StepTech

runMES User Manual

Contact window:

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Revision History

Rev#	Date	Description	By	Notes
1906.b1	2019/6/3	1906 Beta 1 release	Joshua Chin	
1907.rc1	2019-07-10	1907 rc1 release	Joshua Chin	1. Add work order import 2. Add fab monitoring 3. Enhance EQ record - to many 4. Add manager user group 5. Change installation procedures 6. Add start up scripts
1907.rc2	2019-07-18	1907 rc1 release	Joshua Chin	1. Add EQ StepIn 2. Add lot priority change 3. Add Redis server
1908rc1	2019-08-16	1908rc1 release	Joshua Chin	1. Modeling import 2. User import

Table of Contents

1. License agreement

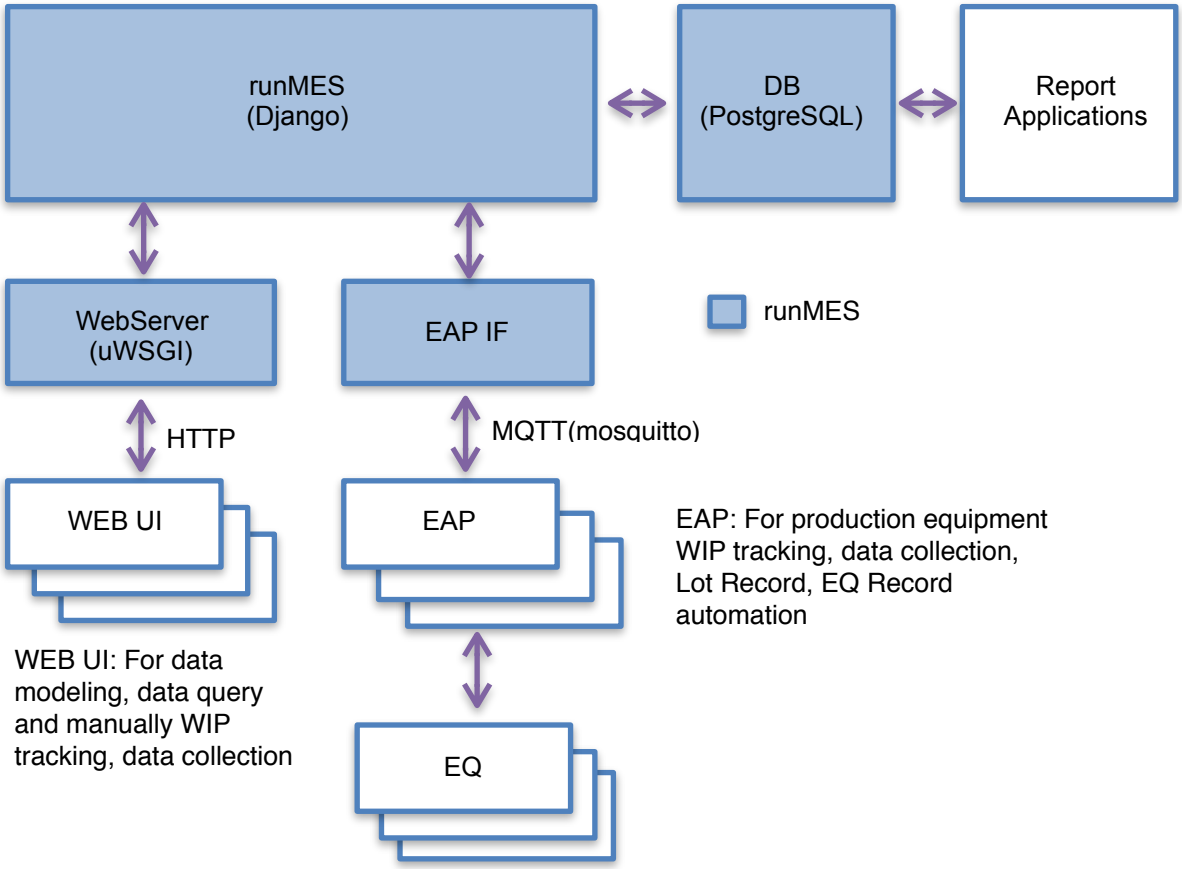
runMES is an open source and follow BSD licenses policy

2. Scope of runMES

The roles of runMES is a Manufactory Execution System for factory management and automation.
Major functions are

- WIP tracking, data collection, lot management, equipment management
- Work order management, lot start
- Real time fab monitoring
- Lot Record for non-tracking data collection
- EQ Record for EQ daily check, SPC/FDC data collection(EAP automation)
- EAP(Equipment Application Program) automation interfaces (detail in other document)

3. System Architecture



4. System installation

if you are not familiar with Linux, PostgreSQL, Django and Web server, It is recommend to install runMES from an image file (with operation system, database, python and MQTT)

4.1. Operation system

Linux: Ubuntu 1804

4.2. Database

PostgreSQL 11.3(please refer to PostgreSQL installation manual)
pgadmin3 (PostgreSQL management tool)

4.3. Python

It is recommend to install runMES in a python virtual environment for easy version version upgrade, after installed python and virtual environment, run install_pip.sh in shell to install required python files

- Version 3.6 (python3-pip python3-dev build-essential libssl-dev libffi-dev python3-setuptools)
- Django 2.2.1
- django-crispy-forms 1.7.2
- django-extensions 2.1.6
- django-modeladmin-reorder 0.3.1
- paho-mqtt 1.4.0
- psycopg2-binary 2.8.2
- shortuuid 0.5.0
- whitenoise 4.1.2
- uwsgi 2.0.18
- validators 0.12.5
- redis 3.2.1

4.4. MQTT

mosquitto 1.4.15 (please refer mosquitto installation manual)

4.5. Redis

install redis-server v4.0.9 (please refer to redis manual)

5. System initial setup

5.1. Operation system

- Computer name
- Ip address
- User account

5.2. Database

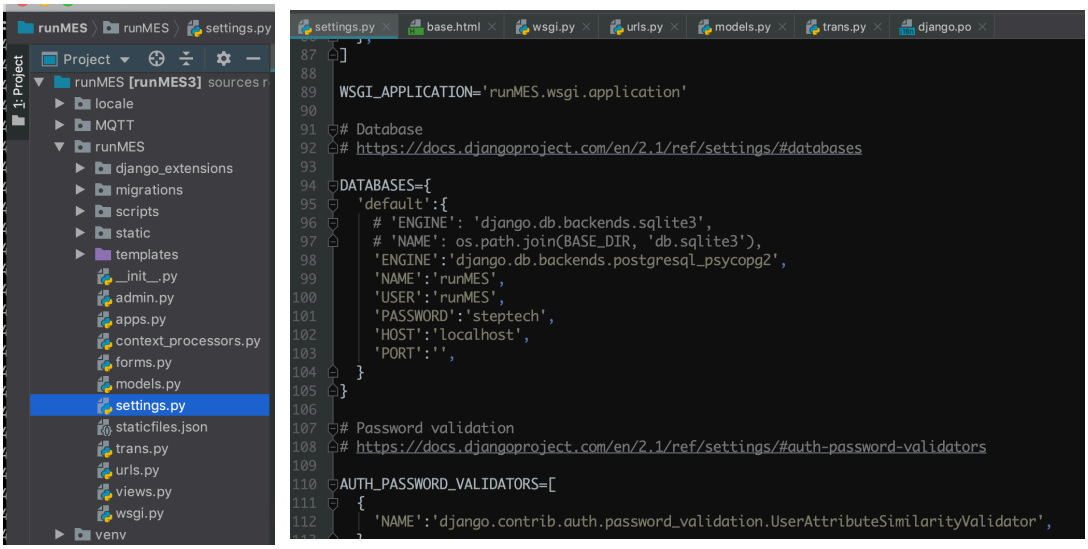
- Startup PostgreSQL
- Change the postgres user password
- Create user name and password for runMES (the user name and password will needed in Django settting.py)
- Create database for runMES
- Create initial database tables from Django(see below about manage.py makemigrations and manage.py migrate)

5.3. runMES source

Copy runMES source to your designated directory under a python virtual environment (e.g. / runMES_1908rc1/)

5.4. Django

Goto the directory with manage.py (runMES/runMES/manage.py)
Update the file settings.py database related contents,(e.g USER and PASSWORD)



5.5. Web server

Goto the directory runMES(upper level of manage.py), update uWSGI initial file - uwsgi.ini (http and basedir)

```
[uwsgi]
http=localhost:8000
#http=192.168.8.101:8000
basedir=/Users/joshuachin1/Dropbox/workspace/runMES/runMES_1908rc1
chdir=%(basedir)/runMES/
module = runMES.wsgi:application
check-static=%(basedir)/runMES/static
virtualenv=%(basedir)/
env=DJANGO_SETTINGS_MODULE=runMES.settings
processes = 10
master = True
pidfile=%(basedir)/uwsgi-master.pid
max-requests=500
vacuum=True
http-timeout=120
buffer-size=32768

log-5xx=true
disable-logging = true

log_dir=%(basedir)/runMES
log_prefix=uwsgi-
log_num=7

logto = %(log_dir)/%(log_prefix)@(exec://date +%%Y-%%m-%%d).log
log-reopen = true
unique-cron = 23 3 -1 -1 -1 { sleep 66 && kill -HUP $(cat %(pidfile)) && ls -tp %(log_dir)/%
(log_prefix)* | grep -v '/$' | tail -n +%(log_num)  | xargs -d '\n' -r rm --; }
```

5.6. Change files to executable

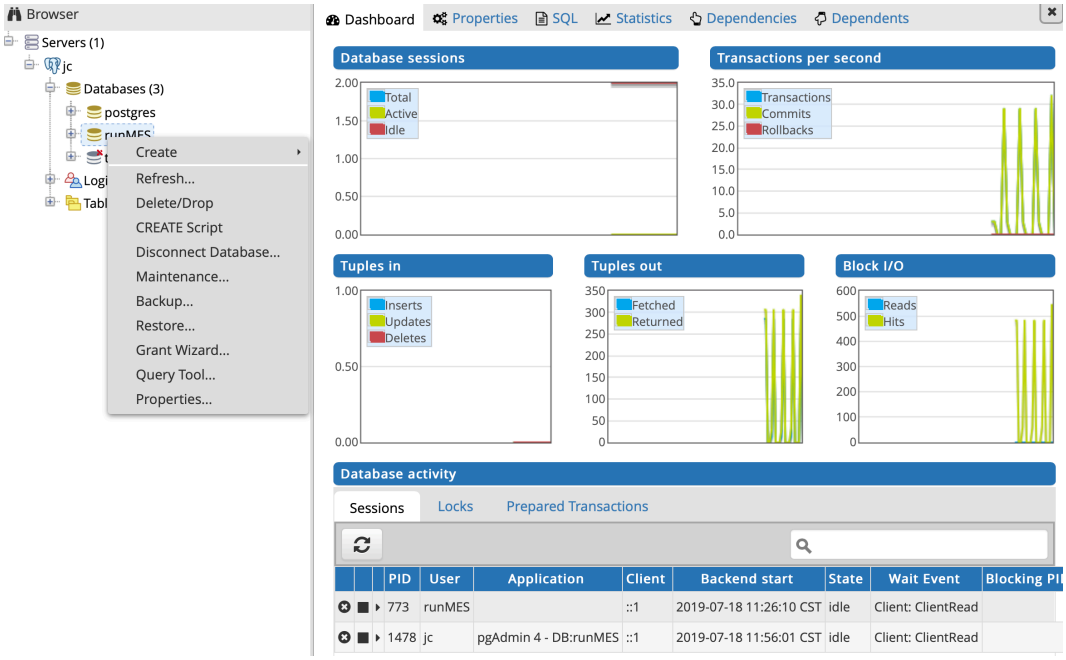
change all .sh files under runMES to executable (start_CFM.sh, start_eap_if.sh, start_log_runMES.sh, start_runMES.sh, install_pip.sh)

