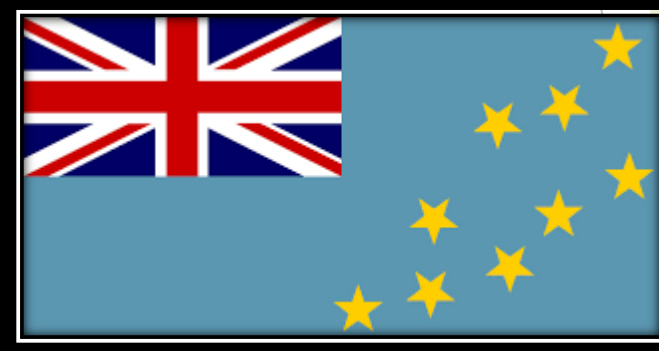


# Professional Development of a Biomedical Engineer



- ▶ Nelson Vaguna (Biomedical Technician)
- ▶ Semisi Finau (Biomedical Engineering Consultant)

# What is Professional Development?

- ▶ Gaining new skills and knowledge
- ▶ To continue for higher Education
- ▶ Capacity building
- ▶ Upgrading tools and equipment
- ▶ Occupational Health and Safety in workplace
- ▶ Registering to Professional engineering license

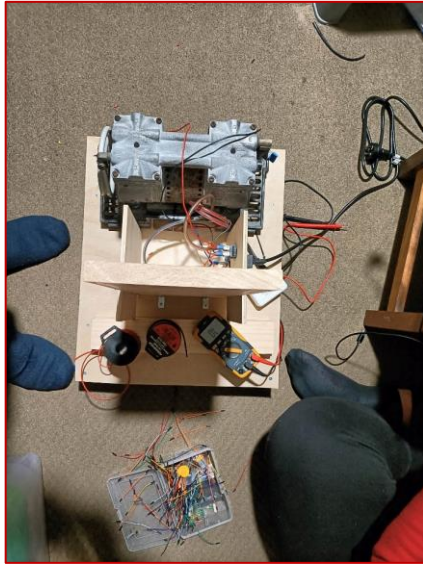
# Learning New Skills

- ▶ 3 years- BSE in Electrical Engineering (Unitec Institute of Technology, AKLD NZ)
- ▶ Assist in the installation of new electrical back-up generator-TEC

## Assist in the Installation of New Generator

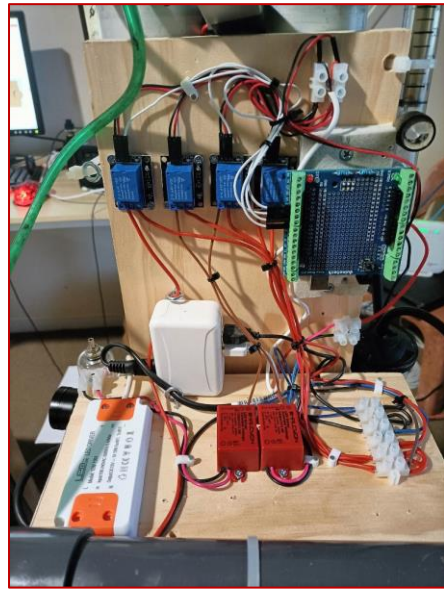






## Parts and Components

- Order online
- Use old machine/device parts
- Purchase in electronic shop
- Download software online or available in Uni



```
//*****  
Serial.println("Relay Test Sequence");  
delay(Relay_Test_Delay);  
digitalWrite(Sieve_A_Valve, HIGH);  
delay(Relay_Test_Delay);  
digitalWrite(Sieve_B_Valve, HIGH);  
delay(Relay_Test_Delay);  
digitalWrite(PreCharge_Valve, HIGH);  
delay(Relay_Test_Delay);  
digitalWrite(Motor, HIGH);  
delay(Relay_Test_Delay);  
Serial.println("Relay Test Sequence Complete");  
delay(Relay_Test_Delay);  
Serial.println("Program Starting...");  
delay(Relay_Test_Delay);
```



