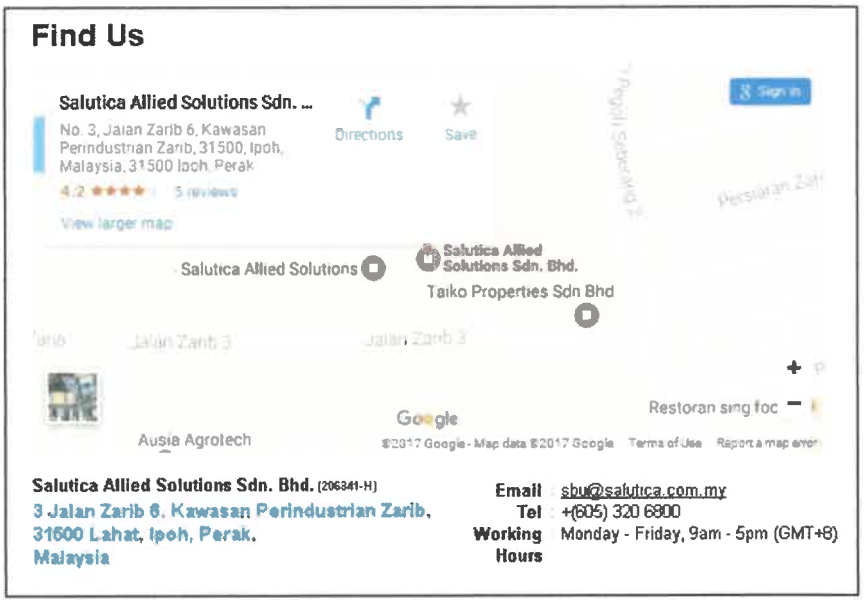


Figure 2: Company Location

1.1.6 Firm Services

1.1.6.1 Product Design

Based on the needs of the customers and accuracy, Salutica provides the following services:

i. Product concept & ID
ii. Electronics & Software Design
iii. Mechanical Design
iv. Product Test Plan

1.1.6.2 Surface treatment

With the firm, we provide high quality service that is secondary cosmetic treatment:

i. 2K or 1K mono spray paint
ii. A cot and diversity of colour laser
iii. Marking painting pad Nano
iv. Coating waterproof

Figure 3: Cosmetic Area

1.1.7 Engineering Plastic

1.1.7.1 Precision plastic injection

i. We have a range of sophisticated tone plastic injection machine to run according to the accuracy of the moulding.

ii. 1 k or 2 k the internal moulding

iii. Moulding decoration (IMD)

iv. Moulding thin walls (0.3 mm) optic light connection Moulding

Figure 5: Moulding Area

1.1.8 Tooling

We have experienced, design tools and engineering here in the world. A tooling carried in conformity with the tools.

i. Tooling Design
ii. Tooling Fabric
iii. Equipment improvement and maintenance
iv. In Salutica, we have goods, sophisticated machines and reliability to be used
v. Electrical discharge machining process of sinking,(EDM)
vi. Wire cut (WC) ,
vii. High Speed Machine (HSM) ,
viii. Laser welding
ix. SPI Al molud the end.

1.1.9 Assembly

1.1.9.1 Installation Products

High-rate production installed in Salutica own to meet a wide range of the volume of the box which the completions or sub-electromechanical
Installation of the product.

➢ Internal technique involves:

i. The accuracy of the thermal restructuring
ii. Ultra sonic mould
iii. Rivet
iv. Loctite accuracy of glue
v. The inclusion of liquid in
vi. Automatic bar featured hot
vii. *UV glue robot dispensing*
viii. We can also perform the installation of cleaning room if needed.

1.1.9.2 PCBA

We provide high reliability in PCBA process one to various levels of flex or rigid PCBs.

In the PCBA facilities as follows:

i. Installation of high-speed 01005
ii. Installation of micro BGA
iii. Installation of flex circuits
iv. Process support glue
v. Laser De-panelling (LPKF)
vi. Nano Coating PCBA
vii. Process flow of an inert nitrogen back
viii. AOI & screening x-ray 2.3.5

1.1.10 Quality Assurance

1.1.10.1 Quality System

I. Our firm is a firm of certified standards to ISO 9001 , ISO 14001 , SA8000 , OHSAS 18001 , Sony Green Partner and ROHS.
II. Product Reliability
III. We have a system-level abilities and attempt to ensure that the product strength facilities.
IV. Reliability testing (HAST), mechanical environment testing, environment testing, attempted departure electrostatic coating endurance test, attempt.
V. Type of proof test (FCC, CE, IC, E-MARK, R&TTE, EN 60950, UL 6095, Bluetooth standards)
VI. Measurement of character (moth Performance, sharpness colour, paint, gloss level, the flow of liquid plastic.
VII. Analysis of failure (part cross, colouring, small structure and x-ray analysis.

1.1.11 Supply Chain Management

1.1.11.1 Sources

We have an advanced network resource to:

I. Electronic components
II. Engineering resins
III. Division iron mechanical
IV. Components
V. Battery Packaging

1.1.11.2 Material Plans

High accuracy for material planning and purchasing spouse with the efficiency of the production planning to ensure the most comprehensive in a timely manner.

1.1.12 Technology

1.1.12.1 Bluetooth

We have developed products such as Bluetooth wireless audio, mono and stereo headsets since 2006 for most customers. Now, we have developed our expertise in the Bluetooth to engage in on the internet via a wireless tag, IBEACONS and is the first in the world of all Bluetooth smart tire pressure control system (TPMS) in FOBO brand

1.1.12.2 Optical Touch System

We manufacture optical light guide for a patented optic touch solution from Europe.

1.1.12.3 Patent Pending Technologies

I. We file a pattern as follows:

This technology uses FOBO application to smooth and can be used in a variety of devices using ID and password while maintaining data that was recorded previously.

II. Web Search Me

This technology allows people to search by application FOBO

III. F.I.T (Fobo Intra Connect)

This technology allows harvesting of data environment with one sensor cluster and then send data between each other to the final recipient.

1.1.13 Original Design Manufacturing

1.1.13.1 FOBO TPMS Series (Tire Pressure Monitoring System)

i. This product is used to monitor tire pressure and display tire pressure

1.1.13.2 FOBO Tag

I. This product is used to keep track of personal belonging

1.1.14 The completed original equipment manufacturing product of Salutica Allied Solutions Sdn Bhd

i. Below is completed product devices that has satisfy and quality verify:

Figure 6: Jaybird True

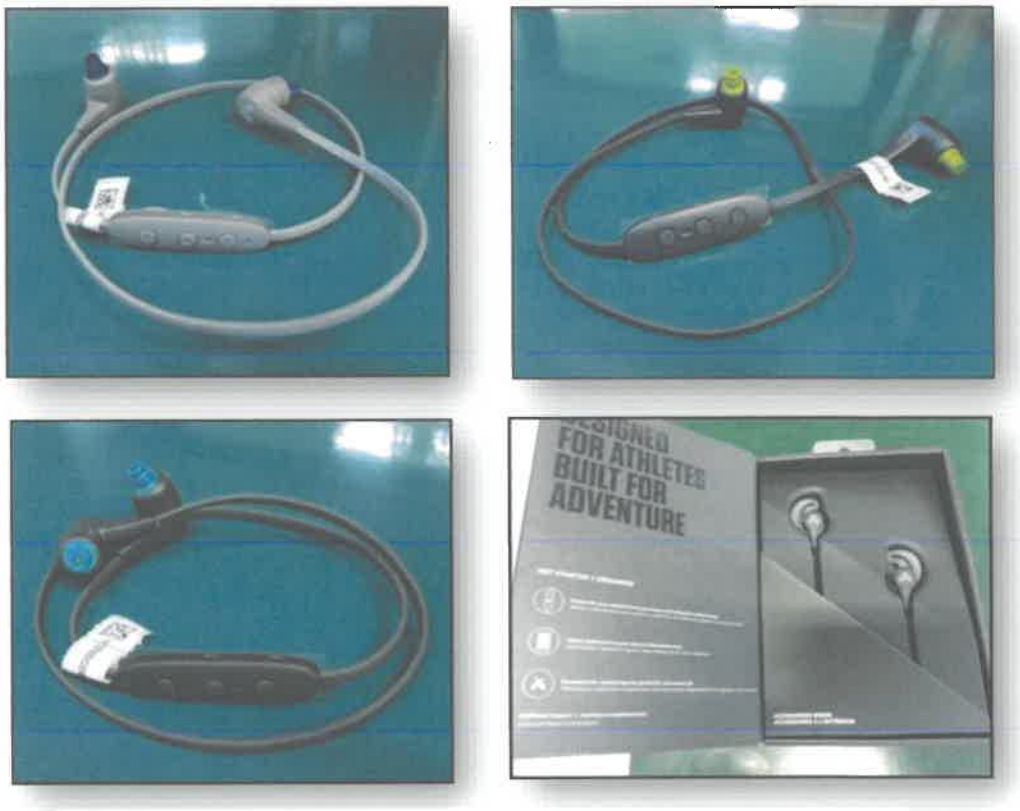


Figure 7: Jaybird X4

Figure 8: Jaybird X3

1.1.15 Salutica Cooperation Customers

Below is Salutica customers in involving cooperation to creating and making the product for marketing around Asia.