6. Data cleanup from old runMES

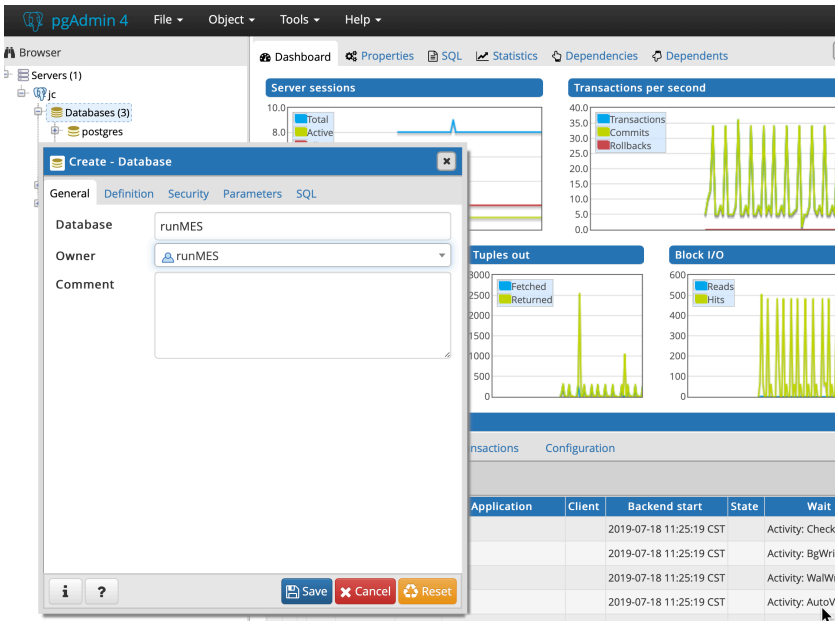
If you prefer to start a refresh new database with any default testing data and modeling data, you can clean runMES by the following instructions

6.1. clean up database

- delete database runMES from pgadmin or psql console

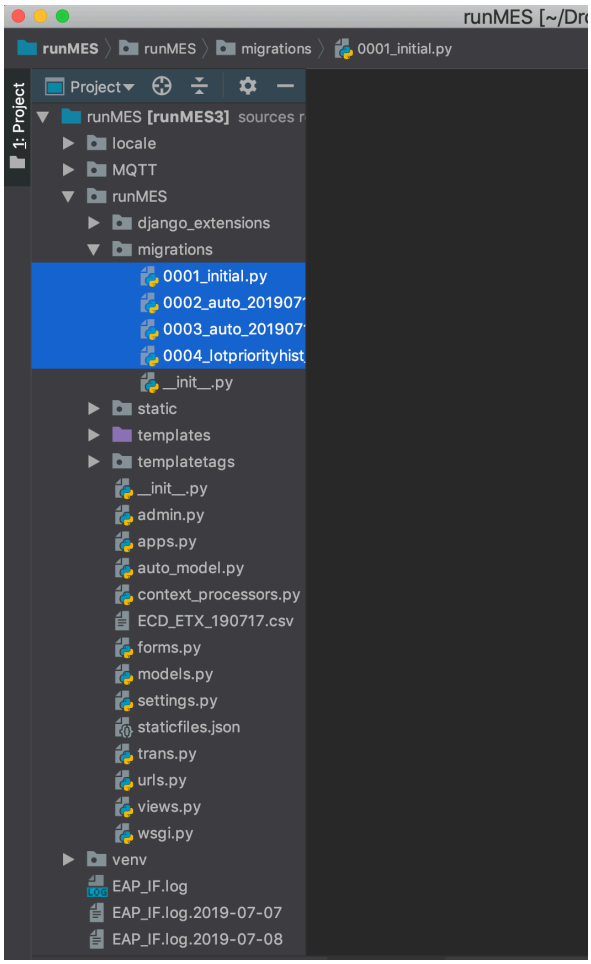


- create new new database runMES (remember the Owner)



6.2. remove old migration files

remove the migration files under runMES/runMES/migrations, keep the __in__.py only.



6.1. Migration

Under the directory with manage.py, type python manage.py makemigrations, then python manage.py migrate, the system will create new schema to runMES database.

6.1. Create users

- Startup system
- Under the directory with manage.py, type python manage.py createsuperuser, input your user name and password for system super user
- login to runMES admin UI (http://yourip:8000/admin), start to create user groups (‘OP’, ‘Super’, ‘Manager’, ‘Admin’) and users, assign user group’s privileges to each user.

7. System startup

After system boot up -

7.1. Startup PostgreSQL (please refer to PostgreSQL manual)

7.2. Activate python virtual environment

- Goto the runMES directory with manage.py
- Type source ../bin/activate to get into virtual environment

7.3. Startup MQTT (please refer to Mosquitto manual)

7.4. Startup runMES (including web server, async logger, fab monitoring, EAP interface)

- run start_runMES.sh in shell

8. Data modeling - Users and User Groups

If your are install from an empty database for runMES, you have to start from creating an new superuser

- goto the directory with manage.py
- issue command > python manage.py createsuperuser
- input superuser name and password
- goto runMES admin GUI for data modeling (ip:8000/admin)
- The default data modeling for user group must manually model, the required groups are OP, Super, Manger, Admin(type sensitive)
- OP: for query, WIP tracking, data collection
- Super: for lot management(lot start, hold, release, bonus, scrap..)
- Manager: for Work order, Lot start, Fab monitoring
- Admin : for data modeling
- create users and assign groups privileges to each user

8.1. Data backup

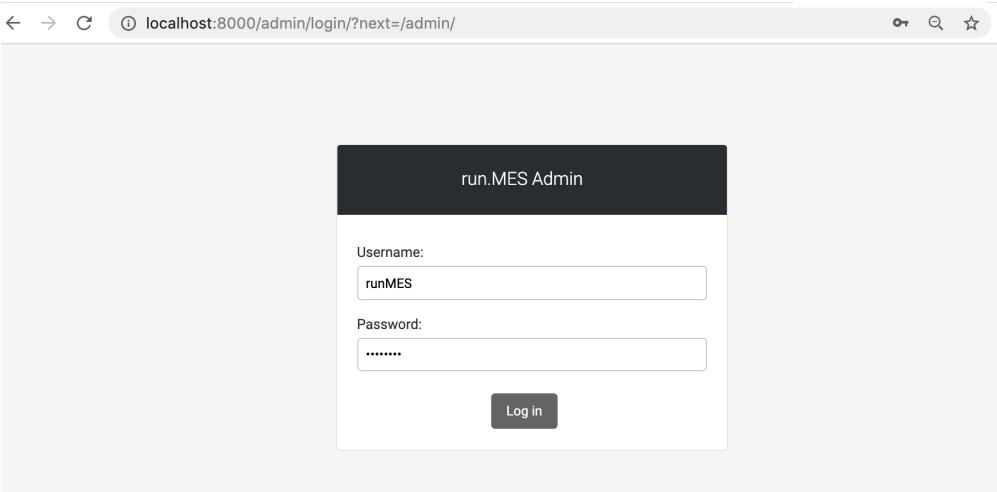
- **In a production, it is critical to backup data every day, you can verify the data in a testing environment.**

8.2. Data modeling approach

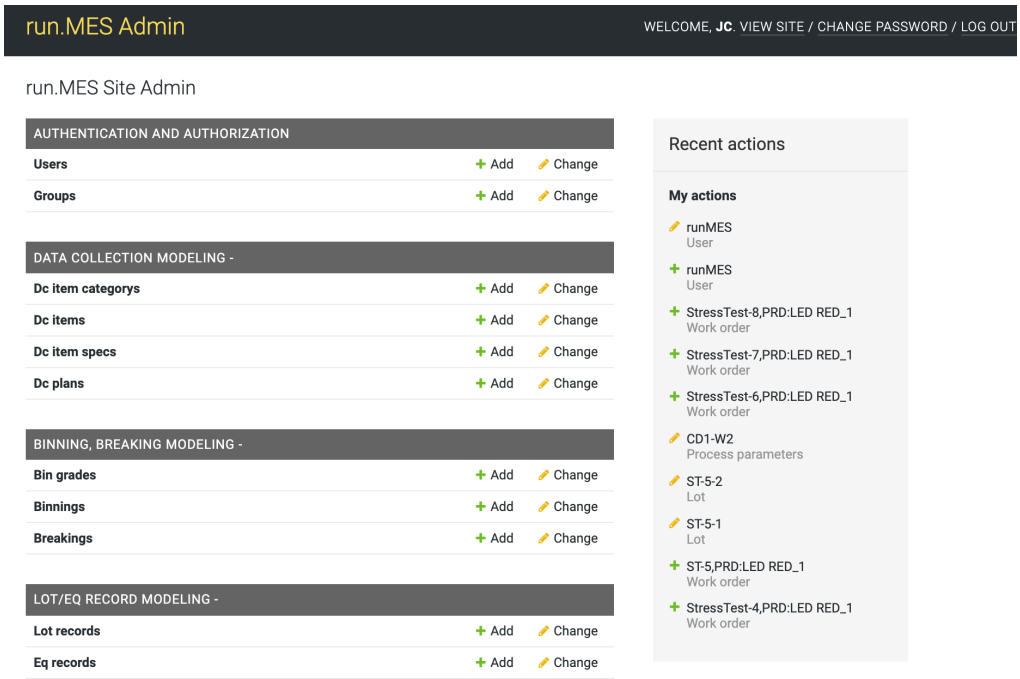
If you are new to runMES, it is recommend you start data modeling manually, once you are familiar with the data relationship in modeling, you can try with modeling import for mass data modeling.

8.3. User name and Group

- Login runMES admin http://yoursite/admin



- runMES data modeling GUI



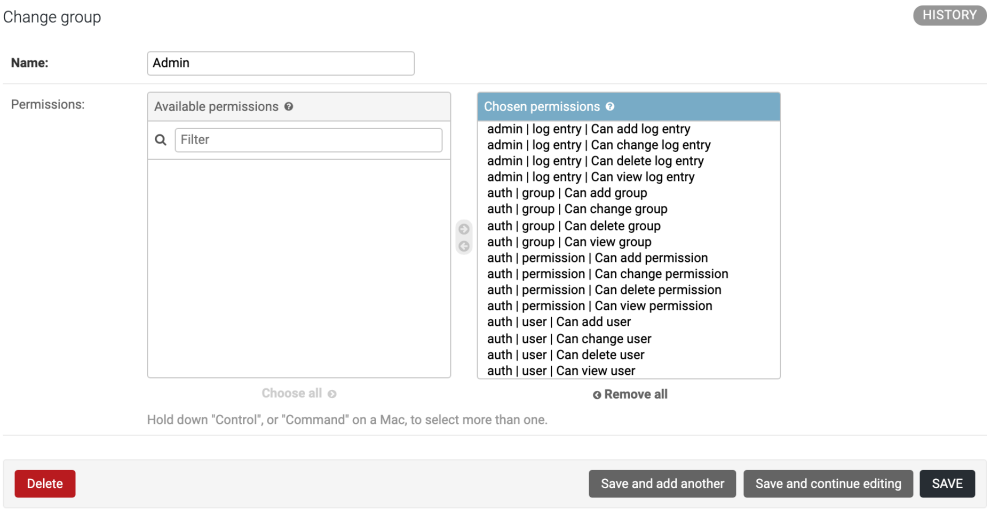
8.1. User group

8.1.1. Create user groups:

runMES requires default groups: OP,Super,Admin

8.1.2. Assign Admin privileges: all privileges

The remove of Admin(Super user who has admin privilege) users, please refer to Django manual, this will require command line operations.