Accumulation tank

AC -DC converter

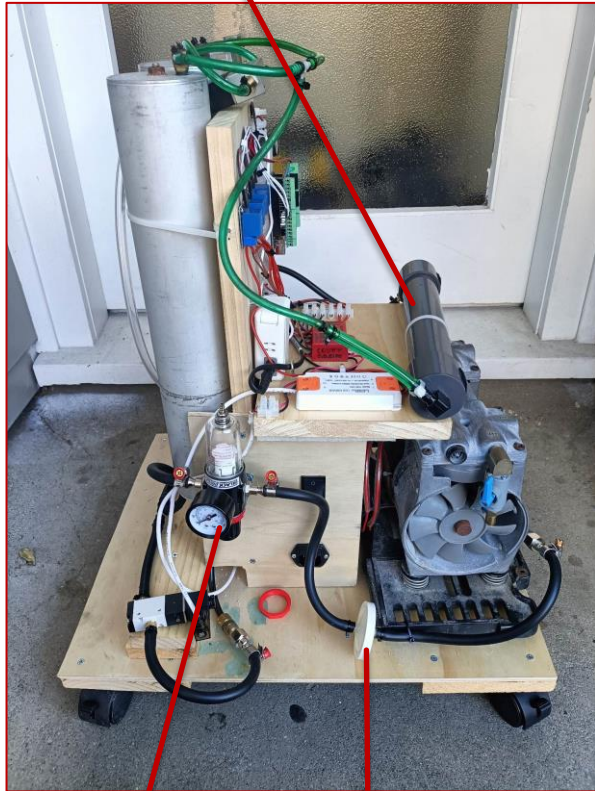
Relays

Arduino Uno

Air Flow control

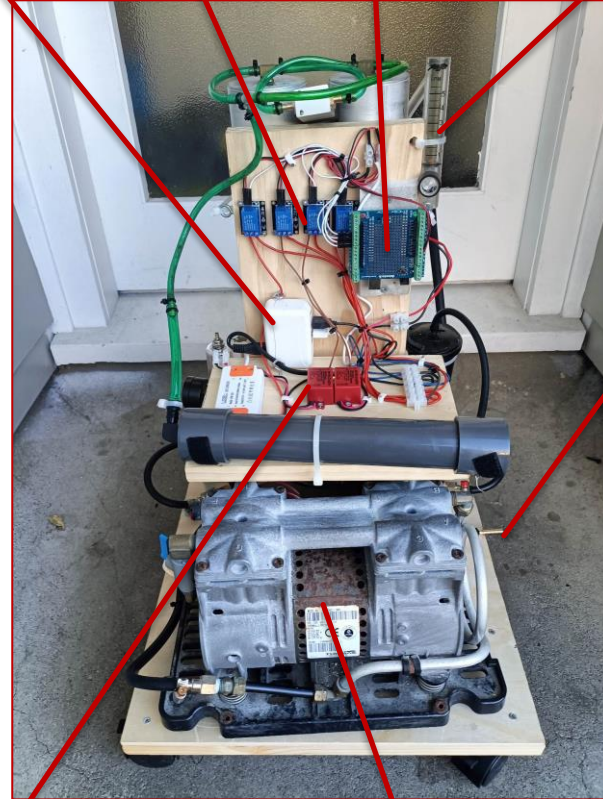
Oxygen outlet

Balancing pressure solenoid



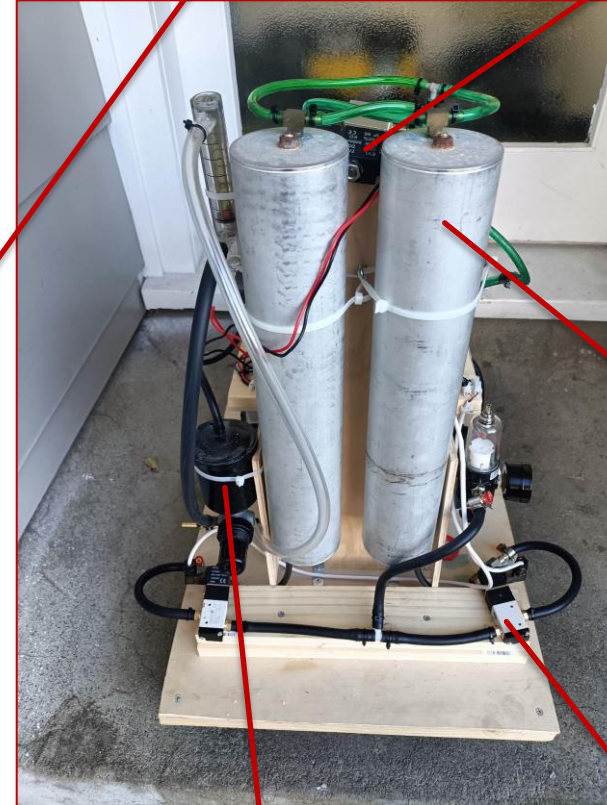
High pressure regulator

Air pressure filter



Voltage converter

Air-Compressor (air free)