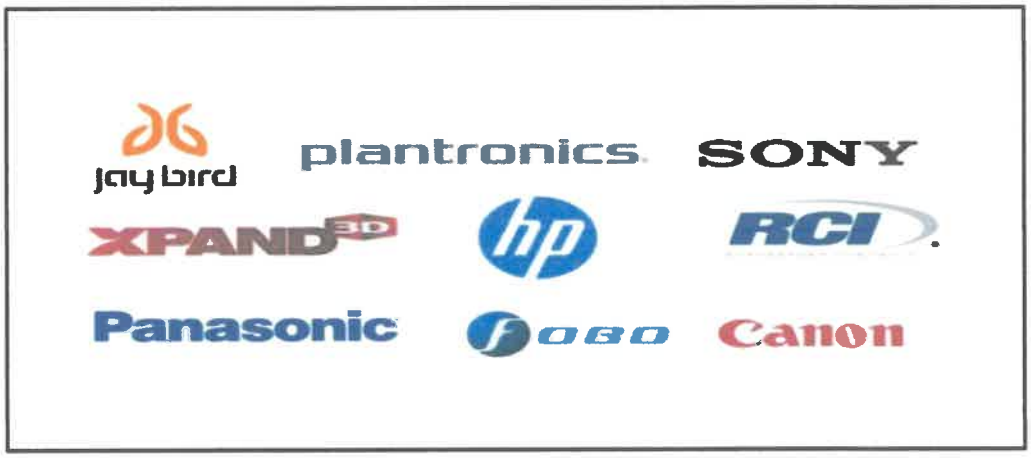


Figure 9: Salutica Customers

1.2 Organizational Structure

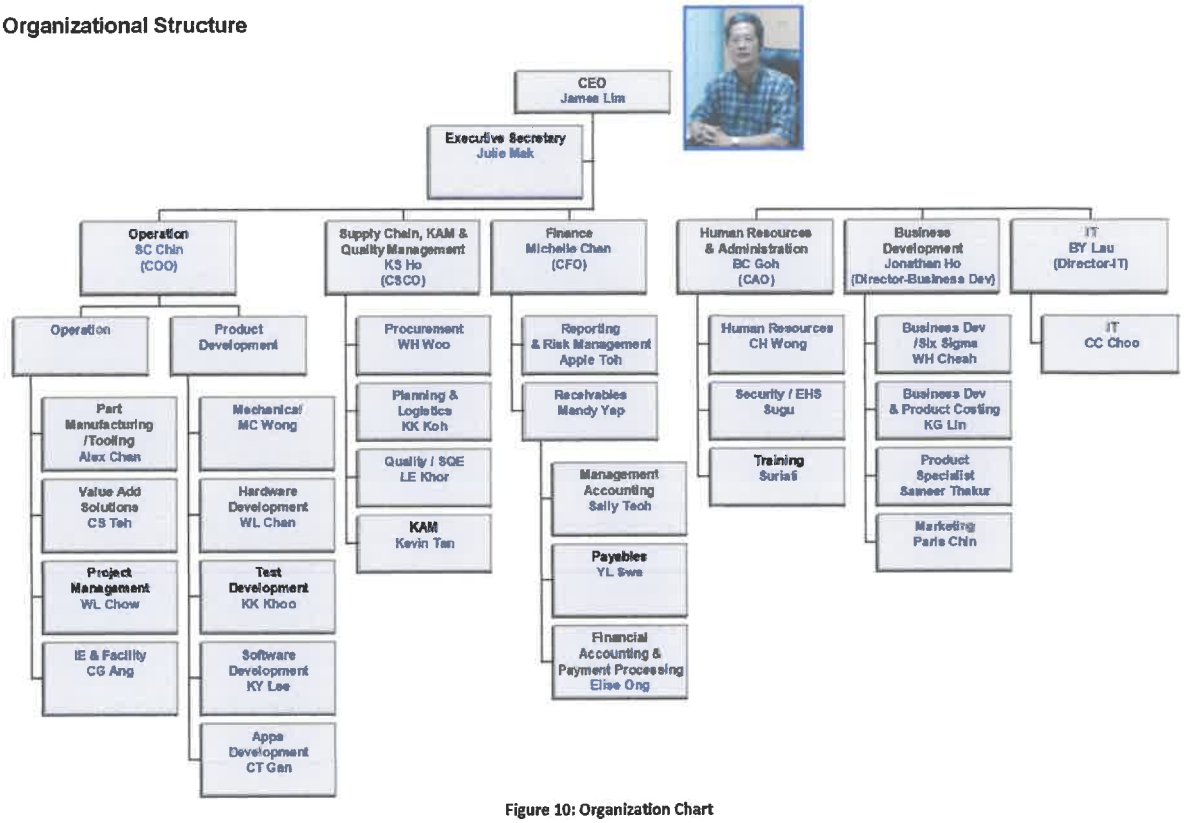


Figure 10: Organization Chart

2 CHAPTER 2: ORGANIZATION INFORMATION

2.1 Departmental Structure (Reliability Lab)

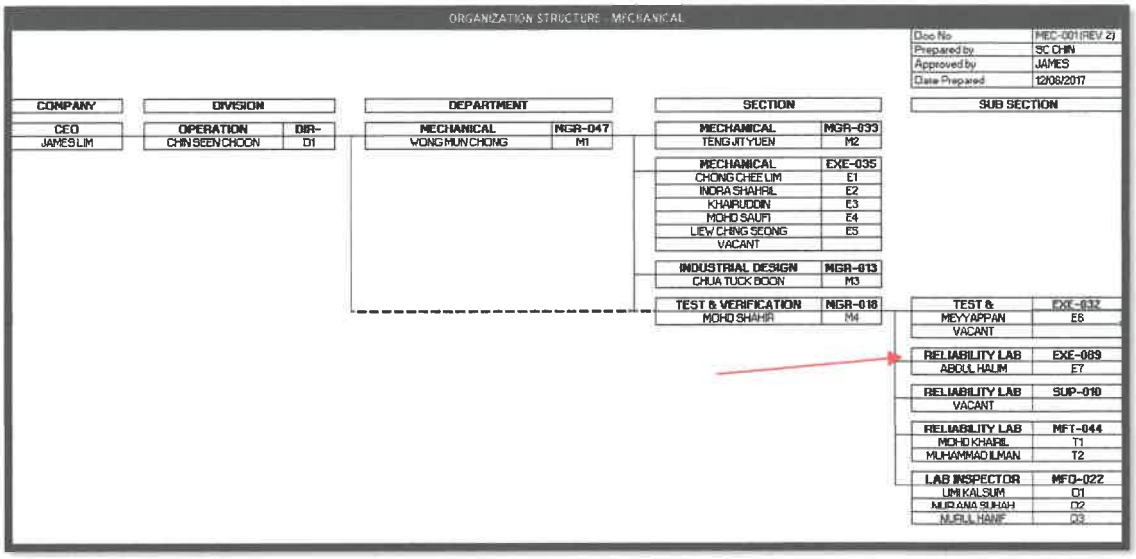


Figure 11: Department Structure of Reliability Lab

This is departmental structure of Reliability Lab. Reliability Lab is sub-department under Test & Verification department that in charged by Mr. Abdul Halim Bin Din (Industrial Supervisor) of the trainee.

2.2 Department Function

Reliability Lab is sub-department under Research and Design Department (R&D) where their functional operation is consist of reliability testing and verify the new development product such as electronic devices.

Figure 12: Reliability Lab Office

Those activities progress in Reliability Lab involves;

i. **Non Operation & Humidity – 53 Hours**

Non Operation & Humidity test is to check operation during temperature cycling.

ii. **Operating Temperature & Humidity – 12 Hours**

Operating Temperature & Humidity test is to check operation during temperature cycling.

iii. **Thermal Shock**

iv. **Salt Spray Test**

v. **Drop Test**

vi. **Pressure Intensity**

vii. **Wireless Connection**

viii. **IPX 7**

ix. **Main-Key Life Test**

Main-Key Life Test to ensure design robustness and to meet the product button specification

x. **Burn In Test**

This test is to estimate product life could meet LOGITECH MTTF criteria.

xi. **Wheel Ratchet Life Test**

Wheel Ratchet Life Test to ensure design robustness and to meet the product button specification

xii. **Wheel Button Life Test**

Wheel Button Life Test to ensure design robustness and to meet the product button specification

3 CHAPTER 3: INDUSTRIAL TRAINING ACTIVITIES

3.1 Training Activities

This chapter is a summary of the total weekly activity performed during the process industrial training. Based on the activities performed, written in the logbook briefly will be described in the chapter covering the duties assigned by the supervisor. Each activity or task undertaken will be recorded in the daily logbook. Therefore, this section will explain briefly the activities and duties trainee performed while undergoing industrial training in one semester during 20 weeks. All activities will be described overall each month in order to conclude the work that has been done in a week as well as simplify the process of revision.

In industrial training, the trainee has been exposed to many new things. When undergoing in industrial training, the trainee has been placed at Reliability Lab. Reliability Lab is sub-department under Product Development Department that further works more to testing & verification. In Reliability Lab, it divided into two parts, which is process of observation and evaluation. Furthermore, the trainee duties is to assist workers especially engineer, technician, operator in order to observes and evaluates samples product devices to giving a result whether PASS or FAIL.

Each assigned job scheduled by organization supervisor of Reliability Lab for simplifying complex next on a daily basis need to do work (prevention maintenance) it means making inspection and maintenance equipment schedule machine set. In addition, the duty to inspect of samples product that received from Production Department and labelling (Test & Verification) stickers as confirmation of samples devices has completed testing and verifying.

Table 1: Summary of Activities

Early February – End of February	I. Briefing session about company background, policy and safety procedure of organization. II. Introduced with original design and equipment manufacturing devices by Industrial Supervisor III. Briefing operating testing in Reliability Lab by Industrial Supervisor and Staff IV. Learning a technique how to manage and operating machine to running testing, observation and evaluation of testing purpose V. Taking opportunity to operate observe mechanical part devices, evaluating of reading forces of mechanical part and inserting the data into Microsoft Excel for observes result to verify PASS or Fail

Early of March – End of March	I. Running test for Packaging Sequence A. Packaging Sequence A involves three type which is Drop Test, Compression Test and Vibration Test II. Running a test which is Wireless Connection (Distance) Test III. Running a test which is Cable Slider Organizer Durability Test IV. Performing checks on Logitech Mouse devices after completion of Packaging Sequence A. Observation of white mark, damaging and functionality of Logitech Mouse packaging box and appearance Logitech Mouse V. Perform for Non-Operating Temperature and Humidity Test 78 hours VI. Arranging placement for new machine equipment to running testing for Logitech Mouse. Those of equipment machine which is Mouse Main-Key Life Test, Wheel Ratchet Life Test, Burn In Test (Oven), Wheel Ratchet Forces VII. Learning and performing for setup new machine maintenance which is Mouse Main-Key Life Test. Setup alignment plate Jig Fixture to 25° degree

	VIII.	Measuring forces of Logitech Mouse button (left/right) and evaluates the difference percentage result for verify the forces around specification or fail
Early April – End of April	I.	Operate testing of Logitech Mouse Button by using Mouse Main-Key Life Test to observe performing by requirement spec which is 10K,20K,40K,100K,250K,500K,1M,2M and 3 Million actual goals
	II.	Performing checks functionality 8 units Logitech Mouse with using Microsoft Excel, Paint and Bus Hound software.
	III.	Performing testing of Logitech Mouse roller to evaluate intensity pressure with requirement spec by Logitech
	IV.	Measuring forces of Logitech mouse by using Universal Testing Machine. Three mechanical part of mouse involves to measure, which is main button, left/right side roller and top roller mouse.
	V.	Inserting data result measuring forces and highlight selected data that out of specification requirement into Microsoft Excel

	VI. Share and email the measurement data record to project leader as references to feedback to customer (Logitech) of results
Early of May – End of May	I. Measuring forces of 12pcs, Logitech Mouse switch mechanical parts by using Universal Testing Machine (Zwick Brand) II. Operate testing of Logitech Mouse Button by using Mouse Main-Key Life Test to observe performing by requirement spec which is 10K,20K,40K,100K,250K,500K,1M,2M and 3 Million of actual goals I. Measuring forces of 8cps Logitech Mouse Button by using Universal Test Machine (Zwick Brand) after completed test of 500K,1M,2M and 3M actual goals III. Making documentation testing instruction of Main-Key Life Test IV. Labelling all Logitech Mouse samples by Test & Verification stickers for able the samples has completed of testing and locate samples into packaging box and seal the box to keep in storage room

	V. Performing Burn In Test with 32 samples units Logitech Mouse by using France Etuves XU225 (Oven)

Early of June – End of June	1. Performing Burn In Test with 32 samples units Logitech Mouse by using France Etuves XU225 (Oven) 2. Operate testing of Logitech Mouse Button by using Mouse Main-Key Life Test to observe performing by requirement spec which is 10K,20K,40K,100K,250K,500K,1M,2M and 3 Million of actual goals 3. Measuring forces of 8cps Logitech Mouse Button by using Universal Test Machine (Zwick Brand) after completed test of 500K,1M,2M and 3M actual goals 4. Operate testing of Wheel Button Life Test with requirement 50K,100K,250K and 500K 5. Collect Logitech samples from production to Reliability Lab for performing a test for Burn In Test (Oven)

3.1.1 New Project Logitech Wireless Mouse

Figure 13: Logitech Mouse

Early of March Reliability Lab have a new incoming product development as per customer requirements to operating testing and requalify changes of material/suppliers/ process improvement mouse devices from Logitech. The product model is Logitech Wireless Mouse (M325).

Furthermore, this project are issue of War Trade (USA-China) and a part from that Logitech China able to make cooperation with Salutica Allied Solutions Sdn Bhd for design, develop and ensure qualify of product devices for Asia Market. Based on that, the industrial supervisor allow the trainee to take opportunity for gain experience of new incoming project for Reliability Lab in order to learn in how to testing, observes and evaluates the wireless mouse with new equipment machine that will to use to operating the testing.

A part from that, Reliability Lab needed new room space to locate new machine that arrived to arrange the maintenance of machine equipment. The trainee, industrial supervisor and other staff are collaborate to setup arrangement of maintenance machine. The new room is namely as Reliability Lab (Logitech Wireless Mouse).

Figure 14: New Room Reliability Lab

The figure above is the new room of Reliability Lab for operating the new machine to do a testing for Logitech Wireless Mouse. Equipment's of machine that was used to doing a testing including Mouse Main-Key Life Tester, France Etuves XU255 Oven, Wheel Ratchet Life Tester and Wheel Ratchet Forces. The entire machine needed to maintenance to ensure the reliability of testing can operating smoothly without any problems. Besides, the trainee and staff involves of this room always upgrading the systematic arrangement for easily to doing and to ensure safety as important alert to avoid any accident that can injured during testing are begin.

On this project, It involves several build stages in getting approval from Logitech China to continue project whether it is accepted or not. The build stage is divided into three levels, namely the Prototype Build (PB), Mass Production (MP) and Ongoing-Reliability Test (ORT) and below is the description and summary of the stages in order to running the project of Reliability Lab.