8.1.1. OP, Super, Manager, Admin privileges:

The system divide privileges into four groups, you can create the 4 groups manually or run the script (initial_groups.sh)

One user can assign with multiple groups of privileges

- OP group
  For lot query, StepIn, StepOut, Data Collection

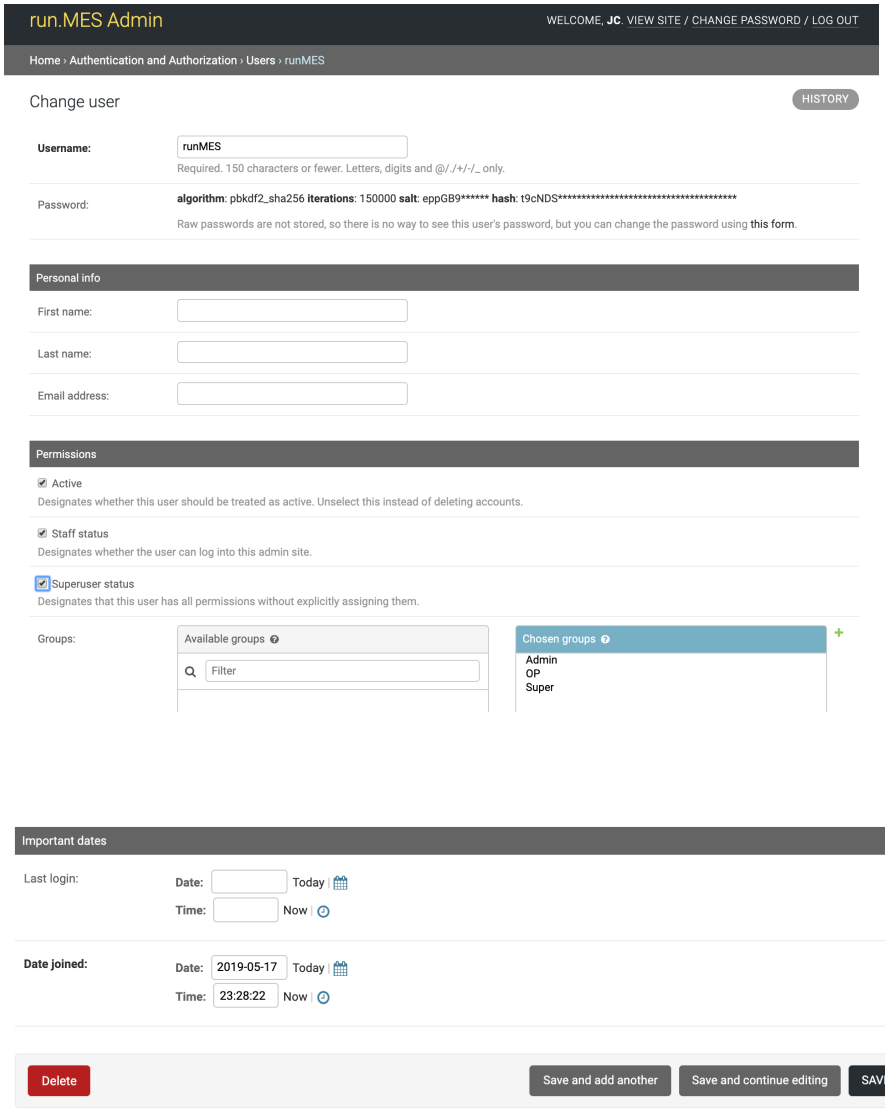
- Super group
  For lot and EQ status changes, lot split/merge, bonus/scrap, change product

- Manager group
  Work order maintain, lot start, fab monitoring

- Admin group
  For data modeling and users privileges maintain

8.2. User

- Create a new user
- Assign password
- Choose groups
- Turn on permission for Admin users only
- Save



8.3. Data modeling sequence

Each Process Step includes step operations by modeling

- StepIn (default): stands for start of a process step
- StepOut (default): stands for end of a process step
- Data collection (optional): to collection material, tools, metrology, equipment parameters and sensors information
- Breaking (optional): for product has breaking operation, the result will change to new product and quantity of the lot
- Binning (optional): for product needs grading, the result will divide the lot to sub lots by each grades

8.3.1. Step 1: create groups(OP, Super, Manage, Admin), users

8.3.2. Step 2:

- Data Collection
  Data collection category > Data item > Data item spec > DC Plan
- EQ
  Area > EQ Group > Equipment
- Binning
  Bin Grade > Binning

8.3.1. Step 3:

- Records
  Lot Record, EQ Record (Based on Data Collection)

8.3.1. Step 4:

- Process (no Breaking in process steps, since Breaking need special take care)
  Step Category > Process Step > Process > Product
- Process with the Breaking in a Process Step
  Since Breaking needs to assign a new Product, the new Product required Process < Process Step < Step Category related modeling should be completed before the Breaking modeling as previous process modeling sequence.

  e.g.
  If you have a LED Wafer product with a breaking process step, the breaking operation will change to a LED Chip product, the sequence of modeling will be
  1. LED Chip product required modeling: Step Category > Process Step > Process
  2. LED Wafer product required modeling: Step Category > Process Step > Process

8.3.1. Step 5:

- **Codes modeling (no sequence, you can do any time before production)**
  Lot Bonus/Scrap, Lot Hold/Release, EQ Hold/Release

8.4. Models relationship

Product <map to> Process Flow

One process flow have many process steps, each process step can have many operations such as StepIn, StepOut, Data collection, break or binning

- Process Flow
  - ✓Process Step 1
    - StepIn
    - StepOut
  - ✓Process Step 2
    - StepIn
    - DC Plan 2
    - StepOut
  - ✓Process Step n
    - StepIn
    - Break
    - StepOut

- DC Plan <map to> ProcessStep

- DC Plan <map to> Lot Record

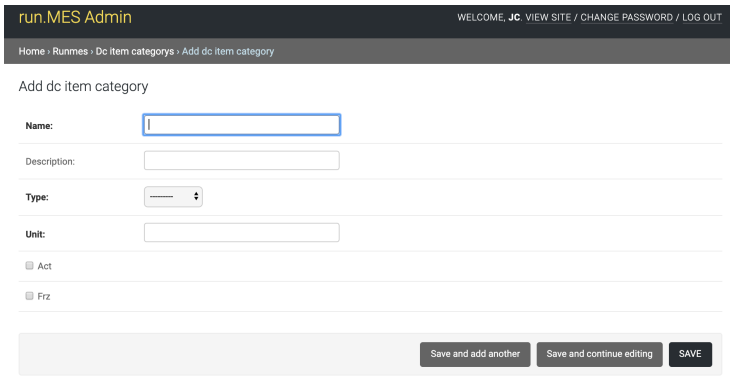
- DC Plan <map to> EQ Record

One DC Plan can have many DC Items

- ✓DC Plan 1
  - Chamber Temp 1
- ✓DC Plan 2
  - AOI Width 1
  - AOI Offset 1
- ✓DC Plan 3
  - Material PN
  - Material SN

8.5. General rules for data modeling

- Act(active) flag: this item can be seen from other data modeling
- Frz(freeze) flag: once the flag turn on, the record will be frozen, it can not change anymore, and it must turn on in order to let other data modeling use this item
- In order to protect the product in product line, once the lot start with the related data modeling will be protect from change(only limited fields can be changed after frozen, eg. active) or delete from modeling GUI
- If you do not need some data models, you just turn off the Act flag and it will not choose by other modeling anymore.

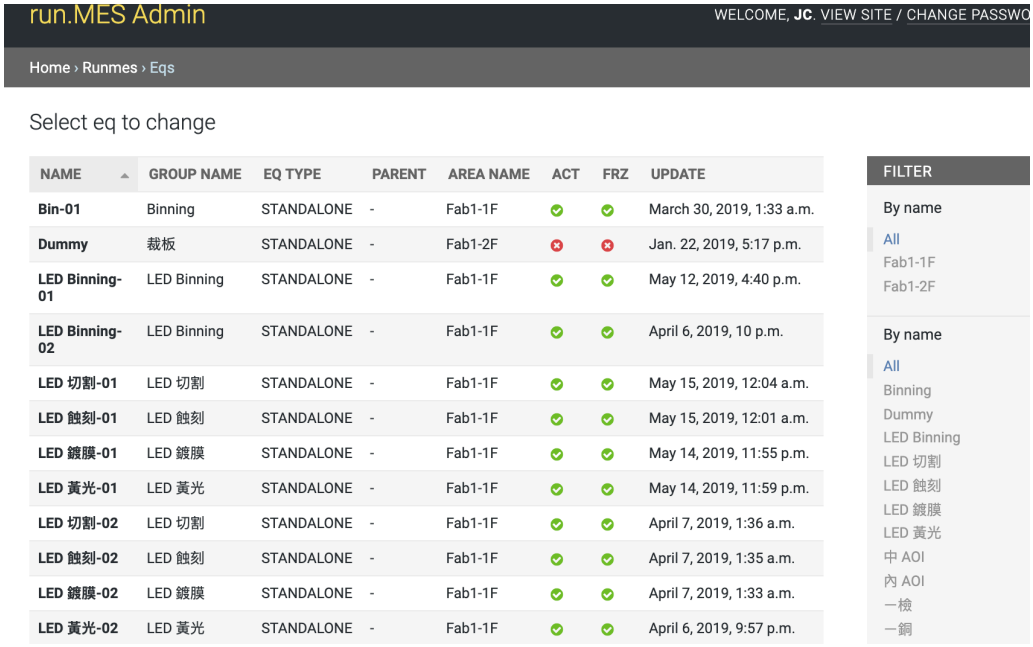


8.6. Code

- bonus scrap codes
- Lot hold release codes
- Eq hold release codes

8.7. EQ modeling

- Area: for reporting purpose
- Eq group: eq group will map to process step
- Eq: each eq belongs to a eq group



8.8. EQ states

The EQ states vs runMES validation for StepIn as following

- ('RA','Run Available')
- ('RN','Run Not Available')
- ('PM','Maintenance')
- ('ID','Idle')
- ('DM','Down')
- ('LN','Lend')
- ('SU','Setup')