Zeolite Canister

Low pressure gauge

3 port/ 2way solenoid valve





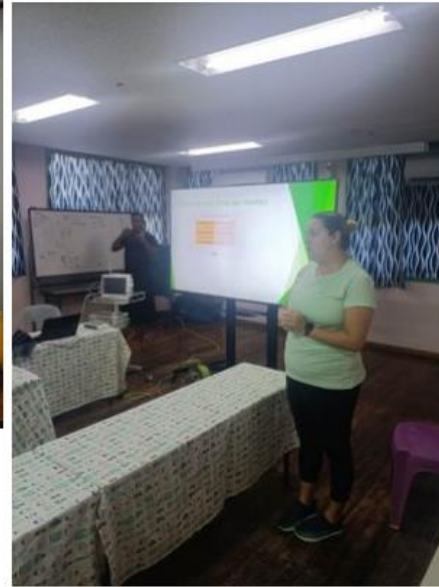
# Training and Workshops



- Medical equipment user's care training workshops
- Training on testing equipment tools
- Career pathways expo

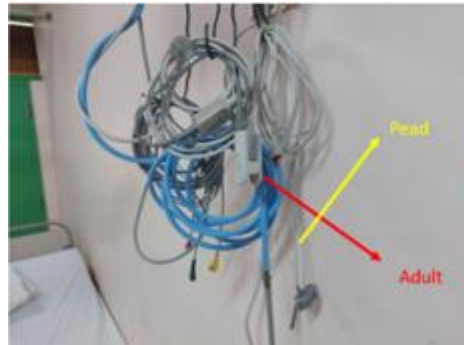


## Human Resources recruitment and Sustainability





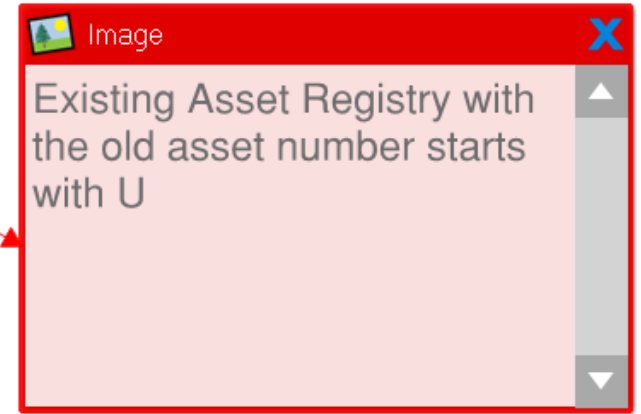
# Proper Order



If you are ready prepared you should not fear

# Asset Registry- At First

BME NO.	DEPARTMENT	DESCRIPTION	MAKER	MODEL	SERIAL NUMBER
U4875	LABORATORY	Laboratory Centrifuge	Thermo Fisher Scientific	Heraeus Megafuge 8	721114052602
U4324	LABORATORY	Automated Hematology Analyzer	Sysmex Cori	KX-21N cobas	B8678
System ID: 119892	LABORATORY	DAC VANTAGE ANALYZER (HbA1C analyzer)	SIEMENS HEALTHINEERS	(240) 10282970	(21) 5069517
U4323?? Asset Register 2018	LABORATORY	9180 Electrolyte Analyser	Roche Diagnostics		Ref: 03112349180

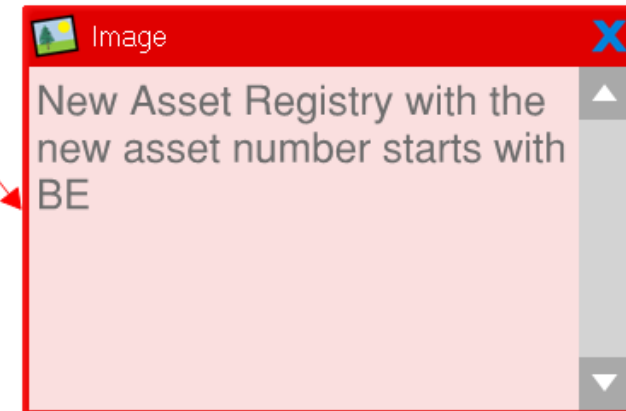


File Home Insert Draw Page Layout Formulas Data Review View Automate Developer Help BLUEBEAM Comments

Trebuchet MS 14 A A Conditional Formatting Insert Delete Format Analyze Data Sensitivity Create PDF Change Settings Batch PDF

Clipboard Font Alignment Number Styles Cells Editing Analysis Sensitivity Bluebeam