3.1.2 Build Stage

3.1.2.1 Prototype Build (PB*)*

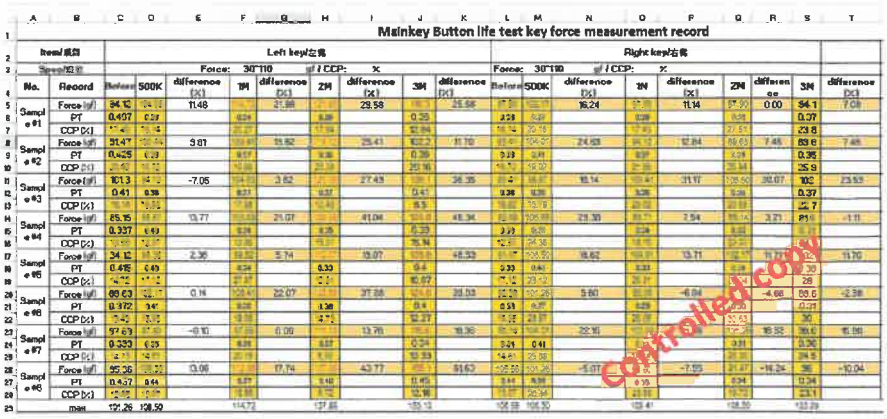
Prototype Build (PB) is an early sample, model, or release of a product built to look at a notion or system or to act as an aspect to be replicated or discovered from. The process is to identify and making testing to a sample of wireless mouse to giving the result whether is Pass or Fail in order to getting approval from Logitech (China). The testing includes mechanical part, which is switch of wireless mouse and completed wireless mouse. In this stage, the industrial supervisor and the trainee making testing and observes the switch and button wireless mouse devices with use of machine equipment and measuring the forces of wireless mouse. After test are completed, the trainee will inserting the data into Microsoft Excel and identify the result to compare with eight units samples that has used for operating the testing.

3.1.2.2 Mass Production (MP)

Mass production is the manufacture of giant portions of standardized products frequently the usage of assembly traces or automation technology. In this stage, production assembly department of Salutica was running 10,000 samples of wireless mouse, and some of samples able send to Reliability Lab for operate the testing. The trainee received samples from production to operating the testing of wireless mouse. The testing involves the use of machine, which is Mouse Main-Key Life Test, and Universal Test Machine (Zwick). During the process of operating the test, Logitech China also doing the same process and when the testing are complete, it will to share and feedback the result to Logitech China and comparing the statistics of data whether it in specification requirement from Logitech China for Pass or Fail.

3.1.2.3 On-Going Reliability Test (ORT)

On-Going Reliability Test is a hardware test process normally used in manufacturing to make sure that quality of the merchandise is nevertheless of the identical specifications as the day it first went to manufacturing or regular availability. In ORT stage, the sample collected are in small quantity and the sampling will categories by monthly. The process of testing it regarding base on schedule that has been created to ensure it will complete in right time. In this stage, the trainee has participate to involved of the testing for ensure the quality, observation and evaluation of the product (Logitech Wireless Mouse). All of the result will inserting on the Logitech report format and the project leader will observe the result and feedback to Director of the project as references purposes.



Mainkey Button life test key force measurement record

No.	Record	Left key/左键 Force: 30~110 gf / CCP: % Before	500K	difference (%)	1M	difference (%)	2M	difference (%)	3M	difference (%)	Right key/右键 Force: 30~110 gf / CCP: % Before	500K	difference (%)	1M	difference (%)	2M	difference	3M	difference (%)
Sample #1	Force (gf)	94.10		11.48		21.98		29.58		25.66			16.24		11.14	0.00		94.1	7.08
	PT	0.407							0.35									0.37	
	CCP (%)																		
Sample #2	Force (gf)	91.47		9.81		25.41		31.70					24.63		12.84	7.45		89.6	7.46
	PT	0.425							0.35									0.35	
	CCP (%)																		
Sample #3	Force (gf)	101.3		-7.05		27.49		34.35					18.14		31.17	30.07		102	23.59
	PT	0.41							0.41									0.37	
	CCP (%)																		
Sample #4	Force (gf)	85.15		13.77		41.04		48.34					29.30		7.54	3.71		81.9	-1.11
	PT	0.337							0.29										
	CCP (%)																		
Sample #5	Force (gf)	84.10		2.36		19.07		48.53					16.62		13.71				13.70
	PT	0.416							0.4										
	CCP (%)																	28	
Sample #6	Force (gf)	88.63		0.16		37.88		28.03					9.80		-6.84	-4.68		86.6	-2.38
	PT	0.372							0.4										
	CCP (%)																	30	
Sample #7	Force (gf)	97.63		-6.10		13.76		19.36					22.16					95.6	15.08
	PT	0.393							0.34									0.36	
	CCP (%)																	24.5	
Sample #8	Force (gf)	95.36		13.06		43.77		51.63					-5.07		-7.55	-16.24		96	-10.04
	PT	0.437							0.45									0.34	
	CCP (%)																	23.1	
	max	101.26	106.59		114.72		137.88		139.13		106.58	106.30		109.41		108.30		102.29	

Figure 15: Measurement Record Main-Key Life Test

3.1.3 Equipment Machine Testing of Logitech Wireless Mouse

The new project of Logitech Wireless mouse will using equipment machine according to specification of Logitech China in order to running and making testing for the sample of product. Those equipment it involves four types of machine which is Mouse Main-Key Life Tester, Burn In Test, Wheel Ratchet Life Test and Wheel Ratchet Forces. Below is the description details of the equipment used for running the testing.

Figure 16: Main-Key Life Test

Figure 17: Burn In Test

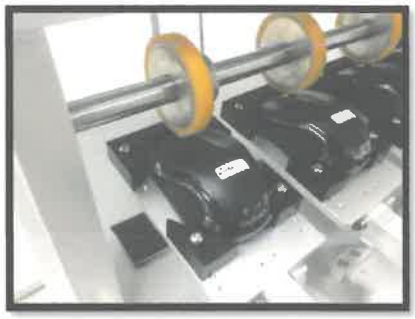


Figure 18: Wheel Ratchet Life Test

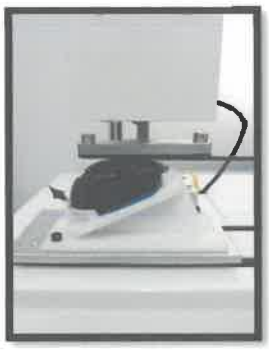


Figure 19: Wheel Ratchet Forces

3.1.3.1 Mouse Main-Key Button Life Tester

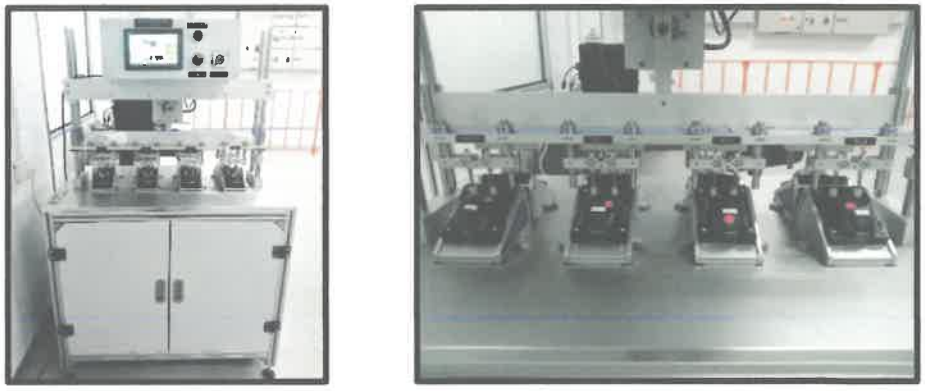


Figure 20: Main-Key Life Test

Purpose of test:

I. To ensure design robustness and to meet the product button specification.

II. To stimulate usability per-click time's use of mouse by user in daily, weeks, month and year.

Methodology of test:

I. Locate 8 unit samples Logitech wireless mouse on the jig

II. Set counter cycling based on specification requirement

III. Checking the button feeling monitory after finished

IV. Measuring force button performance after completed 500K,1M,2M and 3M by using Universal Test Machine (Zwick)

• **500,000 times** • 2-3Hz/sec (2-3 times/sec) • Actuation force : 250 ±50 gf • Test Angle : 0° • Test with power ON • AP check (Ms. Excel) • Button feeling check • Quantity : 8 units • Monitoring every : Before, 50K, 250K, 500K **Acceptance Criteria** Button force difference <50% (after - before) /before % Force: 200~300 gf	Key life test: 47 hours (500K) Measure key force: 4 min/unit Functionality check : 2 min/unit Total = 48 hours

Figure 21: Figures of Main-Key Life Test Specification Requirement

3.1.3.2 Appearance Check

Figure 22: Appearance Check Main-Key Life Test

3.1.3.3 Functionality Check

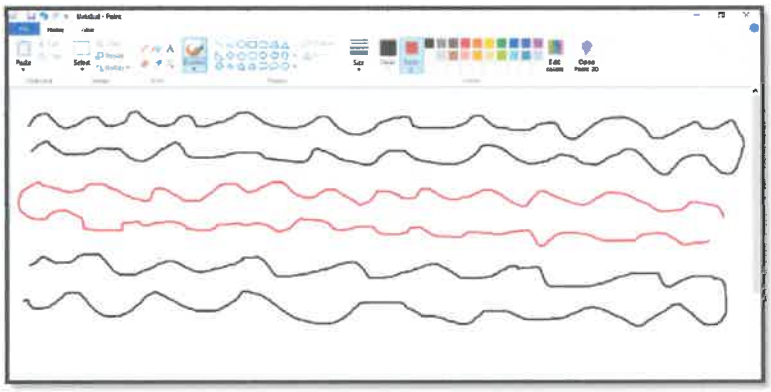


Figure 23: Functionality Check (Good Function)

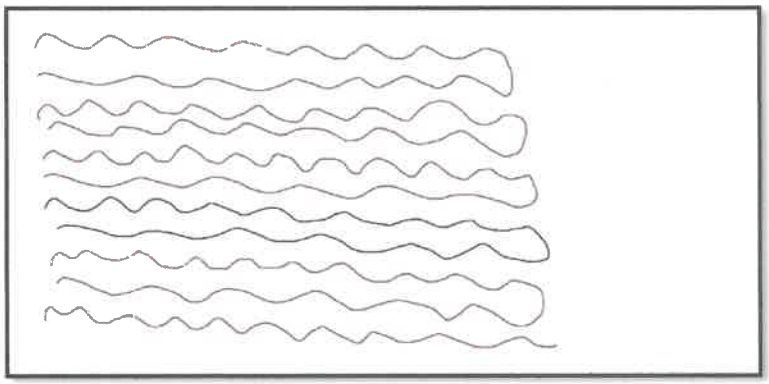


Figure 24: Functionality Check (Not Good Function)

3.1.3.4 Burn In Test

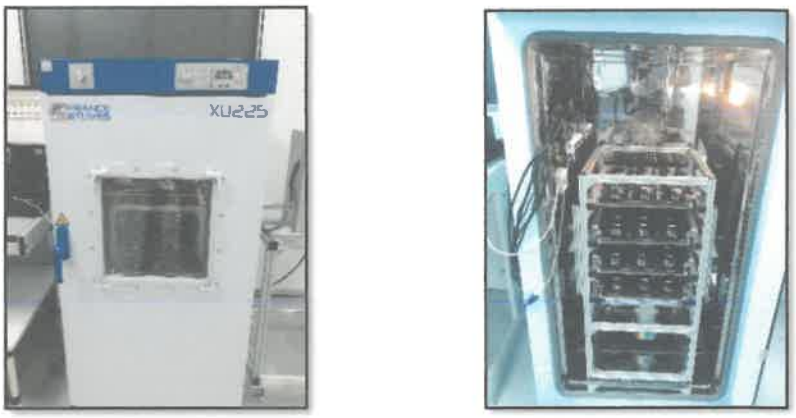


Figure 25: Burn In Test Operating

Name: France Etuves (XU225) Oven

Purpose: To checking operation during temperature cycling

Methodology of Test:

I. Locate 32 unit samples Logitech wireless mouse into moving rack trail

II. Set the temperature to 45 degree, closed the door oven let it to 24 hours

III. After test completed, checking and verify the functionality and performance of samples

Finding: During operation in Prototype Build Stage there is one sample found not good functionality

Action: Records the serial number of wireless mouse and named as not good sample in Logitech report

3.1.3.5 Wheel Ratchet Life Test

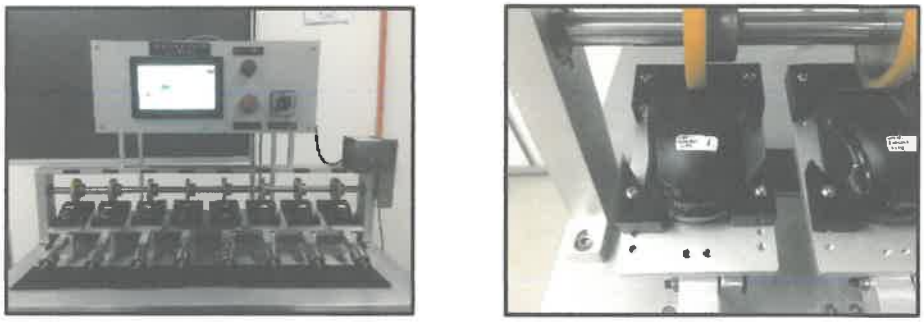


Figure 25: Wheel Ratchet Life Test

Figure 22: Appearance Check Main-Key Life Test

Wheel Ratchet Life Test is operation testing to checking the pressure intensity wireless mouse roller with the specification requirement by Logitech.