Only RA,ID and LN states are allow to StepIn

8.9. Data collections

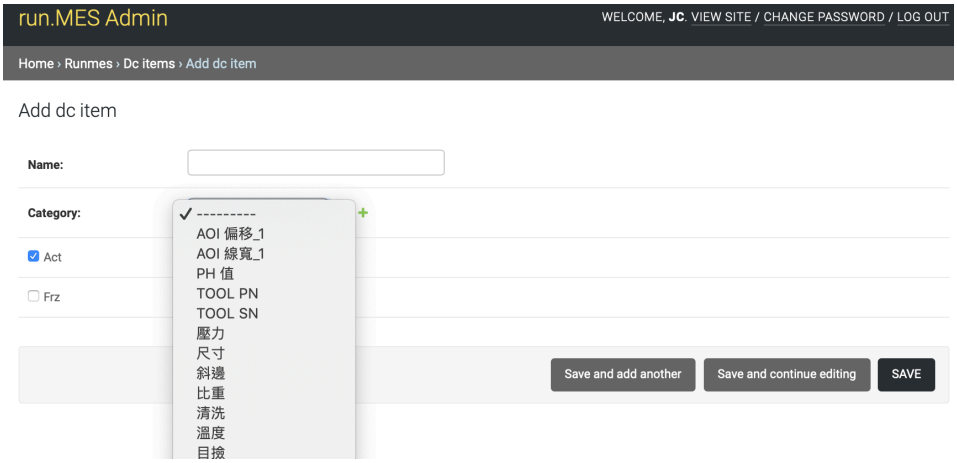
8.9.1. Data item category

For data item modeling consistency, runMES provides the item category to reduce naming issue for each data items

NAME	TYPE	UNIT	ACT	FRZ
AOI 偏移_1	FLOAT	MIL	✓	✓
AOI 線寬_1	FLOAT	MIL	✓	✓
PH 值	FLOAT	pH values	✓	✓
TOOL PN	TEXT	EA	✓	✓
TOOL SN	TEXT	EA	✓	✓
壓力	FLOAT	Kg/cm square	✓	✓
尺寸	INTEGER	mm	✓	✓
斜邊	INTEGER	mm	✓	✓
比重	FLOAT	SG	✓	✓
清洗	BOOLEAN	手動作業	✓	✓
溫度	FLOAT	Degree C	✓	✓

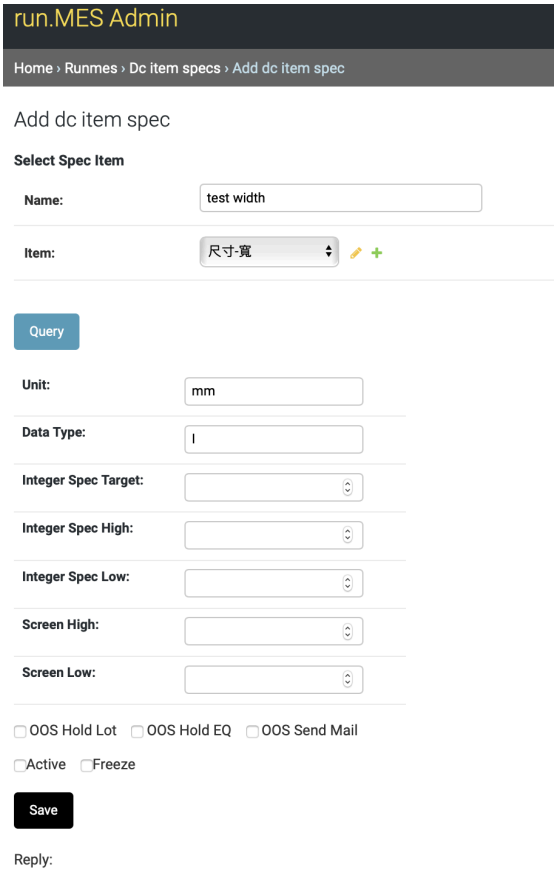
8.9.2. Data items

Data item modeling by choosing item category



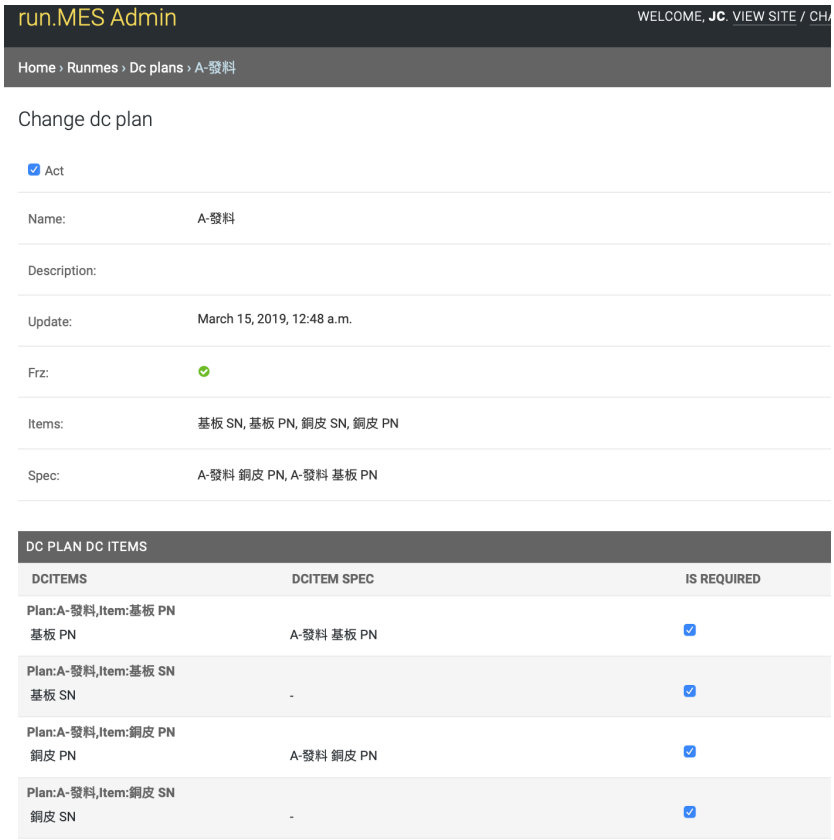
8.9.3. Data item Spec

Data item spec defined the dc item spec and OOS actions



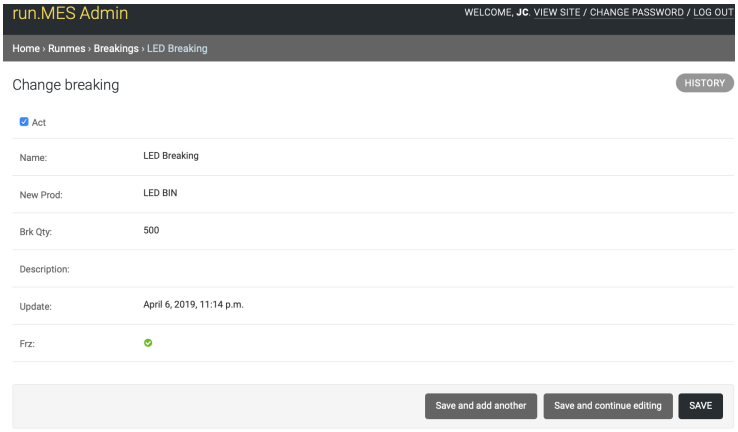
8.9.4. Data collection plan

A data collection plan is a set of data collection items and specs for a Process Step, Lot record, EQ record
Lot Record will not check item specs(since Lot Record will not validate Lot and EQ), there fore if the dc spec is only will be used by Lot Record it will be meaningless.
Again, the data item and spec 'Act' and 'Frz' flag must turn on before the data collection plan modeling can see it



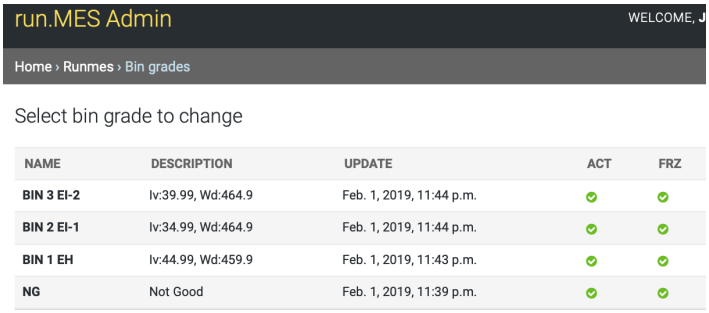
8.9.5. Breaking

The break operation is for cutting or breaking process, the lot quantity will change base on the break operation defined quantity and change to a new product, therefore the quantity will be different from StepIn to StepOut
Limitation: current version support only one new product