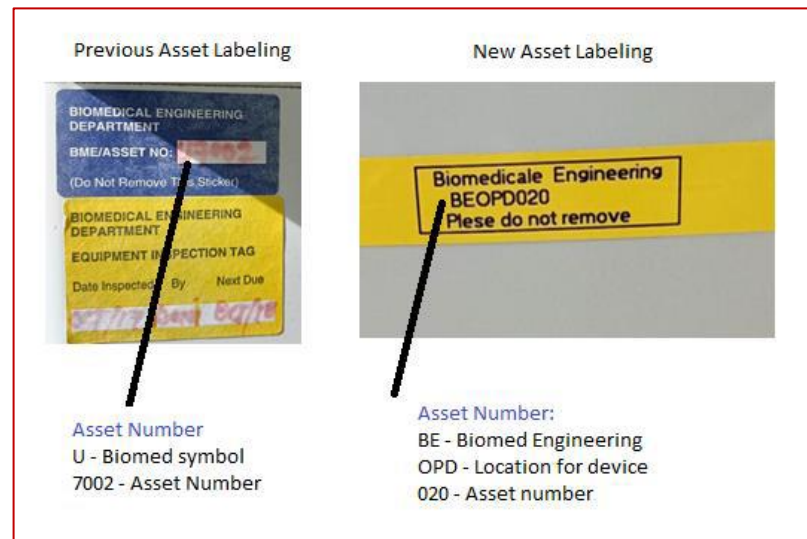
BME NO.	DEPARTMENT	DESCRIPTION	MAKER	MODEL	SERIAL NUMBER	DATE
BEOP016	OPD	Syringe pump	SINO MEDT	SIN-600V	0498200828A0105 1	2022
BEOP018	OPD	Fingertip Pulse oximeter	YIMI LIFE	YM101	1.01201E+15	2022
BEOP019	OPD	Forehead thermometer	RNA PHARMA	AET-R1B1	1.06938E+13	2022
BEOP017	OPD	ECG machine	EDAN	SE-301	360625- M211301140019	2022





# Asset Registry- Unique

- **BE (Asset number)**
- BEICU001-Intensive Care unit
- BEOPD001-Outpatient Department
- BEOBS001-Obstetric Ward
- BELAB001-Laboratory
- BEOPT001-Operating Theatre
- BENUI001-Niutao Clinic
- BELOU001-Loufeagai



# Asset Register Database

Asset No	Department	Description	Manufacture	Brand/Model	Status	Last Maintenance	Next Maintenance
BEOPD001	OPD	Defibrillator	MEDIANA	IMD	Active	01/01/2023	01/01/2024
BEOPD002	OPD	Defibrillator	MEDIANA	D500	Active	01/01/2023	01/01/2024
BEOPD003	OPD	AED Defibrillator	Physio Con.	LIFEPAK C.	Active	01/01/2023	01/01/2024
BEOPD004	OPD	Patient monitor	Biocare	PM-900	Active	01/01/2023	01/01/2024
BEOPD005	OPD	Compressor Nebulizer	DeVibiss	Pulmo Aide	Active	01/01/2023	01/01/2024
BEOPD006	OPD	Patient Monitor	Biocare	PM-900	Active	01/01/2023	01/01/2024
BEOPD007	OPD	Patient monitor	MEDIANA	M50	Active	01/01/2023	01/01/2024
BEOPD008	OPD	Oxygen concentrator	DeVibiss	drive	Active	01/01/2023	01/01/2024
BEOPD009	OPD	Adult Scale	China	Seca	Active	01/05/2023	01/05/2024
BEOPD011	OPD	Medication cart			Active	01/01/2023	01/01/2024
BEOPD012	OPD	Medication cart			Active	01/01/2023	01/01/2024
BEOPD013	OPD	ECG machine	Trismed	CARDIPAR.	Active	01/01/2023	01/01/2024
BEOPD014	OPD	Medication cart			Active	01/01/2023	01/01/2024
BEOPD016	OPD	Syringe pump	SINO MEDT	SIN-600V	Active	01/01/2023	01/01/2024
BEOPD017	OPD	ECG machine	EDAN	SE-301	Active	01/01/2023	01/01/2024
BEOPD018	OPD	Oxygen concentrator	DeVibiss	drive	Active	01/01/2023	01/01/2024