3.1.3.5.1 Specification Requirement

Product	Button Type	Test Condition	Duration
Mouse	Wheel Ratchet	Goal: 200K Times	Wheel Life Test : 5K = 2.5 Hours
		1.8hz/sec	Measure Force = 5min/unit
		Actuation Force: 100 gf	
		Button Feeling Check	
		Quantity: 4 Units	
		Monitory Every: Before, 5K,10K,20K,50K,100K,200K	

Figure 26: Figures of Wheel Ratchet Life Specification Requirements

Purpose: To check the roller performance with the specification requirement by Logitech

Methodology of Test:

i. Locate 8 unit samples Logitech wireless mouse

ii. Set machine counter monitory according to test condition

iii. Verify the roller function and performance of the samples

iv. Measuring forces of roller performance by using Wheel Ratchet Forces, recording the data result into Logitech report

Finding: After 200K cycling completed, the roller cycling performance is out of specification when push forward and backward the friction block of wireless roller mouse has found

Action : Measuring forces of roller mouse and evaluate the data result. After that, the trainee needed to observes the difference of data whether Pass or Fail.

3.1.3.6 Wheel Ratchet Forces

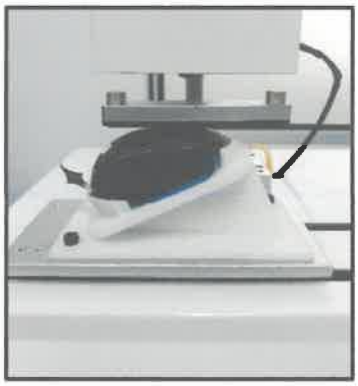


Figure 27: Wheel Ratchets Forces

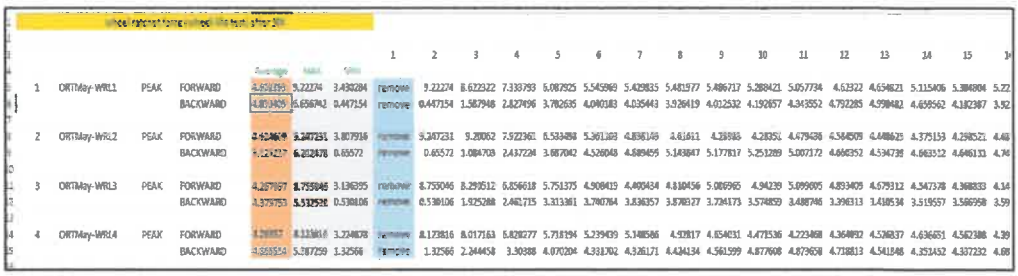
Purpose of test: To measuring forces of wireless roller mouse after completed Wheel Ratchet Life Test

Methodology of test:

I. Locate wireless mouse samples on jig

II. Starting measuring forces, observes the movement of mouse forward/backward

III. Observes the performance result, records the result into Logitech report



								1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1	ORTMay-WRL1	PEAK	FORWARD	4.651799	9.22274	3.430284	remove	9.22274	8.622322	7.333793	6.087925	5.545969	5.429835	5.481977	5.486717	5.288421	5.057734	4.63522	4.654821	5.115406	5.384804	5.22	
			BACKWARD	4.873405	6.656742	0.447154	remove	0.447154	1.587948	2.827496	3.782635	4.040183	4.035443	3.926419	4.012532	4.192657	4.343552	4.752285	4.998482	4.658562	4.182387	3.92	
2	ORTMay-WRL2	PEAK	FORWARD	4.424649	5.247231	3.807916	remove	5.247231	9.20062	7.922361	6.533498	5.361103	4.836148	4.61611	4.23885	4.28351	4.479436	4.584509	4.448625	4.375153	4.298521	4.48	
			BACKWARD	4.124227	6.282478	0.65572	remove	0.65572	1.084708	2.437224	3.687042	4.526048	4.589459	5.143847	5.177817	5.251289	5.007172	4.666352	4.534738	4.663512	4.646133	4.74	
3	ORTMay-WRL3	PEAK	FORWARD	4.287697	8.755046	3.136395	remove	8.755046	8.295512	6.856618	5.751375	4.908419	4.469434	4.810456	5.086965	4.94239	5.099005	4.893409	4.679312	4.347378	4.368333	4.14	
			BACKWARD	3.379757	5.512526	0.538106	remove	0.538106	1.925268	2.461715	3.313361	3.790764	3.836357	3.878327	3.724173	3.574859	3.488746	3.396313	3.418534	3.519557	3.566958	3.59	
4	ORTMay-WRL4	PEAK	FORWARD	4.29857	8.123816	3.234878	remove	8.123816	8.017163	6.828277	5.718194	5.239439	5.148586	4.92817	4.854031	4.472536	4.223468	4.364892	4.526837	4.636651	4.582386	4.39	
			BACKWARD	3.393524	5.287259	1.32566	remove	1.32566	2.244458	3.30388	4.070204	4.331702	4.326171	4.434134	4.561599	4.877608	4.879658	4.738813	4.541848	4.353452	4.337232	4.68	

Figure 28: Measurement Record Wheel Ratchet Life Test

3.1.3.7 Universal Test Machine (Zwick)

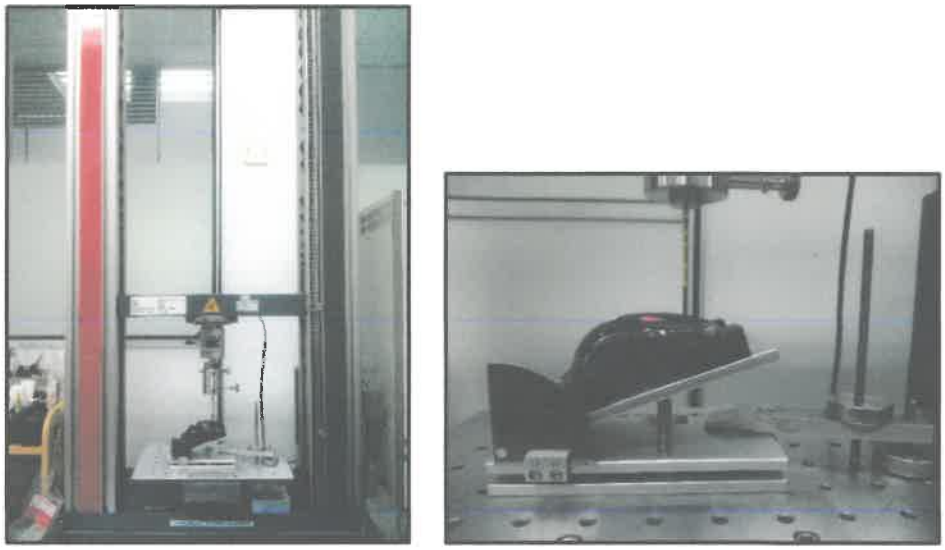


Figure 29: Universal Test Machine

Purpose of Test: To measuring forces main-key button mouse devices,

roller mouse devices

Methodology of Test:

I. Locate wireless mouse samples on jig plate with 25 degree angle

II. Starting measuring forces and observe the finger pressure on the top case button

III. Evaluate the graph performance and reading forces whether it in specification

IV. Inserting the result into Preliminary Test and Logitech report

Importance of Test:

I. To evaluate the wireless mouse button performance with intensity pressure with by specific requirement

II. To stimulate button feeling whether it in spec by doing measuring force

Preliminary Test and Analysis Report

Product Name: Gyro - 8L
Build stage: MP
Sample ID: New Supplier Kailua

Test Start Date: 17-May-19
Test End Date: 29-May-19
Tested By:

Test Name: Key force measurement
Acceptance : Main key force 30-110gf

OF = Operation force
RF = Release force
PT = Travel
CR = Click rat
(Opt force - relase force)/opt force x100%

DUT ID : 1

			gf				ccp			pt	
Ser. No	no of cyc	Keys		Opt. Force gram	Release Force N	Release Force gram	Click Ratio (%) N	Click Ratio (%) gram	Travel (um)	Travel (mm)	Difference <50%
1	Before	LEFT	0.677	69.03	0.536	54.66	20.83	20.83	274.795	0.27	#VALUE!
		RIGHT	0.756	77.09	0.607	61.92	19.71	19.71	301.434	0.30	#VALUE!
	1M	LEFT	0.668	68.12	0.536	54.66	19.76	19.76	233.731	0.23	-1.33
		RIGHT	0.747	76.17	0.563	57.41	24.63	24.63	265.912	0.27	-1.19
	2M	LEFT	0.668	68.12	0.519	52.92	22.31	22.31	225.189	0.23	-1.33
		RIGHT	0.738	75.25	0.563	57.41	23.71	23.71	256.303	0.26	-2.38
	3M	LEFT	0.643	65.46	0.484	49.35	24.61	24.61	235.43	0.24	-5.17
		RIGHT	0.703	71.68	0.550	56.14	17.50	17.50	275.159	0.28	-7.01

Figure 30: Measurement Record Main-Key Life Test

Mainkey Bottom life test key force measurement record

Item/項目			Left key/左鍵									Right key/右鍵								
Spec/規格			Forces: 30~110 gf / CCP: % different <50%									Forces: 30~110 gf / CCP: %								
No.	Record	Finger force(gf) 200~300	Before	500K	difference (%)	1M	difference (%)	2M	difference (%)	5M	difference (%)	Finger force(gf) 200~300	Before	500K	difference (%)	1M	difference (%)	2M	difference (%)	5M	difference (%)
1	Force (gf)	250.13	69.03	NA	NA	68.12	-1.33	68.12	-1.33	66.46	-5.17	222.88	77.09	NA	NA	76.17	-1.19	76.20	-2.38	71.68	-7.01
	PT		0.27	NA	NA	0.23		0.23		0.24			0.30	NA	NA	0.27		0.26		0.28	
	CCP (%)		20.83	NA	NA	19.76		26.31		24.51			19.71	NA	NA	24.63		23.71		17.50	
2	Force (gf)	243.40	76.84	NA	NA	78.92	1.18	71.68	-8.10	73.02	-5.75	237.93	91.68	NA	NA	73.52	2.56	70.87	-1.14	70.87	-1.14
	PT		0.38	NA	NA	0.31		0.26		0.29			0.33	NA	NA	0.30		0.26		0.28	
	CCP (%)		20.65	NA	NA	21.58		19.79		19.08			19.89	NA	NA	18.45		20.29		20.29	
3	Force (gf)	257.88	73.52	NA	NA	71.68	-2.50	68.98	-6.10	68.00	-8.10	224.34	69.01	NA	NA	67.20	-2.66	67.20	-2.66	72.80	5.17
	PT		0.35	NA	NA	0.30		0.28		0.27			0.33	NA	NA	0.26		0.26		0.24	
	CCP (%)		20.60	NA	NA	22.48		22.15		21.16			22.84	NA	NA	18.66		18.10		22.15	
4	Force (gf)	226.37	76.74	NA	NA	76.17	-4.48	70.80	-1.02	76.17	-4.48	237.25	79.95	NA	NA	72.80	-8.01	71.87	-10.21	72.80	-8.01
	PT		0.35	NA	NA	0.29		0.28		0.30			0.32	NA	NA	0.26		0.28		0.28	
	CCP (%)		23.53	NA	NA	22.36		21.48		19.95			22.79	NA	NA	27.11		20.29		19.80	
5	Force (gf)	230.76	64.55	NA	NA	68.12	5.53	68.98	-1.42	68.28	2.84	207.00	70.77	NA	NA	73.68	3.30	68.12	-3.75	68.12	-3.75
	PT		0.29	NA	NA	0.31		0.28		0.29			0.32	NA	NA	0.30		0.28		0.28	
	CCP (%)		22.27	NA	NA	19.76		18.27		19.05			22.17	NA	NA	22.48		24.11		26.41	
6	Force (gf)	225.05	68.03	NA	NA	68.12	-1.33	67.20	-2.66	64.58	-6.50	255.95	82.76	NA	NA	73.25	-8.79	72.82	-10.88	72.82	-10.88
	PT		0.28	NA	NA	0.25		0.23		0.22			0.26	NA	NA	0.28		0.28		0.24	
	CCP (%)		16.17	NA	NA	23.11		15.93		19.43			17.69	NA	NA	20.19		19.56		22.15	

Figure 31: Raw Data Measurement Forces

3.2 Special Project

The project duration is about 5 month, starting from February 2019 and expected to be completed on June 2019. Therefore, the trainee has been participated with the planning and analysis phase only, whereby all information & resources are being studied and identified. The trainee was discuss with organization supervisor about special project that are need to complete by requirement of subject IMC690 and faculty core. During discussion session, organization supervisor has inform that mouse project is incoming with new equipment machine that will to use for operating testing for Reliability Laboratory.