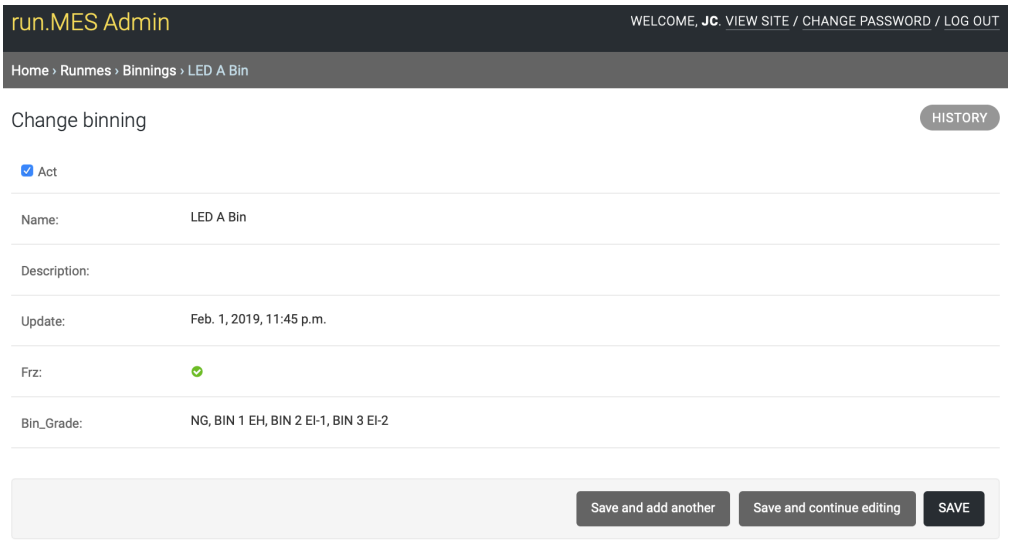
8.9.1. Bin Grade

Define grade level



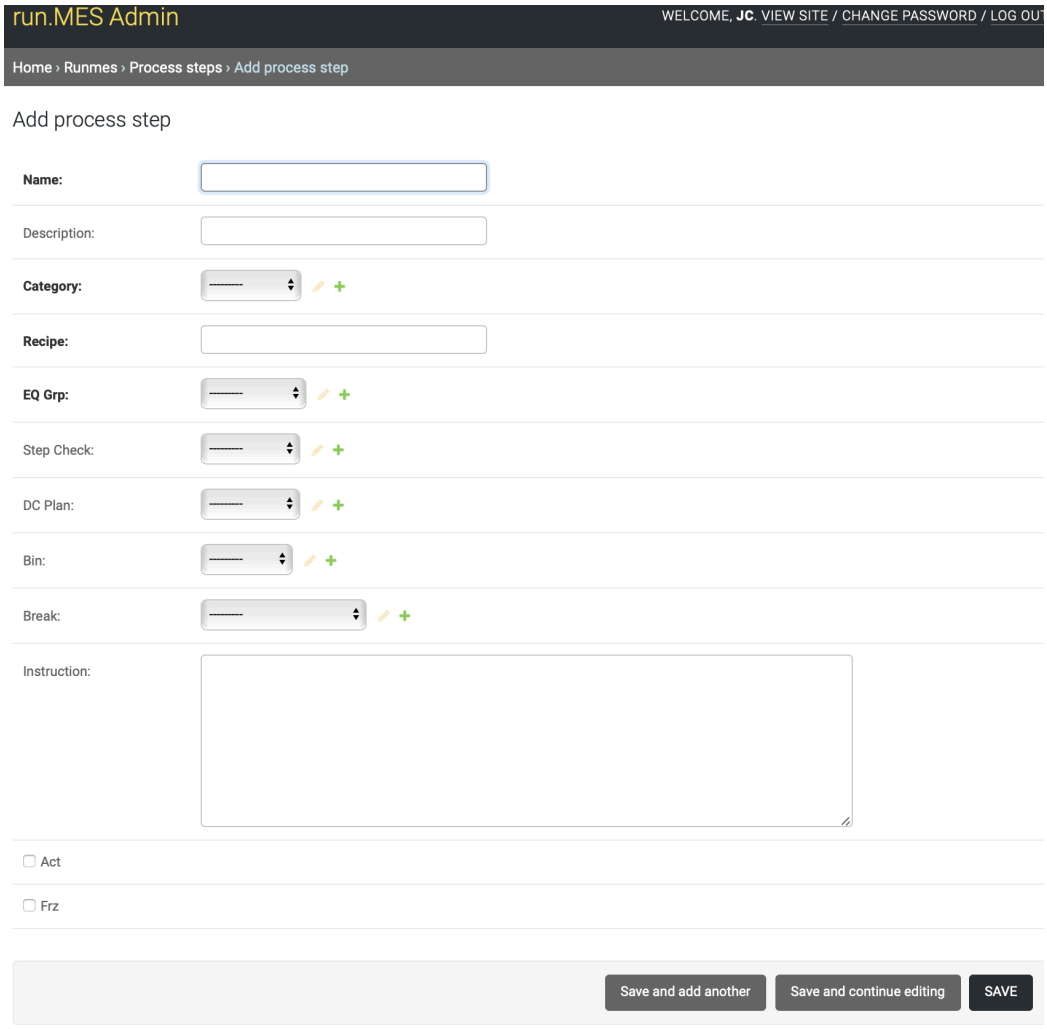
8.9.2. Binning

Binning is for grading lots, once the lot divides to many grades, the lot will split to each grade after StepOut.
Binning define what bin grades should be included



8.10. Process Steps

Process step is a collections of manufacturing operations and define recipe, instruction.
The operations can be multiple (DC Plan + Break)
Sequence: Step Check > StepIn > DC Plan > Break > Bin > StepOut



8.10.1. StepIn, StepOut

Are default to each process step(not show up in modeling UI).

8.10.2. Category

Category is only for reporting categories

8.10.1. Recipe

Define the process step recipe

8.10.2. EQ Grp

Map to EQ Group

8.10.3. DC plan

Optional, link to dc plan > dc items > dc specs

8.10.4. Step Check

Optional, the system will require EQ Record check if the equipment recipe or product is different from previous lot

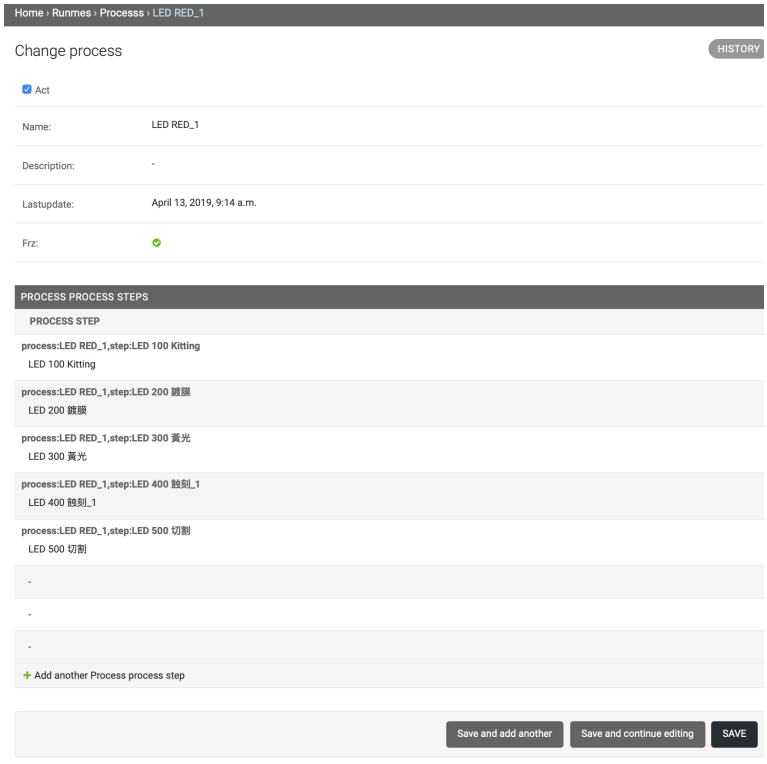
8.10.1. Instruction

For process step instruction, it can modify after the record ‘Frz’ in on.
Product

8.11. Process

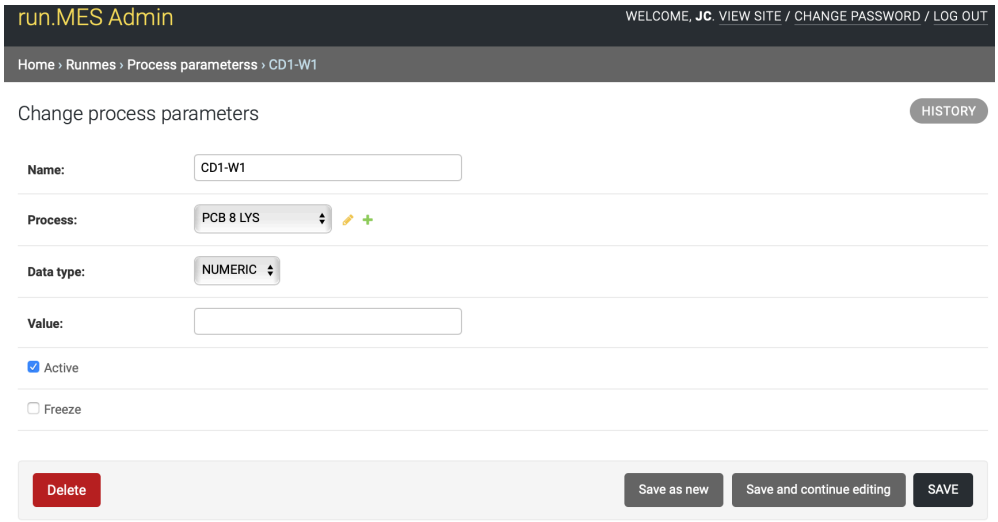
Process is to select sequence of process steps together

NAME	PROCESS STEP NAME	ACT	FRZ	LASTUPDATE
LED RED_1	LED 100 Kitting > LED 200 鍍膜 > LED 300 黃光 > LED 400 蝕刻_1 > LED 500 切割	✓	✓	April 13, 2019, 9:14 a.m.
LED RED	LED 100 Kitting > LED 200 鍍膜 > LED 300 黃光 > LED 400 蝕刻 > LED 500 切割	✗	✓	April 13, 2019, 9:14 a.m.
LED BIN	LED 700 Binning	✓	✓	April 6, 2019, 11:13 p.m.
Break No new Prod	067 Breaking-No New Product	✓	✗	April 5, 2019, 5:23 p.m.
Break No new Proc	066 Breaking-No New Process	✓	✓	April 5, 2019, 5:23 p.m.
Before Break-4	065 Breaking	✓	✓	April 4, 2019, 10:28 a.m.
After Break-4	850 包裝 > 900 入倉	✓	✓	April 2, 2019, 5:13 p.m.
Bin-Process	830 Binning	✓	✓	March 27, 2019, 10:54 p.m.
New Product - A	600 防焊 > 630 文字 > 900 入倉	✓	✓	March 26, 2019, 10:02 p.m.
PCB-B	110-8 內乾-8 > 150 蝕刻-1 > 900 入倉	✓	✓	March 20, 2019, 10:55 p.m.
PCB Flow-A	100 發料 > 150 蝕刻-1 > 200 AOI-1 > 250 氧化 > 300 壓合 > 350 機鑽 > 400 鍍銅-1 > 450 檢驗-1 > 500 蝕刻-2 > 550 AOI-2 > 600 防焊 > 650 電鍍 > 700 印刷 > 750 清洗 > 800 檢驗-2 > 850 包裝 > 900 入倉	✓	✓	March 15, 2019, 1:41 a.m.
PCB Matl Proces	050 Kitting Matl Check > 862 包裝	✓	✓	Feb. 7, 2019, 11:55 p.m.
LED Packing	862 包裝	✓	✓	Feb. 7, 2019, 11:36 p.m.
PCB 16 LYS	050 發料 > 060 裁板 > 110-16 內乾-16 > 150 內蝕 > 160 內撿-16 > 170 內AOI-16 > 220 黑化 > 230 壓合-16 > 310 機鑽-16 > 640 電漿 > 420 一銅 > 430 一檢 > 510 外乾 > 550 外蝕 > 580 中AOI > 610 防焊 > 710 金手指 > 740 化金 > 630 文字 > 810 成型-16 > 850 成測-16 > 862 包裝	✓	✓	Jan. 3, 2019, 12:14 p.m.



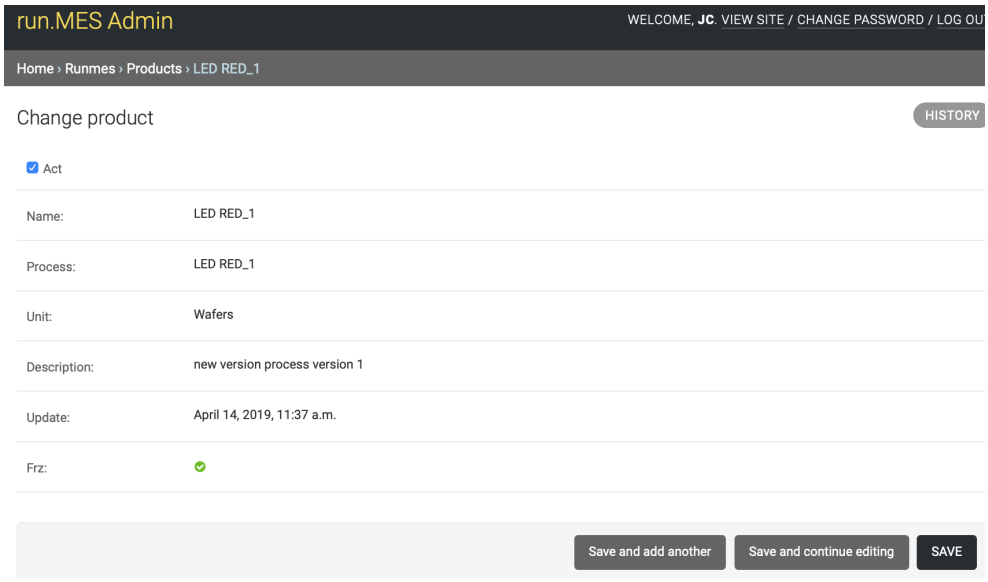
8.12. Process parameters

The process parameters is used for parameters passing between process step in a process flow, how ever, this feature should be integrated with EAP, typical application is R2R control and APC.