# Acceptance Test

**Device Basic Information**

Asset No: \_\_\_\_\_  
 Class: \_\_\_\_\_  
 Type: \_\_\_\_\_  
 Equipment Name: \_\_\_\_\_  
 Location/Depart: \_\_\_\_\_  
 Brand/Model: \_\_\_\_\_  
 Serial Number: \_\_\_\_\_  
 Manufacture: \_\_\_\_\_  
 Donor Name: \_\_\_\_\_  
 Funding: \_\_\_\_\_  
 Status: \_\_\_\_\_  
 Last Service: 22/05/2023  
 Next Service: 22/05/2023

**Acceptance Test**

1. Inspect the packing

- Is the package intact?  Pass  F
- Are the accessories completed as per specification?  Pass  F
- Is the document completed including service and operation manual?  Pass  F
- Is there any soft copy of the operation/service manual?  Pass  F

2. General Inspection

- Is the equipment complete and undamaged?  Pass  F
- Does the equipment have a clamp to install on IV stand?  Pass  F
- Is the software in English?  Pass  F
- Does the medical equipment carry a CE mark with four digit code for compliance?  Pass  F

3. Electrical safety

- Are there electrical safety markings on the device nameplate?  Pass  F
- Is the medical device class 1, 11, type B, BF, CF or AP, APG?  Pass  F

# Preventative Maintenance

Asset No	Department	Description	Manufacture	Brand/Model	Status
BELAB001	LAB	Biochemistry analyzer	Roche	Cobas c 111	Active
BELAB002	LAB	Electrolyte analyzer	i-SENS, Inc.	i-Smart 30	Active
BELAB003	LAB	Automated Hematolog...		XP-100	Active
BELAB004	LAB	1 Centrifuge	Thermo Fis...	Heraeus M...	Active
BELAB005	LAB	DAC VANTAGE ANAL...	SIEMENS ...	10282970	Active
BELAB006	LAB	Cobasc 101		cobasc 101	Active
BELAB007	LAB	Printer		CT-S281	Active
BELAB008	LAB	ImmunoChemistry Ana...	Boditech M...	iCHROMA2	Active
BELAB009	LAB	i-chamber	Boditech M...		Active
BELAB010	LAB	Advanced Vortex Mixer	VELP SCIE...	ZX3	Active
BELAB011	LAB	Eppendorf			Active
BELAB012	LAB	Sample Mixer	DYNAL		Active
BELAB013	LAB	Biochemistry analyzer		Biossays 2...	Active
BELAB014	LAB	Analyzer		malgium 2...	Active
BELAB015	LAB	Microscope	OLMPUS C...	OLMPUS C...	Active

# Equipment testing record

## Fluke Biomedical Ansur Test and Inspection Procedure

### Test Record

**TEST PASSED**

Test Performed: 28/10/2022  
 Date: 28/10/2022  
 Recorder: AS NZS 3551 CL1 mlr  
 Template: AS NZS 3551 CL1 mlr  
 Template Version: 1.0.0

Ansur Components Used  
 Ansur Plug-In ESA612  
 Version 3.1.4  
 Version 1.1.3

### Test Setup

#### Selections

Service Events Performed: Standards Performed: AS/NZS 3551 User defined

#### Device under test

Serial Number: 4548210003 Model: D500  
 Manufacturer: Mediana Co Ltd Korea Location: Outpatient (ER)  
 Type: Defibrillator

#### MTI Data

Test Instrument: Serial Number: Firmware Version:  
 ESA612B 5031040 v3.01

### Signatures

### Test Result

Test Element	Test Type	Pass	Fail
AS/NZS 3551 - CL1	Auto Sequence		
Priority Switching Delay (S)			
<b>Applied Part Configuration</b>			
Applied Part	Type	Level	
1	ECG Defibrillator (AS/NZS 3551 CL1)	B	3
<b>Main Voltage</b>			
Value	Alarm Voltage	High Limit	Low Limit
287.5	280V		
<b>Neutral to Earth</b>			
Value	Alarm Voltage	High Limit	Low Limit
0.8	0.5V		
<b>Live to Earth</b>			
Value	Alarm Voltage	High Limit	Low Limit
287.5	280V		
<b>Protective Earth Resistance</b>			
Value	Alarm Voltage	High Limit	Low Limit
0.108	0.2V		
<b>Insulation Resistance (Main - Case)</b>			
Value	Alarm Voltage	High Limit	Low Limit
10000.0	1000V		
<b>Main to Protective Earth</b>			
Value	Alarm Voltage	High Limit	Low Limit
0.0000	0.2V		
<b>Earth Leakage Current</b>			
Value	Alarm Voltage	High Limit	Low Limit
287.0	280V		