Apart of that, organization supervisor has requested to trainee for develop new system as special project that can give the contribution for Reliability Laboratory. The title of the system that are going to develop and complete is **Product Reliability Test Instruction System**. This system is involves four type of test instruction of machine equipment which is Packaging Sequence A, Main-Key Life Test, Burn In Test and Wheel Ratchet Life Test.

3.2.1 Objectives

Below is objectives for develop this system, which is:

i. To develop a digital reliability testing as well as maintaining manual method
ii. To provide a better illustration and visual of reliability testing of machine tester equipment

3.2.2 Problem Statement

I. The observation found the staff are recording samples transaction by recording in log book

II. There is no systematic places to store the log book

3.2.3 Benefits of the system;

I. To enable user to more understanding the visual in order to use new machine

II. Users can records daily activities with additional recording features of this system

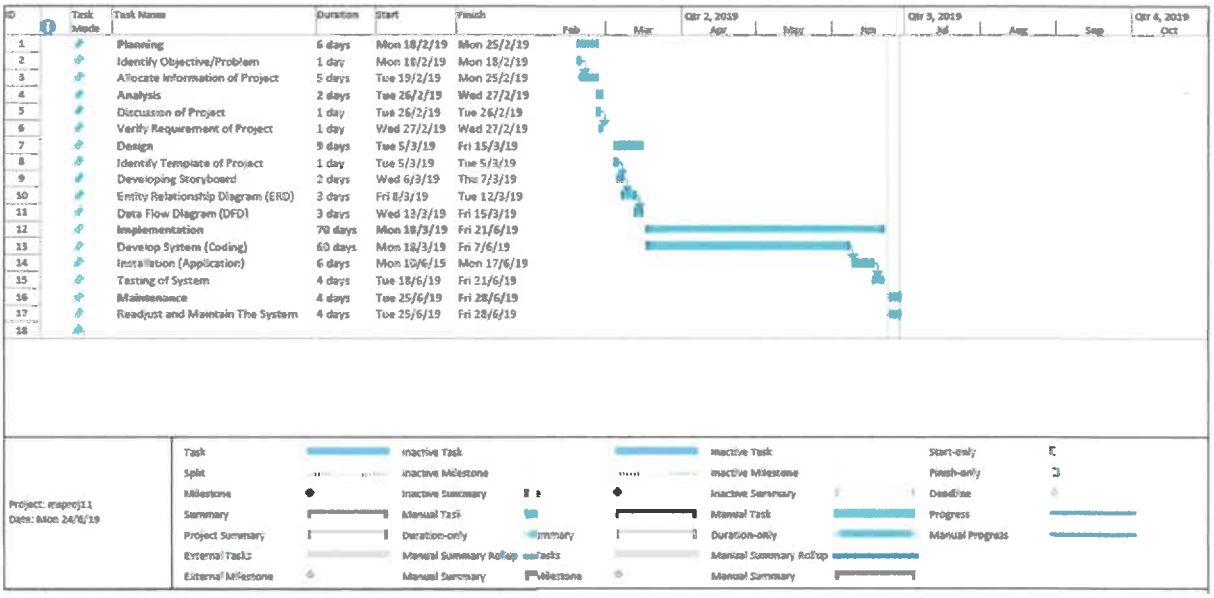
III. Users can tracking a highlighted result quantity samples received and return from production assembly department

3.2.4 Scope of Project

In beginning of proposal of the project, industrial supervisor has requested to the trainee to develop one system as special project in order with upcoming of new project for Reliability Lab. The scope is this project is involves the staff and new trainee that has joined in Reliability Lab.

Furthermore, this project able to easier for the staff and new trainee internship to a better visual of product reliability testing and they can to inserting the sampling transaction of Logitech Mouse between Reliability Lab and production assembly.

3.3 Project Timeline



ID	Task Mode	Task Name	Duration	Start	Finish
1		Planning	6 days	Mon 18/2/19	Mon 25/2/19
2		Identify Objective/Problem	1 day	Mon 18/2/19	Mon 18/2/19
3		Allocate Information of Project	5 days	Tue 19/2/19	Mon 25/2/19
4		Analysis	2 days	Tue 26/2/19	Wed 27/2/19
5		Discussion of Project	1 day	Tue 26/2/19	Tue 26/2/19
6		Verify Requirement of Project	1 day	Wed 27/2/19	Wed 27/2/19
7		Design	9 days	Tue 5/3/19	Fri 15/3/19
8		Identify Template of Project	1 day	Tue 5/3/19	Tue 5/3/19
9		Developing Storyboard	2 days	Wed 6/3/19	Thu 7/3/19
10		Entity Relationship Diagram (ERD)	3 days	Fri 8/3/19	Tue 12/3/19
11		Data Flow Diagram (DFD)	3 days	Wed 13/3/19	Fri 15/3/19
12		Implementation	70 days	Mon 18/3/19	Fri 21/6/19
13		Develop System (Coding)	60 days	Mon 18/3/19	Fri 7/6/19
14		Installation (Application)	6 days	Mon 10/6/19	Mon 17/6/19
15		Testing of System	4 days	Tue 18/6/19	Fri 21/6/19
16		Maintenance	4 days	Tue 25/6/19	Fri 28/6/19
17		Readjust and Maintain The System	4 days	Tue 25/6/19	Fri 28/6/19
18					

Figure 32: Project Timeline Special Project

3.4 System Development Life Cycle

The trainee has applied system development life cycle (SDLC) as part to develop the system as special project that are going to complete. System Development Life Cycle (SDLC) consist part of Planning, Analysis, Design, Implementation and Maintenance.

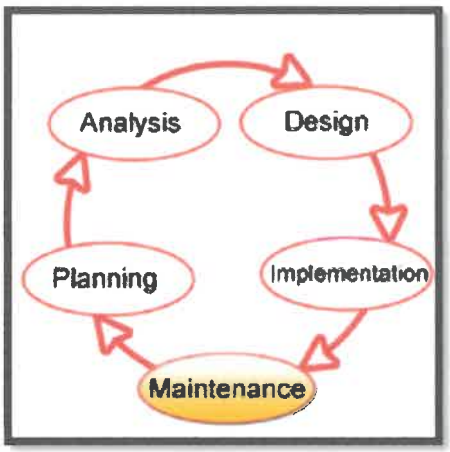


Figure 33: Diagram of SDLC

3.4.1 Planning

Planning phases of this system, the trainee identify the objectives for the project that are going to develop and identify the problems that can providing solutions for the staff in Reliability Laboratory by developing new system for usability their work daily activities. Besides, the trainee allocate information of the project that can be used in order to setup the project consist of duration and resources to complete the project. The trainee drafting the concept of the project that going to complete.

3.4.2 Analysis

The trainee was discussed with organization supervisor about special project for trainee in order to complete industrial training. On the discussion session, organization supervisor has inform, new project will begin for Reliability Laboratory. The project is M325 mouse (Logitech) is wireless mouse that enable for testing according to Logitech requirement. Some of machine was choose for develop the system that involves of Main-Key Life Test, Burn In Test, Wheel Ratchet Life Test and Packaging Sequence A. Based on that, the organization supervisor has requested to trainee for develop a digital test instruction as well as maintaining paper method as special project for trainee. The system consist of two features which viewing visual of test instruction in how to operating testing and recording daily activities of testing machine.

3.4.3 Design

These phases consist of two part, which is conceptual design and physical design. For conceptual design, it involves Entity Relationship Diagram (ERD). Data Flow Diagram (DFD) and Context Diagram. This conceptual design is consist of two entity, which is staff (user), and activities. For physical, design the trainee developing storyboard for the project. Besides, the trainee referring other template that can be to merging with storyboard that has agree by both parties. Emphasis on viewing effect will avoid user with too much of texting.

3.4.4 Implementation

The implementation of the project is developing a digital method as well as maintained a manual paper of test instruction. Hereby, for manual paper test instruction it more details about the usability of the machine. Meanwhile, the manual paper it useful of organization documentation format in order to prepare for audit from external parties to organization.

Developing of project is usability for Reliability Laboratory purpose only meanwhile those can to understanding quickly compare to referring the manual paper by digital method and illustration effects. In addition, in this section also providing coding language that allow to using. For example, PHP, MySQL and Adobe Dreamweaver.

3.4.5 Maintenance

For maintenance section, the trainee enable the project can to handling and identify problem happens such as bugging of the system project. This to ensure the system can to use as well as easier for the user to for viewing and recording their daily activities and easier to tracking for referring purpose. Furthermore, the project can to upgrade with found some features that needed to add for the project as well as suitable based on current situation.