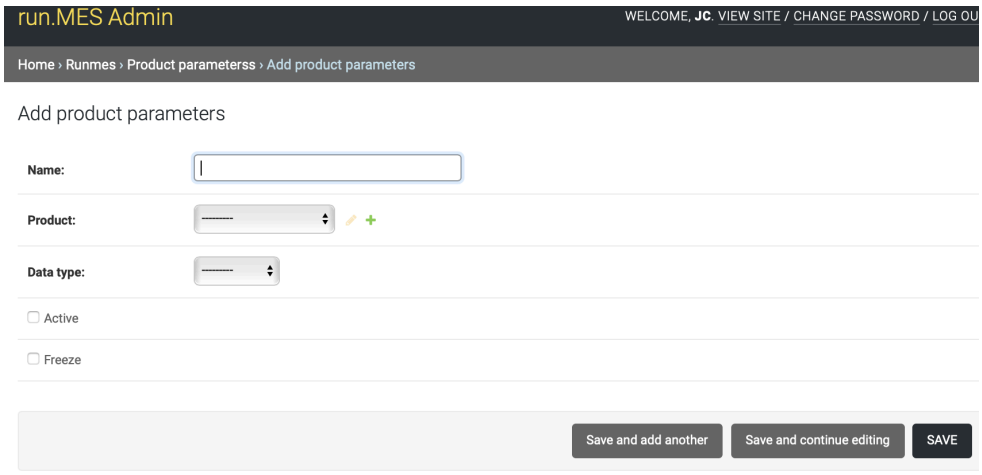
8.13. Product

Product map to a process, different can map to same process



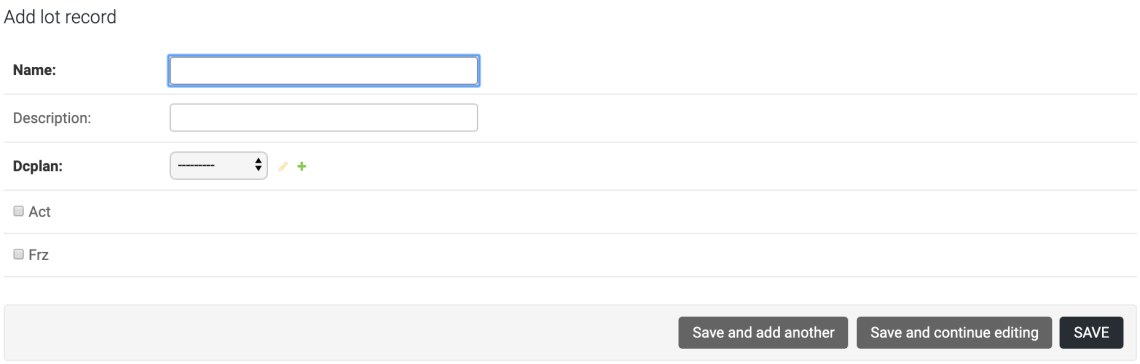
8.14. Product parameters

Same as process parameters, this is product level



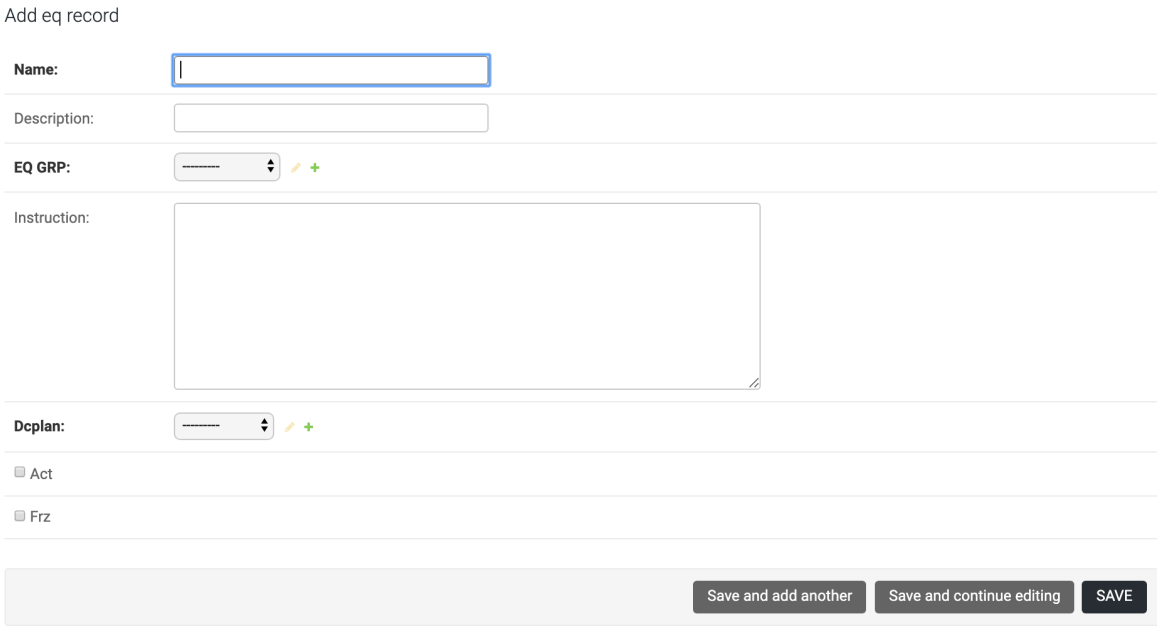
8.15. Lot Record

Lot Record is a lot based data collection, it will not validate lot or eq input in operator GUI, therefor the spec check will not processed in the DC Plan



8.16. EQ Record

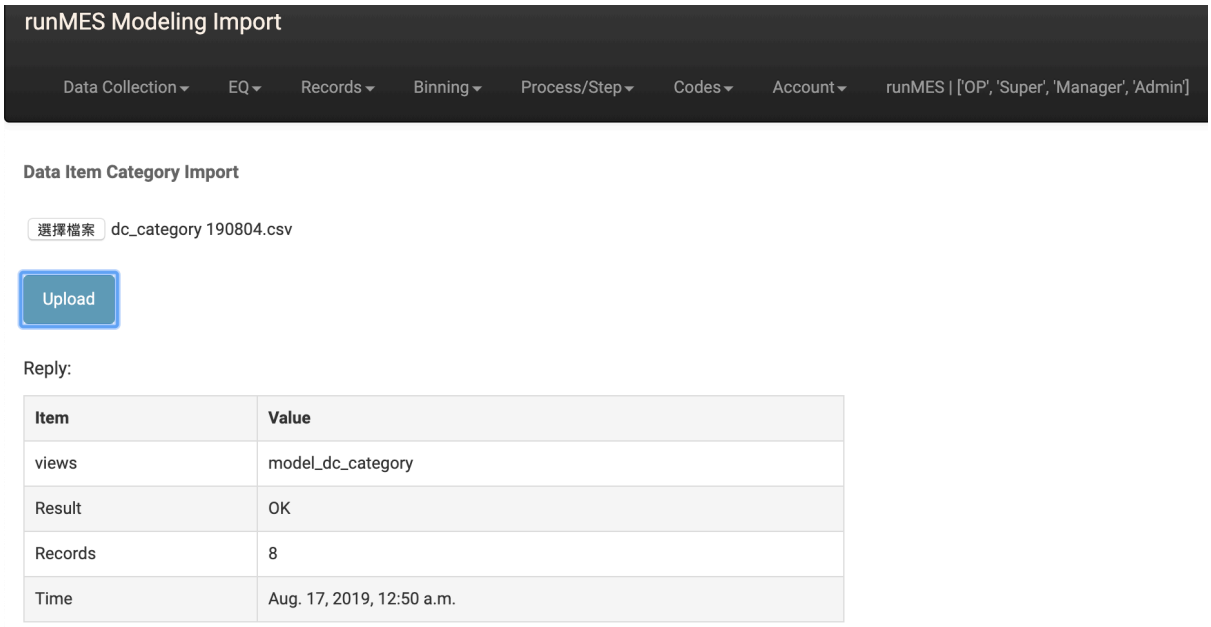
EQ record is used to collect data from equipment, the data modeling will need to choose EQ Group from existing modeling data, dc spec in the DC Plan will be processed for spec check.



8.17. Data modeling by import CSV files

If you are familiar with manual data modeling, you understand the modeling sequence and relationship, you can try data modeling import with CSV file, there are sample file under runMES/csv_samples, the web site is runMES_IP:8000/modeling, user must have Admin group privilege to access

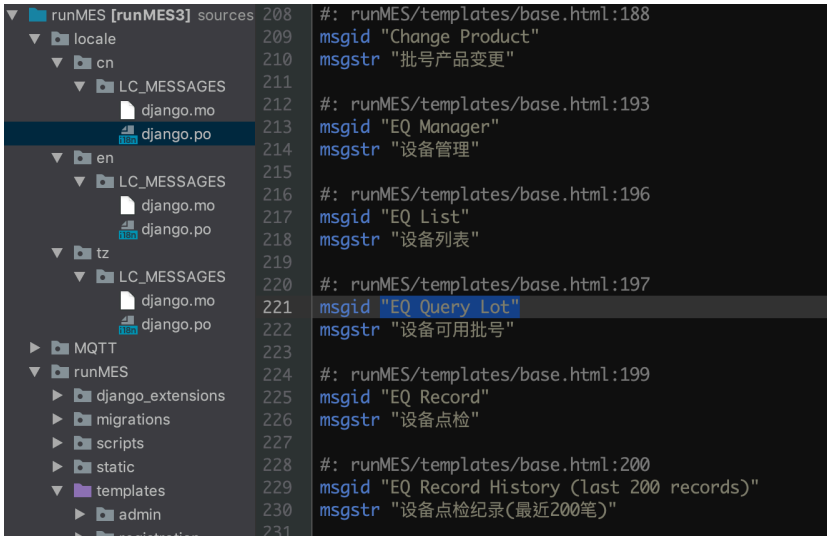
The data modeling import covers all items in manual modeling as well as the users account import



8.18. Language translation

User can change the main menu translation in the operation GUI

- Go to the directory with manage.py
- Update language files for each languages : django.po
- Translate the text in msgstr as you wish
- Compile language file:
  django-admin compilemessages



9. Operator GUI

Open browser, input the http:/runMES ip:8000/home, input user name and password

Language setting: by clicking the available language options on right corner 繁中|简中|EN