# Asset Registry-Performance Verification Report

Medical Device - [ Device Manage Version: 1.0.0.2 ]

Device Manage Help(H) Close (C)

Asset No.BEOB034 Type/Class:6 Child-bearing bed Last Maintance Date:01/01/2023

Save New Performance Verification Report

Device List Device Information Performance Verification Report

Verification Date

Date	Technician
------	------------

Hospital Bed

AS3551:2012

Batteries - check batteries are operational.  Pass  Fail  N//

Side Rails (where fitted)

Check for smoothness of operation and frame clamp tightness  Pass  Fail  N//

Inspect the side rails for general wear and tear on fittings, including pivot joints and brackets  Fail  N//

Check for rust, structural integrity of welds and paint finish  Pass  Fail  N//

Electrical Safety AS3551:2012

Protective Earth Test detachable power supply cord  Pass  Fail  N//

Insulation Resistance Tests >10MΩ  Pass  Fail  N//

Earth Leakage Current Test, 5,000uA max, no fault condition  Pass  Fail  N//

Earth Leakage Current Test 10,000uA max, neutral open or mains reversed  Pass  Fail  N//

Touch Test Current, no fault condition, 100uA  Pass  Fail  N//

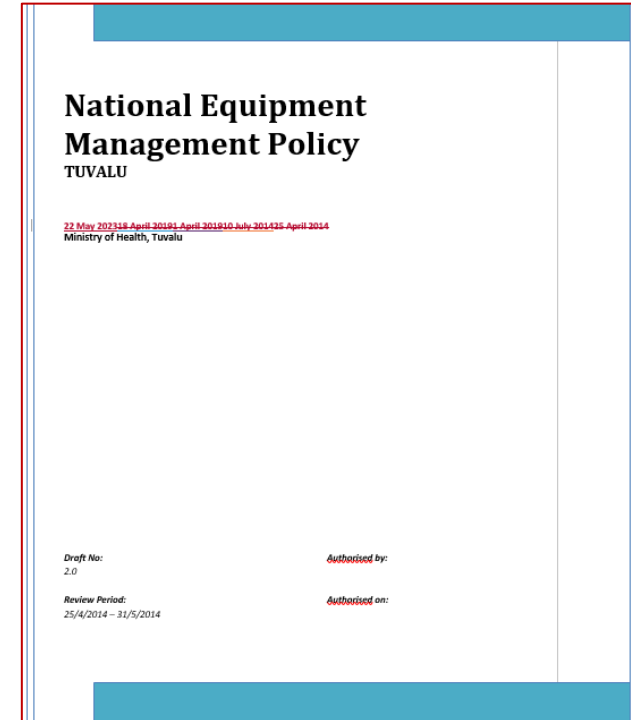
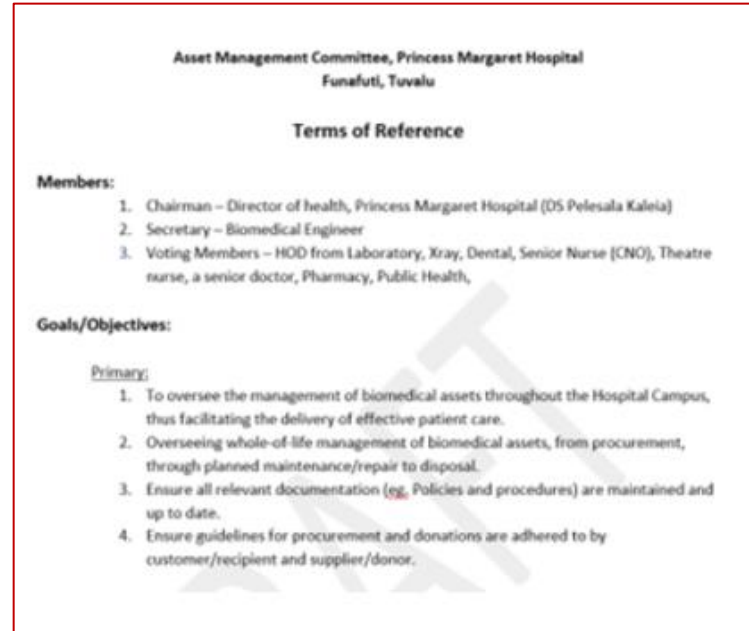
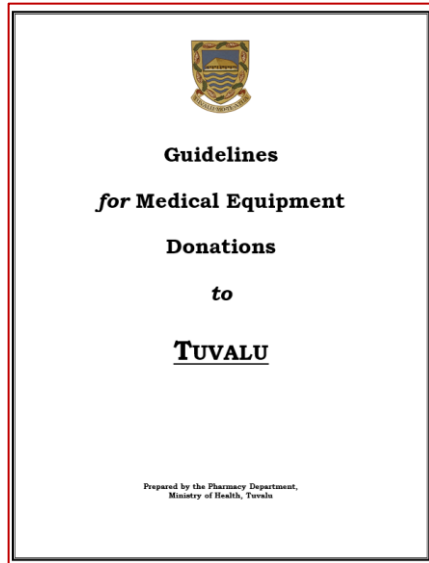
Touch Test Current, neutral open or earth open, 500uA max  Pass  Fail  N//