3.5 Context Diagram

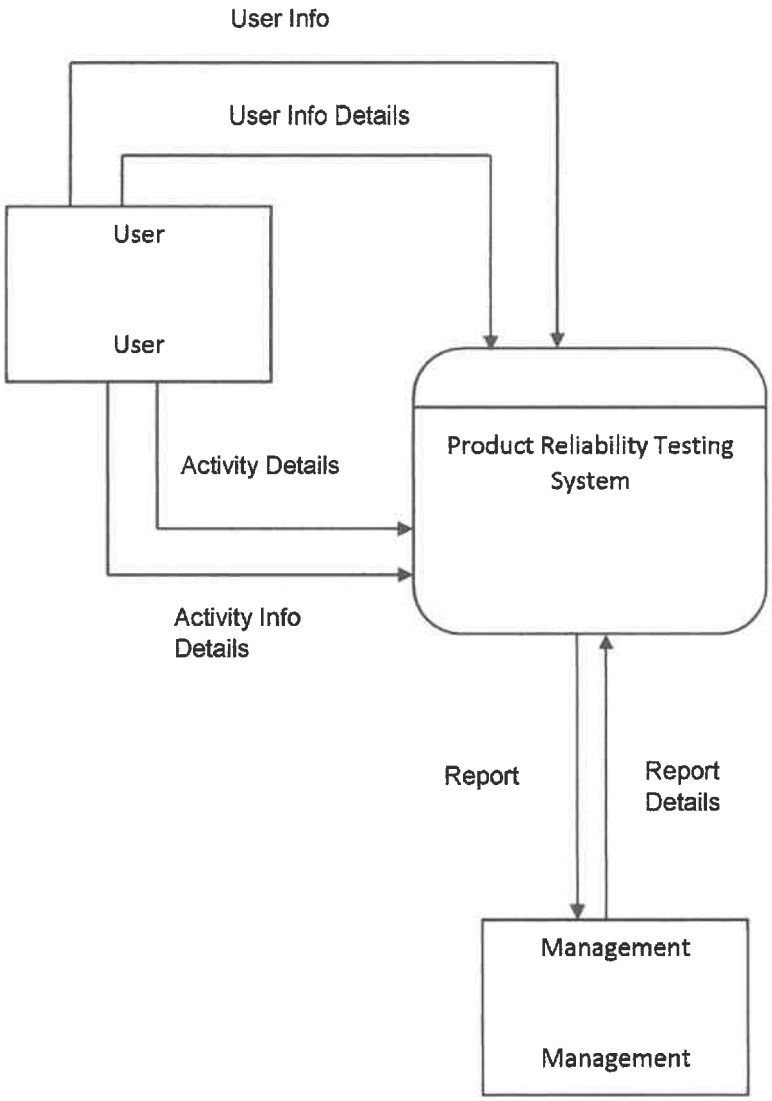


Figure 34: Context Diagram of Special Project

3.6 Data Flow Diagram

3.6.1 Level 0

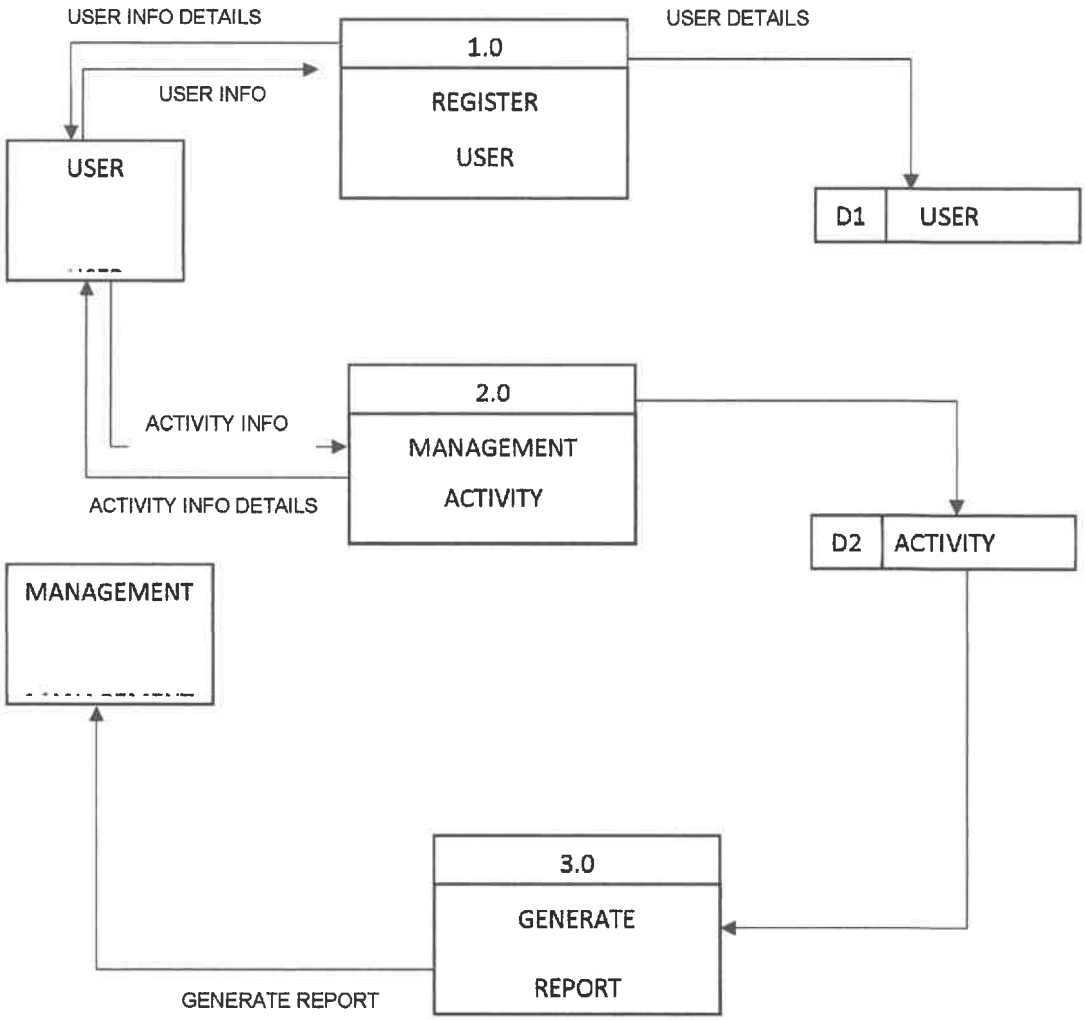


Figure 35: Data Flow Diagram (Level 0) User Details

3.6.2 Level 1

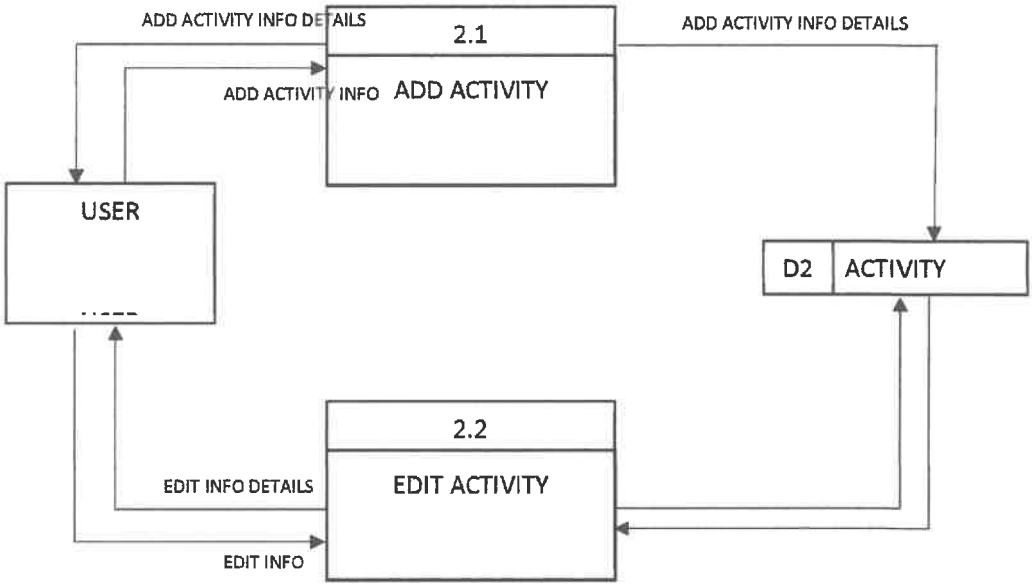


Figure 36: Data Flow Diagram (Level 1)

3.7 Entity Relationship Diagram

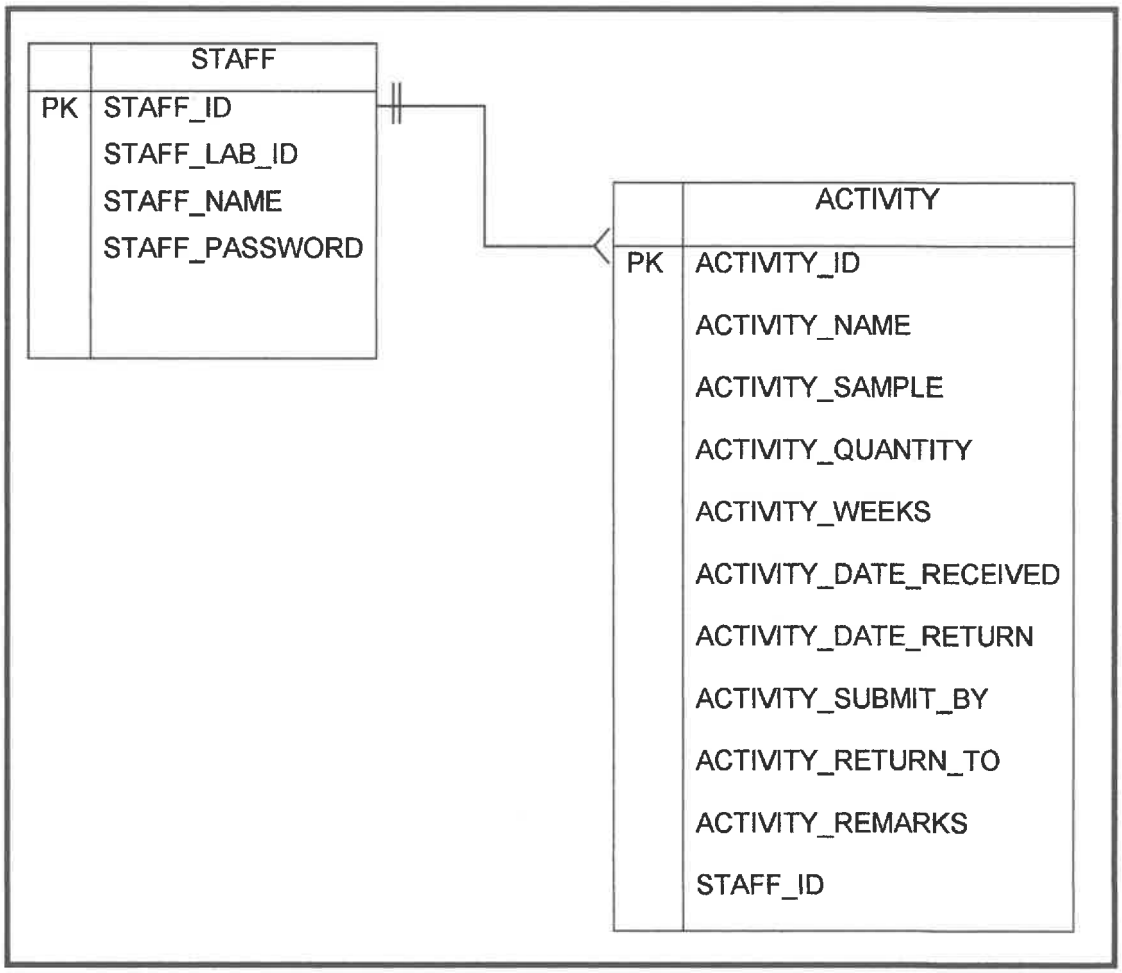


Figure 37: Entity Relationship Diagram of Special Project

3.8 Workflow of System

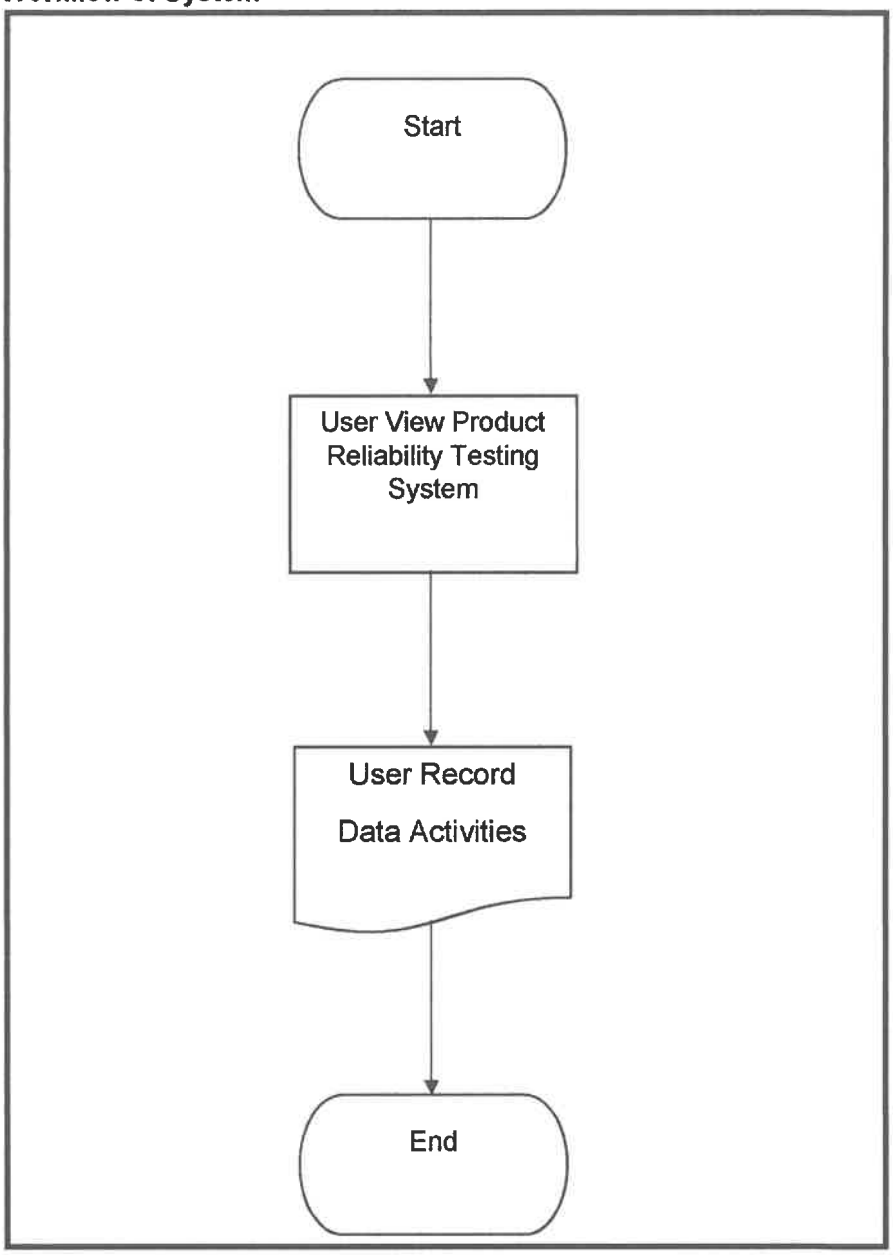


Figure 38: Workflow of Special Project

3.9 Interface Design

3.9.1 Log In Interface

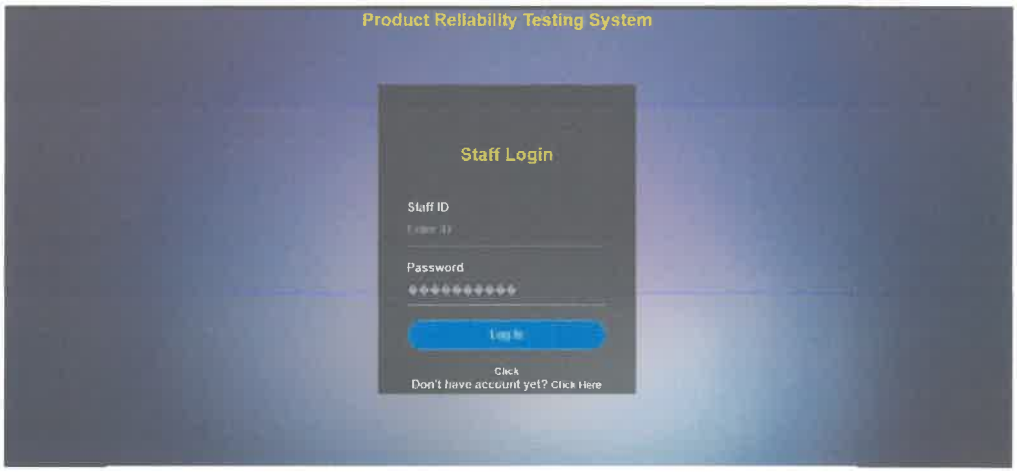


Figure 39: Log In Interface

3.9.2 Sign In Interface

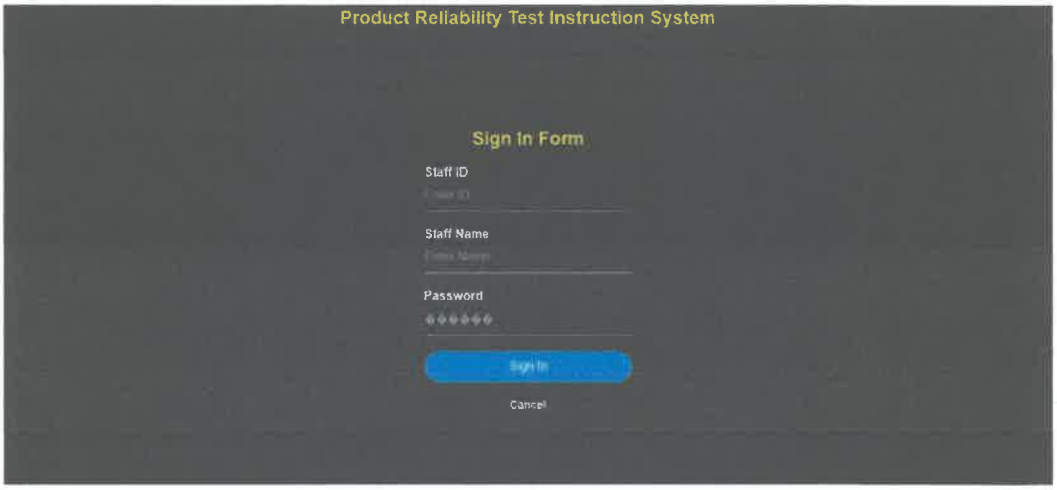


Figure 40: Sign In Interface

3.9.3 Homepage Interface

Figure 41: Homepage Interface

3.9.4 Packaging Sequence A Interface

Figure 42: Packaging Sequence A Interface

3.9.5 Drop Testing Interface

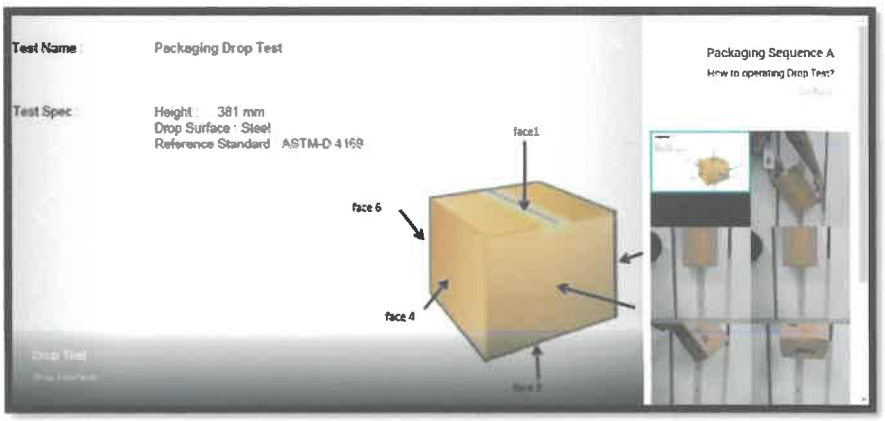


Figure 43: Drop Testing Interface

3.9.6 Compression Testing Interface

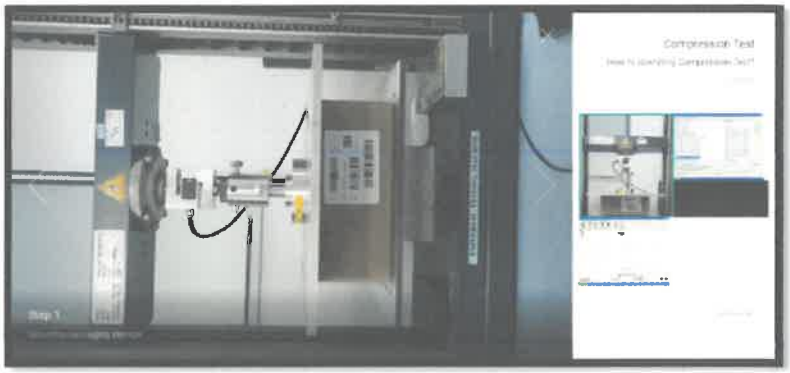


Figure 44: Compression Testing Interface

3.9.7 Vibration Test I Interface

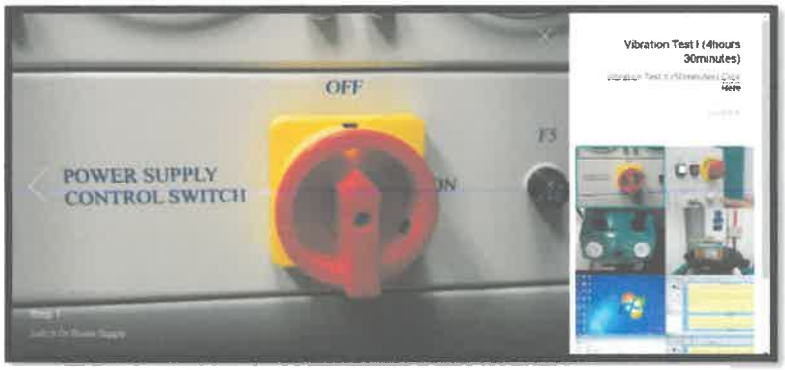


Figure 45: Vibration 1 Interface

3.9.8 Vibration Test II Interface

Figure 46: Vibration Test 2 Interface

3.9.9 Main-Key Life Test Interface

Figure 47: Main-Key Life Test Interface

3.9.10 Equipment Used For Main-Key Life Test

Figure 48: Equipment Used For Main-Key Life Test Interface

3.9.11 Mounting Samples Testing

Figure 49: Mounting Samples Testing Interface

3.9.12 Setup Program Machine

Figure 50: Setup Program Machine Interface

3.9.13 Burn In Test Interface

Figure 51: Burn In Test Interface

3.9.14 Equipment Used For Burn In Life Test

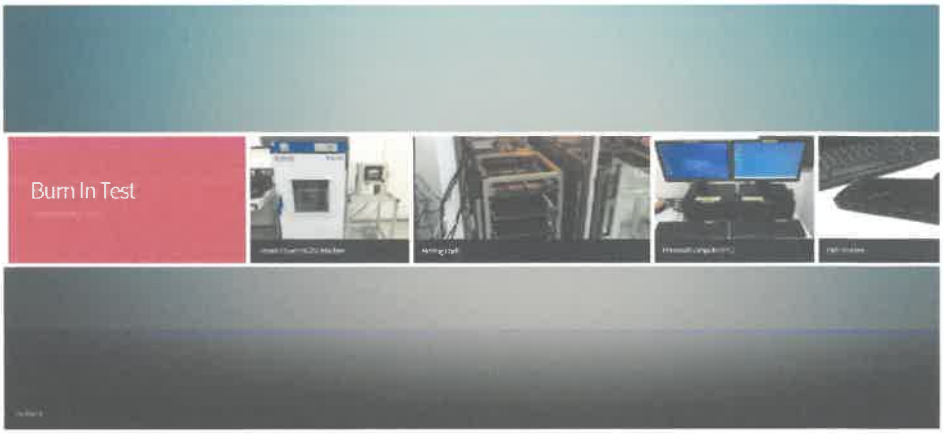


Figure 52: Equipment Used For Burn In Test Interface

3.9.15 Testing Setup For Burn In Test

Figure 53: Testing Setup For Burn In Test Interface

3.9.16 Moving Rack Operating

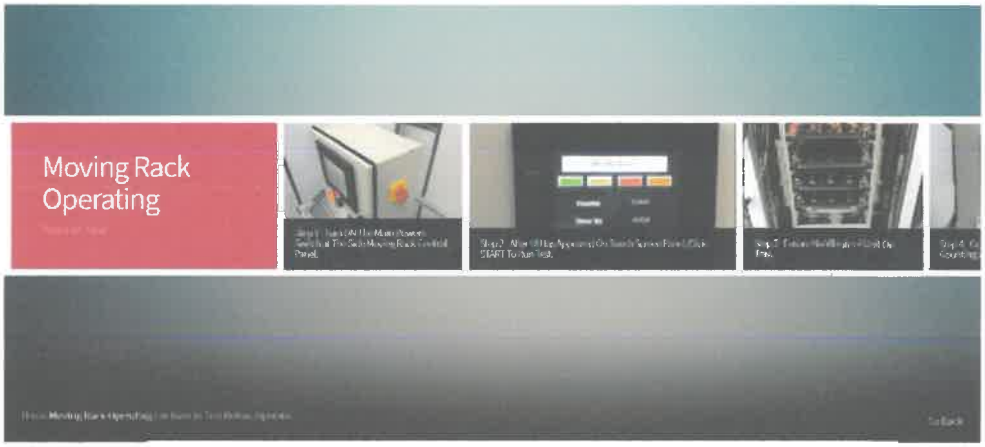


Figure 54: Moving Rack Operating Interface

3.9.17 Testing Setup To Operating Oven

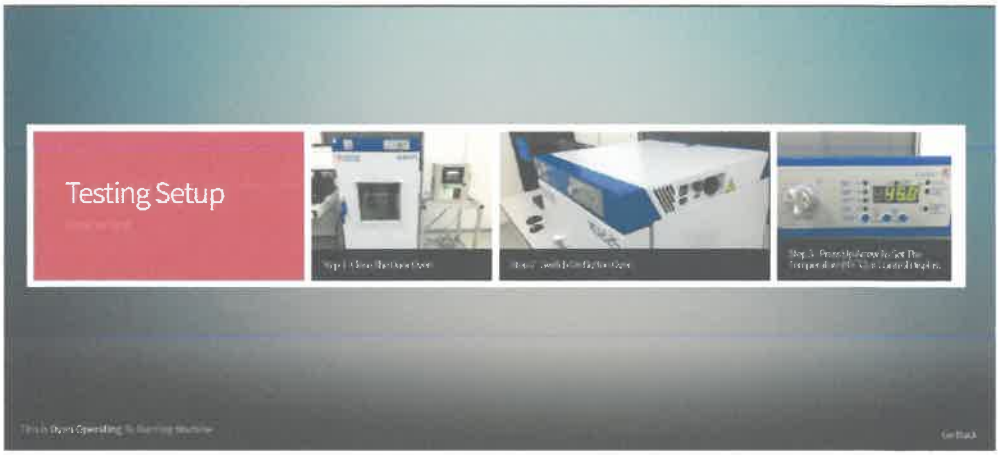
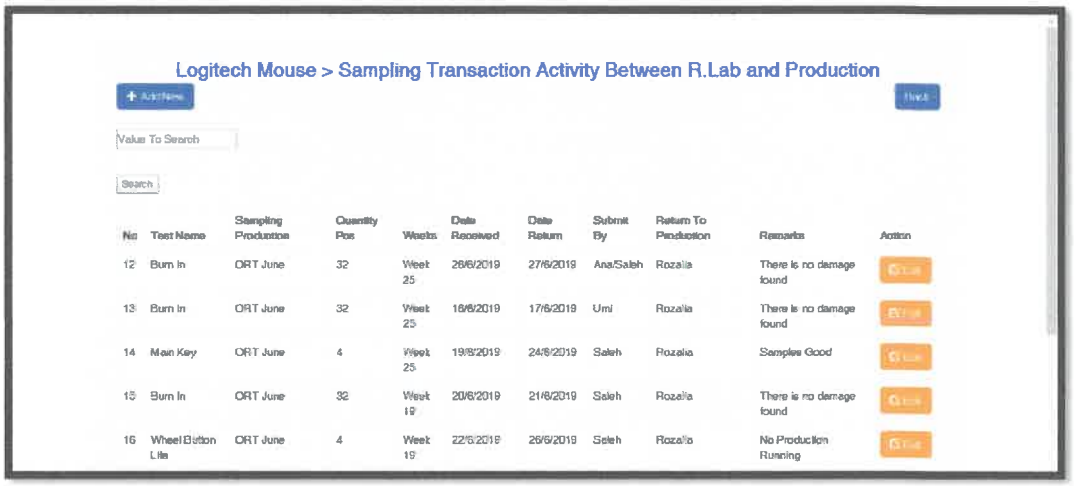


Figure 55: Testing Setup To Operating Oven Interface

3.9.18 Wheel Ratchet Life Tester Interface

Figure 56: Wheel Ratchet Life Tester Interface

3.9.19 Daily Activitity Log Table



Logitech Mouse > Sampling Transaction Activity Between R.Lab and Production

Value To Search

Search

No	Test Name	Sampling Production	Quantity Pcs	Weeks	Date Received	Date Return	Submit By	Return To Pendaftan	Remarks	Action
12	Burn In	ORT June	32	Week 25	26/6/2019	27/6/2019	Ana/Saleh	Rozalia	There is no damage found	
13	Burn In	ORT June	32	Week 25	18/6/2019	17/6/2019	Umi	Rozalia	There is no damage found	
14	Main Key	ORT June	4	Week 25	19/6/2019	24/6/2019	Saleh	Rozalia	Samples Good	
15	Burn In	ORT June	32	Week 19	20/6/2019	21/6/2019	Saleh	Rozalia	There is no damage found	
16	Wheel Button Life	ORT June	4	Week 19	22/6/2019	26/6/2019	Saleh	Rozalia	No Production Running	

Figure 57: Activity Log Table (Inserting Data)

3.9.20 Staff Add New Activities

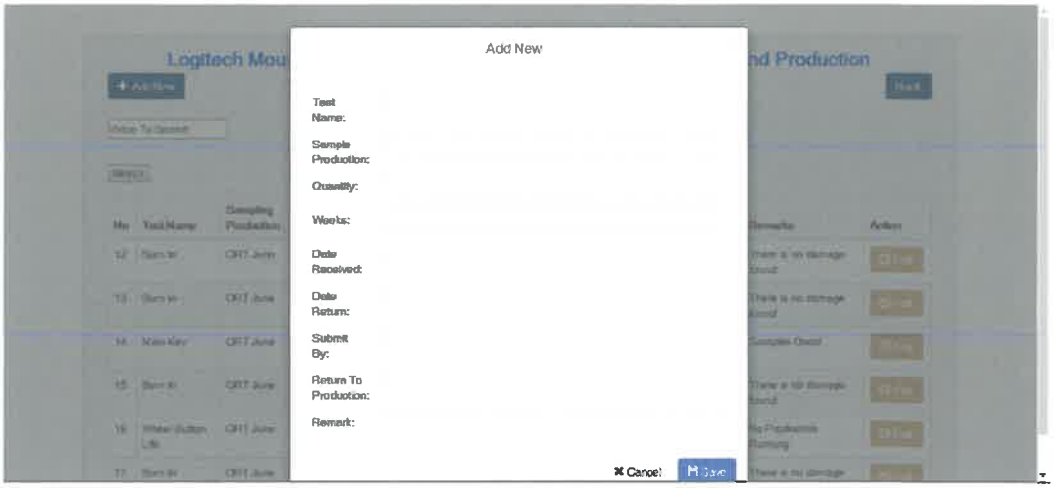


Figure 58: Add New Activities Interface

3.9.21 Staff Edit Activities

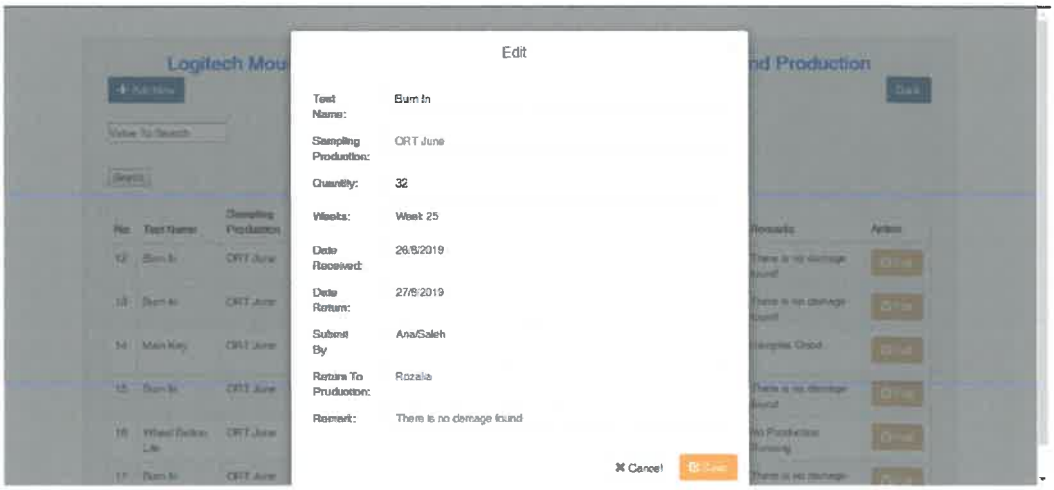


Figure 59: Edit Activities Interface

4 CHAPTER 4: CONCLUSION

4.1 Application of knowledge, skills and experience in undertaking the task (Knowledge gained)

The trainee had applied the knowledge and skills learnt from System Analysis and Design I and II subject in order to develop the system and website for the client. The trainee as well had explored furthermore on PHP coding independently by referring to other sources, such as website portal for template and YouTube for inserting data into databases MySQL. The experience gathered from handling events and programmes (including user training) during studies in Faculty of Information Management, UiTM Kelantan also had benefited the trainee in order to communicate with the staff and to handle an task that was given to ensure the trainee can gain knowledge and more to solves the problems and generate an idea to upgrading for easier to able the activities joined will more faster and excellent.

4.1.4 Communication Skills

The trainee had the probability to enhance conversation skills with the public at some stage in the industrial coaching considering that there is continually be an interplay with different human beings whether or not interaction from staffs in that company, staffs from another agency however additionally the clients. By the interaction from others, it allowed the trainee to trade thought and gain greater knowledge. Before this, the trainee solely had chance to communicate with the classmates and lecturers throughout presentation in class.

4.1.5 Multi-Tasking Skills

The trainee had been trained to be a multi-tasking as the trainee already be capable to do multiple task during previous semester whenever the trainee done the assignment given by the lecturers especially for research purpose assignment which required the trainee to make a research not only by reading an article by also review the article. So, during the industrial training the trainee had get used to not only focus on one task in a day. For example, operating three machine for testing and send the result of testing to upper part of the project for feedback to customer (Logitech) and merging the statistics result between both industries (Malaysia-China).