MasterForm Version:1.0.0.2

使用者: Semisi

HIS2013 Medical Device

# Policy making/review & Managerial skills

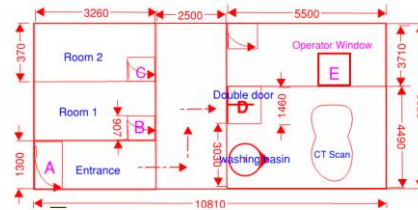




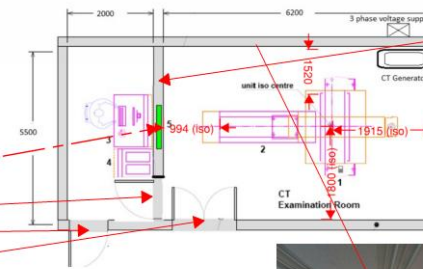


# New Project for Tuvalu Ministry of Health

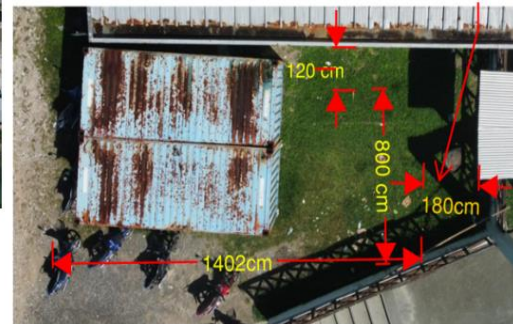
## CT Room Preparation for Installation



## Tuvalu CT Room Final Layout



## Oxygen Plant location and preparations





# Further study and attachment

- ▶ Ballarat- Saint John of God Hospital
- ▶ June 2016
- ▶ March 2018



## Trainings and attachment opportunities



And yes, happy to assist in seeking sites in Adelaide where your trainee biomedics could be attached.

An alternative which may be more cost effective, would be for FBE to provide technical training on-site in Tuvalu.

Either way best send me CVs for the trainees along with a listing of the skills that you wish for them to acquire.

We can then work on a plan to achieve your desired outcome(s).

# FBE

a brilliant biomedical blend



#### About FBE

#### Products

- AirGuard
- OxyGuard

#### Services

- Pipette calibration
- Burette calibration
- Biomedical capacity building
- Need a Biomedical Engineer?
- Biomedical device development
- Posture monitor
- Biomedical device research
- Desert dialysis

### FBE Pty Ltd

Flinders Biomedical Enterprises, FBE Pty Ltd, (FBE) is a biomedical engineering research and consultancy firm wholly owned by Flinders Foundation. FBE uses its close relationship with the joint Biomedical Engineering Department of Flinders University School of Medicine / Flinders Medical Centre, to provide biomedical engineering expertise on a commercial basis and to develop medical devices.

#### Flinders Biomedical Engineering

The firm has grown out of the biomedical engineering research and consultancy practices that have been operating out of Flinders Medical Centre for a number of years. FBE's close collaboration with the Flinders Biomedical Engineering group at Flinders Medical Centre / Flinders University School of Medicine, provides a unique opportunity to get developing medical devices to market.

#### Flinders Foundation

Flinders Foundation is the fundraising arm of the Flinders Medical



- ▶ Edward Hingeley (Biomedical Engineer)- Melbourne Australia
- ▶ Mrs. Kat Knope (Senior Health Adviser and Program manager)
- ▶ “There is always room for improvement”