4.2 Personal thoughts and opinion

4.2.2 Facility and equipment

The facility and equipment in the office is limited. It maybe because of to cut the company budgets. For example, for pc important notice like to remote another pc. The company has no provides personal computer (PC) for the trainee and furthermore the trainee need to borrow the staff PC to inserting the data result. At the same time, the staff also want to use the same PC to inserting the other data result of testing. Besides, in Reliability Lab (Logitech Wireless Mouse) room also has limited PC to able connection receiver wireless mouse when running a testing to view the connection receiver wireless mouse

4.3 Lesson learnt

4.3.1 Teamwork Skill

The trainee had gained team work skill as the trainee not only focus on one task but do all the task given which requires the trainee to work together with the other staff. This eventually will build up the teamwork skill between the trainee and the staff. For example, when the trainee needed to collect the samples unit from production assembly (ground floor) and carry the samples to go to Reliability Lab (Logitech Wireless Mouse) room. Besides, the trainee work together with other staff to running testing to ensure the is no problems happen during testing are begin. The trainee has participate with duty task that asking by industrial supervisor

4.3.2 Gaining Experience

For five month of industrial training had gave a possibility to the trainee to research new things in work experience. For example, the trainee now knows how to doing testing of product devices with use of many machine equipment. In starting learning, the trainee has participate to solve problem happen when observing the statistics data of samples found fail result that it out of specification. Besides, the trainee was participate to troubleshoot the problem with industrial supervisor and gain a better way to ensure testing can gain the specification requirement and collect the pass result. The trainee also gain new skill of used Microsoft Excel for a better skill with support from industrial supervisor and other staff. Besides, the trainee gain trusted from industrial supervisor to emailing the data result of testing to upper department of the Logitech mouse project. This is because, this project involving the biggest person who are cooperate with Logitech customer and because of that, the trainee are use the platform to the best way as the trainee of Reliability Lab and show the good leaning participation.

4.3.3 Optimism

During the industrial training, there is difficulties faced by the trainee. For example, the trainee need to understand the formatting to inserting the data into measurement record and Logitech report format, which may influenced the trainee difficult carefully inserting the data and making a formula of the data to comparing the differences result of samples.

4.3.4 Good social relationships

The five (5) months industrial training had taught the trainee to be friendly with staff in Reliability Lab, which is gain, know the working environment and catch-up the scope of work to ensure the testing will operate by requirement

4.3.5 Independent

The trainee can adopt the work of nature of Reliability Lab where the trainee will running and maintenance the machine independently without waiting instruction from industrial supervisor. The trainee also can doing decision in order to observes the data and sharing the result to upper department which is Research & Design Department to doing another decision of the result

4.4 Limitations and Recommendations

4.4.1 Lack of staff

The trainee and the staff need to do much work in the same time as there is lack of the staff and the staff need to double their effort to done all the work. For examples, when the three testing need to begin at the same time, the trainee and staff need to rushing to setup from one machine to another machine. Furthermore, the industrial supervisor want to staff to collect the data result of samples as soon as possible to feedback to upper department. Here, more staff needed to be hired to help other staff to do the other task as to make the work be done quicker.

4.4.2 Recommendations

For recommendations, Reliability Lab need to upgrade more equipment to much better easier for the staff to running a testing properly. For examples is personal computer (PC) because when doing a testing, PC is very important to enable collected of data result samples can gain quickly and can save time. Furthermore, in Reliability Lab, it should hired more staff to managing the new upcoming project and do not just allow only the trainee to participate for doing a testing but need supported and guideline with permanent staff.

5 References

Bibliography

PHP MySQL UPDATE Query. (n.d.). Retrieved from https://www.tutorialrepublic.com/php-tutorial/php-mysql-update-query.php

(n.d.). Retrieved from https://www.w3schools.com/php/php_intro.asp