### Good Mentors



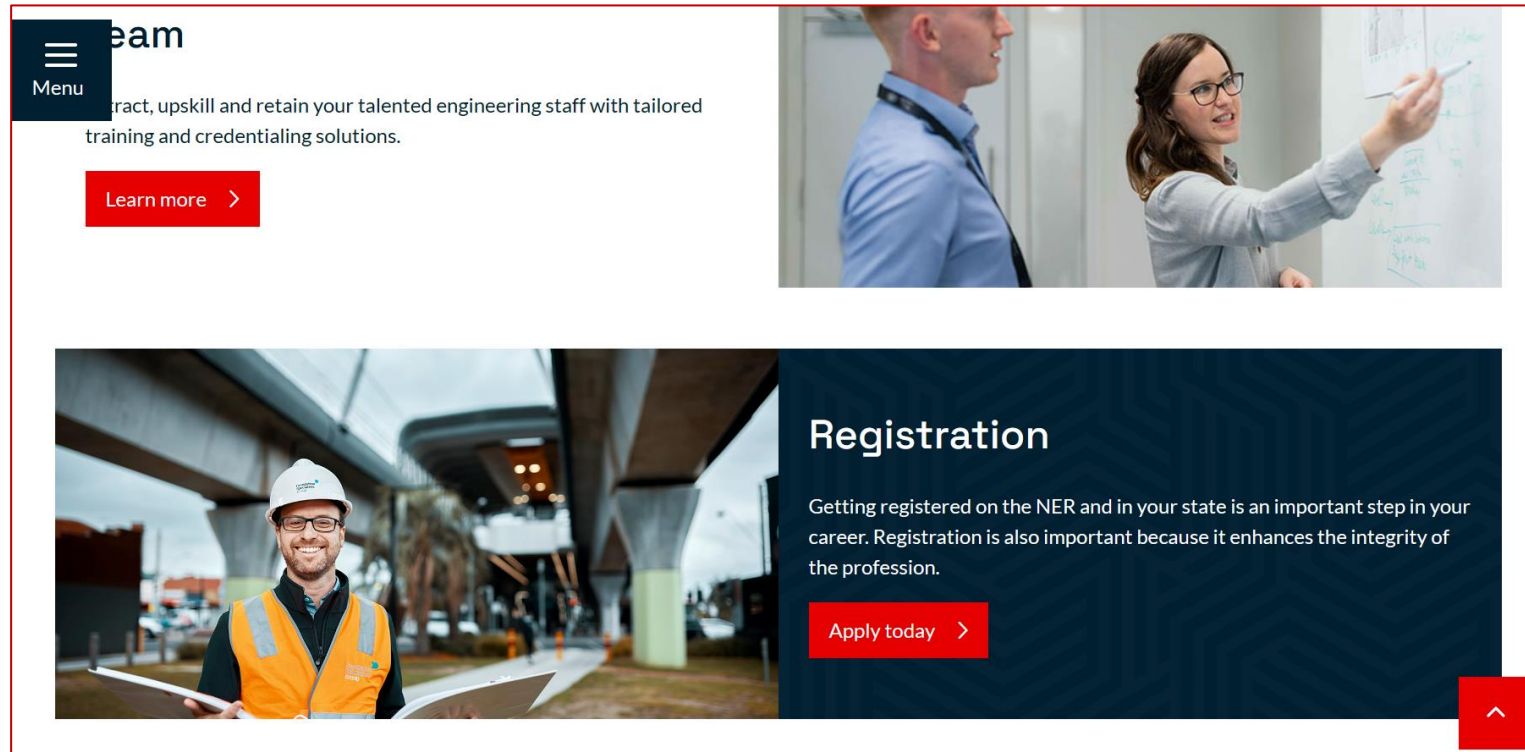
Kat visited Feb, 2023





# Engineering Australia- Membership

## ► Member Professional Engineer- Engineering Australia



The screenshot displays two main sections of the Engineering Australia website. The top section, titled 'Team', features a dark blue header with a 'Menu' icon and the word 'Team'. Below the header, the text reads: 'Attract, upskill and retain your talented engineering staff with tailored training and credentialing solutions.' A red button with the text 'Learn more >' is positioned below the text. To the right of the text is a photograph of a man and a woman in business attire looking at a whiteboard. The bottom section, titled 'Registration', features a dark blue background. On the left is a photograph of a man in a white hard hat and orange safety vest holding a clipboard. To the right of the photo, the text reads: 'Getting registered on the NER and in your state is an important step in your career. Registration is also important because it enhances the integrity of the profession.' A red button with the text 'Apply today >' is located below the text. A small red button with an upward-pointing arrow is visible in the bottom right corner of the screenshot.

**Team**  
Menu  
Attract, upskill and retain your talented engineering staff with tailored training and credentialing solutions.  
[Learn more >](#)

**Registration**  
Getting registered on the NER and in your state is an important step in your career. Registration is also important because it enhances the integrity of the profession.  
[Apply today >](#)