9.1. Change Password

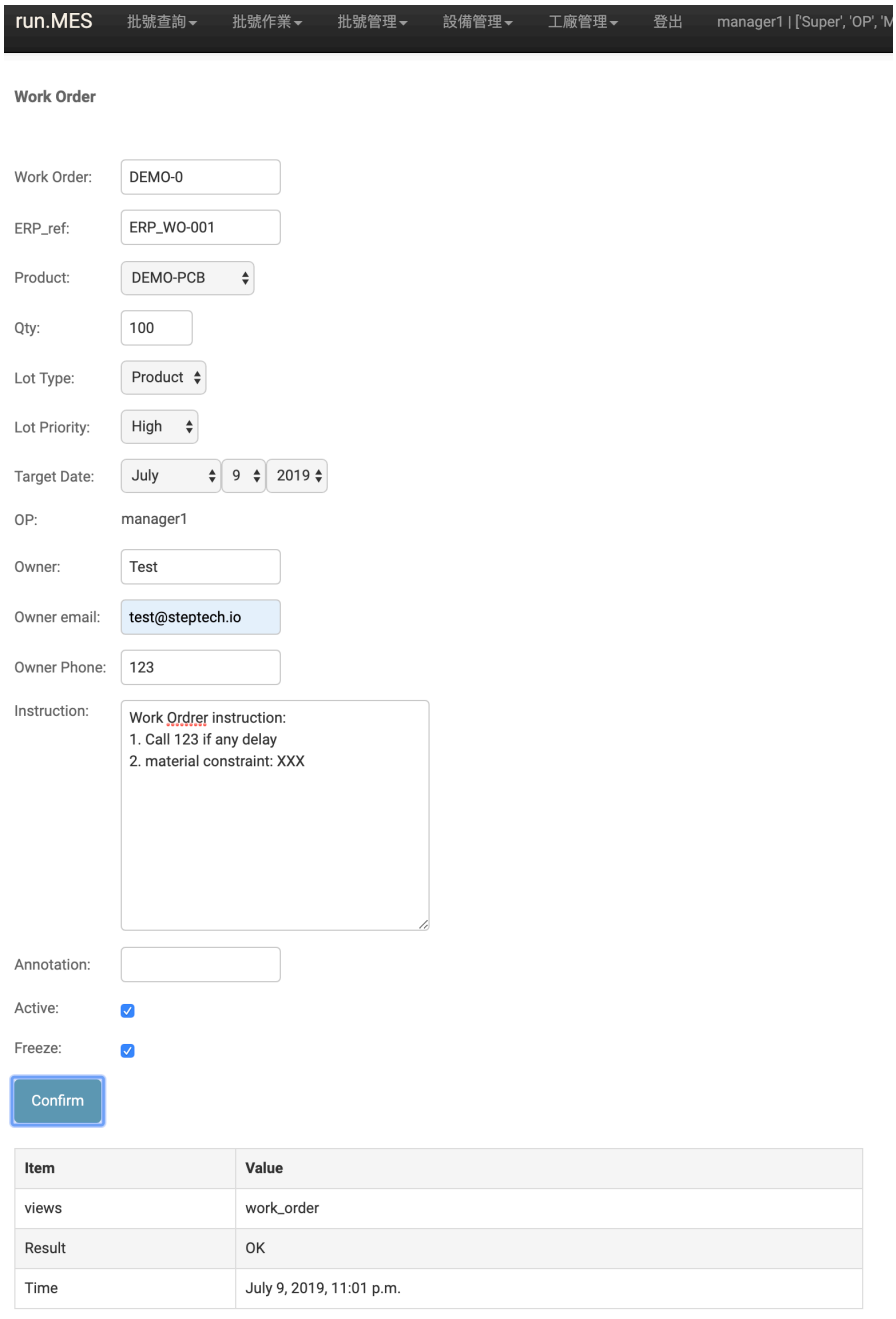
Users can change password from runMES GUI

9.2. Fab management

This function required ‘Manager’ privilege for accessing

9.2.1. Work Order

this function is for work order input and define related information



9.2.2. Work Order Query

9.2.3. Work Order Import

For a batch order input, you can manually generate a work order CVS file by an spread sheet or generate from ERP

- a spread sheet example (export to CSV):

Table 1

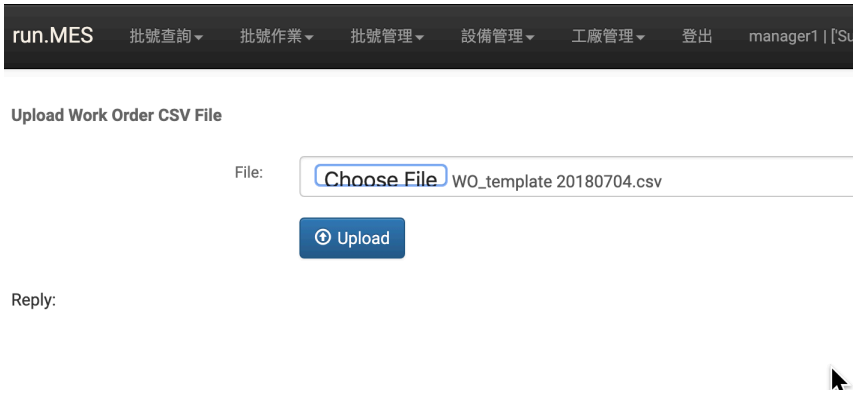
name	ERP_ref	product	lot_type	qty	lot_priority	target_date	owner	owner_email	owner_phone	instruction	annotation
DEMO-1	ERP_1	DEMO-PCB	D	100	5	2019-07-30	Joshua	test@steptech.io	123		
DEMO-2		DEMO-PCB	P	200	4	2019-07-30	Joshua	test@steptech.io		WO instruction	Annotation test
DEMO-3	ERP_3	DEMO-PCB	E	100	3	2019-07-30	Joshua	test@steptech.io		WO instruction	

- CSV file sample:

WO_template 20180704.csv

```
name,ERP_ref,product,lot_type,qty,lot_priority,target_date,owner,owner_email,owner_phone,instruction,annotation
DEMO-1,ERP_1,DEMO-PCB,D,100,5,2019-07-30,Joshua,test@steptech.io,0963-047-075,,
DEMO-2,,DEMO-PCB,P,200,4,2019-07-30,Joshua,test@steptech.io,,WO instruction,Annotation test
DEMO-3,ERP_3,DEMO-PCB,E,100,3,2019-07-30,Joshua,test@steptech.io,,WO instruction,
```

- import csv file:



9.2.4. Lot start

- This is for single lot start function
- Lot start by input Work Order, Lot ID, Qty.
- After lot been started, it will assign to process flow and ready to run process steps

Lot Start

Work Order: W-A-001 Query

Product	Qty	QTY LEFT	OWNER	TARGET DATE
PCB Product A	1000	500		March 31, 2019, 1:44 a.m.

LOT	QTY	OP	LOT START DATE
W-A-001-1	50	jc	March 15, 2019, 1:47 a.m.
W-A-001-2	50	jc	March 15, 2019, 1:47 a.m.
W-A-001-3	50	jc	March 15, 2019, 1:47 a.m.
W-A-001-4	50	jc	March 15, 2019, 1:47 a.m.
W-A-001-5	50	jc	March 15, 2019, 1:47 a.m.
W-A-001-6	50	jc	March 15, 2019, 1:47 a.m.
W-A-001-7	50	jc	March 15, 2019, 1:47 a.m.
W-A-001-8	50	jc	March 15, 2019, 1:47 a.m.
W-A-001-9	50	jc	March 15, 2019, 1:47 a.m.
W-A-001-10	50	jc	March 15, 2019, 1:48 a.m.

Add New Lot

Lot: PCB-A-001 ('Aa-Zz', '0-9', '_', '-' ONLY) Max 16

Qty: 20

OP: jc

Target Time:

Date: 2019-03-31

Time: 01:44:52

Product: PCB Product A

Work Order: W-A-001

Lot Type: P

Add Lot

Reply:

Item	Value
TNS	tx_lot_start
ECD	0
ETX	Succeed
lot	PCB-A-001
product	PCB Product A
work_order_txt	W-A-001
qty	20
Time	May 21, 2019, 6:48 p.m.

9.2.5. Batch lot start

- Batch lot start is for start more than one lot
- Lot number extensions are base on the batch quantity

Batch Lot Start

Work Order: W-A-001 Query

Product	Qty	QTY LEFT	OWNER	TARGET DATE
PCB Product A	1000	480		March 31, 2019, 1:44 a.m.

Batch New Lot

Start Lot ID: PCB-B-100 ('Aa-Zz', '0-9', '_', '-' ONLY, Max 12, extension '-' '1-n' will add on automatically)

Lot Qty: 20 (Max batch size 9999)

OP: jc

Target Time:

Date: 2019-03-31

Time: 01:44:52

Product: PCB Product A

Work Order: W-A-001

Lot Type: P

Add Lot

Reply:

Item	Value
TNS	tx_batch_lot_start
ECD	0
ETX	Succeed
LOT SET	['PCB-B-100-1', 'PCB-B-100-2', 'PCB-B-100-3', 'PCB-B-100-4', 'PCB-B-100-5', 'PCB-B-100-6', 'PCB-B-100-7', 'PCB-B-100-8', 'PCB-B-100-9', 'PCB-B-100-10', 'PCB-B-100-11', 'PCB-B-100-12', 'PCB-B-100-13', 'PCB-B-100-14', 'PCB-B-100-15', 'PCB-B-100-16', 'PCB-B-100-17', 'PCB-B-100-18', 'PCB-B-100-19', 'PCB-B-100-20', 'PCB-B-100-21', 'PCB-B-100-22', 'PCB-B-100-23', 'PCB-B-100-24']
PRODUCT	PCB Product A
WORK ORDER	W-A-001
TOTAL	480

9.2.6. Real time Fab monitoring dashboard

EQ Realtime Monitoring

EQ States:

DM - Down RA - Run Available RN - Run Not Available ID - Idle PM - PM LN - Lend SU - Setup

Show 25 entries

Search:

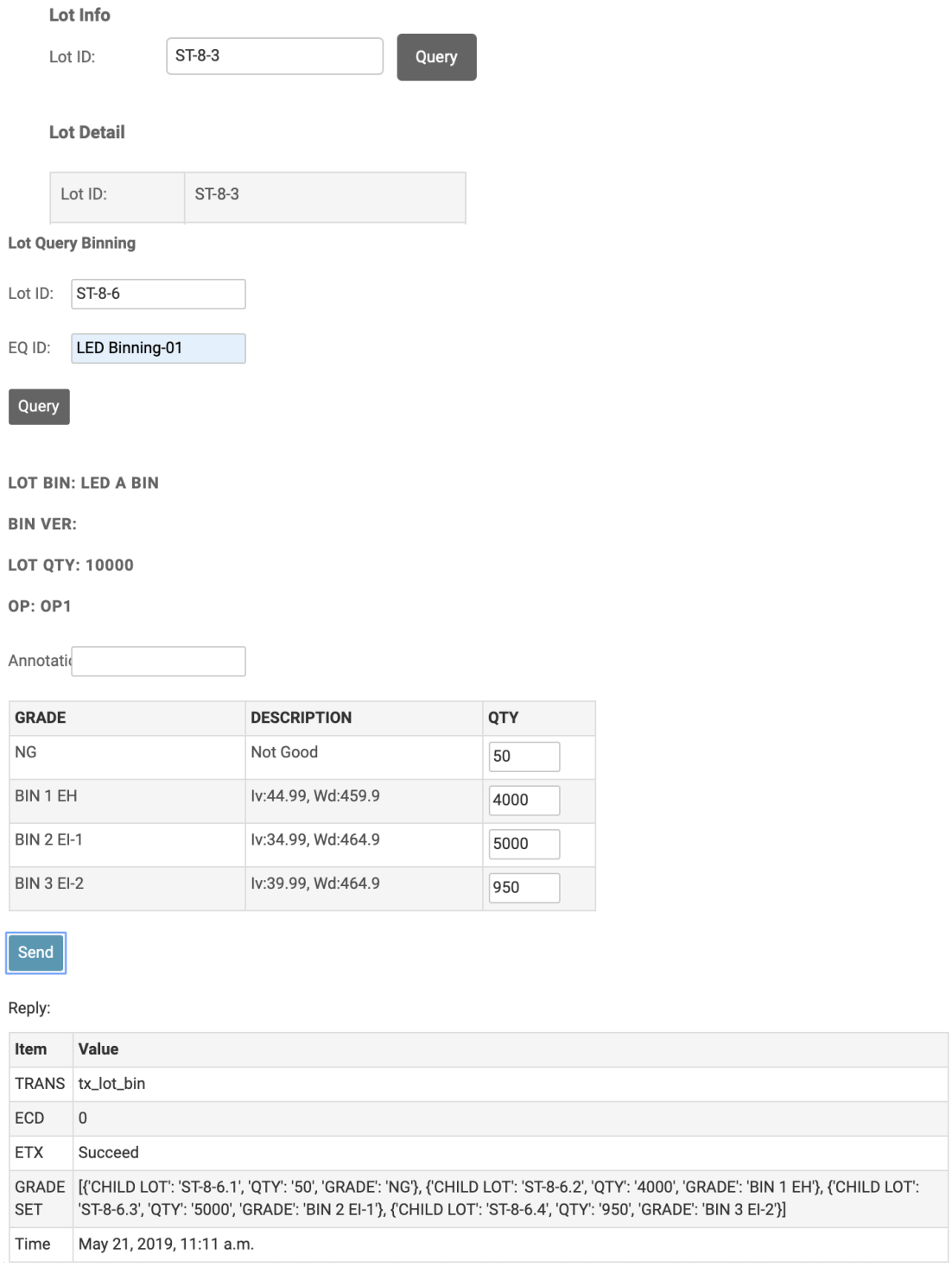
ID	STATE	HOLD	LAST RECIPE	LAST PRODUCT	LOT LIST
DEMO-AOI-01	ID	True			
DEMO-AOI-02	ID	False			
DEMO-Bin-02	ID	False			
DEMO-Bing-01	ID	False			
DEMO-Break-01	ID	False			
DEMO-Break-02	ID	False			
DEMO-Etch-01	RA	False	DEMO-Etch	DEMO-PCB	DEMO-0-01
DEMO-Etch-02	ID	False			
DEMO-Kitting-01	RA	False	DEMO-Kitting	DEMO-PCB	DEMO-0-03 DEMO-0-02
DEMO-Kitting-02	ID	False			
DEMO-Reflow-01	ID	False			
DEMO-Reflow-02	ID	False			
ST-AOI-01	ID	False			
ST-Bin-02	ID	False			
ST-Bing-01	ID	False			
ST-Break-01	ID	False			
ST-Etch-01	ID	False			
ST-Kitting-01	ID	False			
ST-Reflow-01	ID	False			

Previous 1 Next

9.3. Lot query

9.3.1. Lot Info

Get lot detail information



Lot Info

Lot ID: ST-8-3 Query

Lot Detail

Lot ID:	ST-8-3

Lot Query Binning

Lot ID: ST-8-6

EQ ID: LED Binning-01

Query

LOT BIN: LED A BIN

BIN VER:

LOT QTY: 10000

OP: OP1

Annotati

GRADE	DESCRIPTION	QTY
NG	Not Good	50
BIN 1 EH	Iv:44.99, Wd:459.9	4000
BIN 2 EI-1	Iv:34.99, Wd:464.9	5000
BIN 3 EI-2	Iv:39.99, Wd:464.9	950

Send

Reply:

Item	Value
TRANS	tx_lot_bin
ECD	0
ETX	Succeed
GRADE SET	[{'CHILD LOT': 'ST-8-6.1', 'QTY': '50', 'GRADE': 'NG'}, {'CHILD LOT': 'ST-8-6.2', 'QTY': '4000', 'GRADE': 'BIN 1 EH'}, {'CHILD LOT': 'ST-8-6.3', 'QTY': '5000', 'GRADE': 'BIN 2 EI-1'}, {'CHILD LOT': 'ST-8-6.4', 'QTY': '950', 'GRADE': 'BIN 3 EI-2'}]
Time	May 21, 2019, 11:11 a.m.

9.3.2. Lot List

- Lot List (WIP) : query lot in production
- Lot List (Shipped) : query lot already shipped
- Lot List (Terminated) : query lot already terminated

Lot List Query

Show 10 entries

Search:

NAME	PRODUCT	WO	TYPE	CURR_EQ	STEP	RECIPE	CHECK	DC	BREAK	BIN	HOLD	STATE	NEXT	QTY
WO-01.1	Change Product -A	WO-01	P	防銲-01	600 防焊	A-防焊		None	None		False	R	SO	20
WO-01.2	PCB-8-LYS-A	WO-01	P	None	110-8 內乾-8	內乾-8		內乾			False	I	SI	20
WO-01.3	PCB-8-LYS-A	WO-01	P	None	060 裁板	裁板	None		None		False	I	SI	20
WO-01.4	PCB-8-LYS-A	WO-01	P	發料_01	050 發料	發料	None	發料	None	None	False	R	SO	20
WO-01.5	PCB-8-LYS-A	WO-01	P	發料_01	050 發料	發料	None	發料	None	None	False	R	SO	20
WO-01.7	PCB-8-LYS-A	WO-01	P	發料_01	050 發料	發料	None	發料	None	None	False	R	SO	10
WO-01.8	PCB-8-LYS-A	WO-01	P	發料_01	050 發料	發料	None	發料	None	None	False	R	SO	20
WO-01.9	PCB-8-LYS-A	WO-01	P	發料_01	050 發料	發料	None	發料	None		False	R	SO	10
WO-01-10	PCB-8-LYS-A	WO-01	P	None	060 裁板	裁板					False	I	SI	3
WO-01-10.1	PCB-8-LYS-A	WO-01	P	None	060 裁板	裁板					False	I	SI	5

Showing 1 to 10 of 10,385 entries

Previous 1 2 3 4 5 ... 1039 Next

9.3.3. Lot Query EQ

Find available EQ for the Lot

Lot Query EQ

Lot ID: WO-01.2 Query

Available EQ List

NAME	DESCRIPTION	EQ_TYPE	PARENT	AREA	GROUP	CTRL_STATE	IS_HOLD	IS_VIRTUAL	ACTIVE
內乾 02	None	A	None	Fab1-1F	內乾	ID	False	False	True
內乾 01	None	A	None	Fab1-1F	內乾	ID	False	False	True

9.3.4. Lot History

Find lot history of Step(StepIn, StepOut, Lot Record)

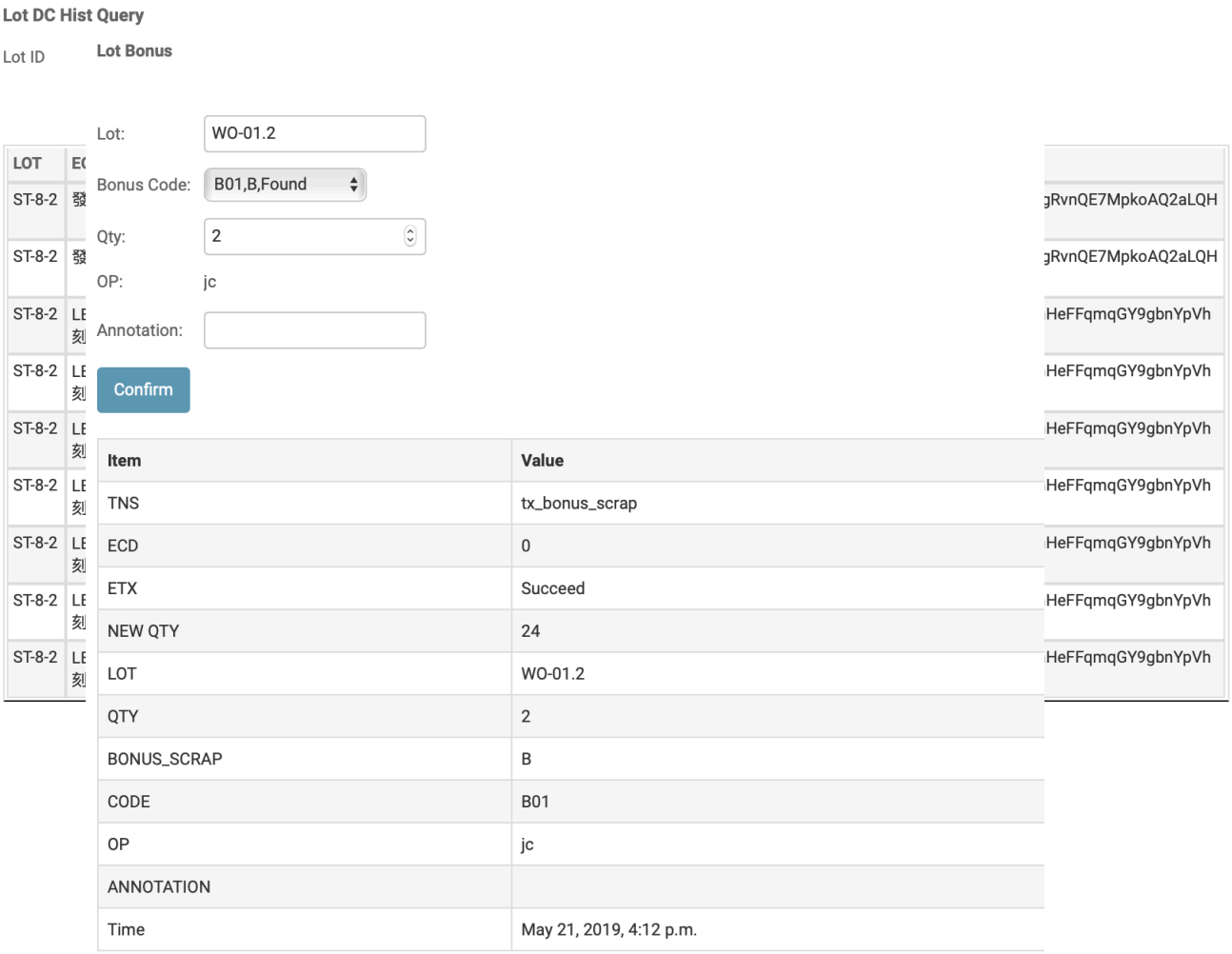
Lot History Query

Lot ID WO-01.2 Query

LOT	EQ	OP	RECIPE	PRODUCT	PROCESS	PROCESS_STEP	QTY	TRANSACTION	TRANS_TIME	ANNOTATION
WO-01.2		jc	發料	PCB-8-LYS-A	PCB 8 LYS	050 發料	None	lot_start	Jan. 10, 2019, 12:19 a.m.	
WO-01.2	發料_01	jc	發料	PCB-8-LYS-A	PCB 8 LYS	050 發料	None	step_in	Jan. 19, 2019, 2:21 p.m.	
WO-01.2	發料_01	jc	裁板	PCB-8-LYS-A	PCB 8 LYS	060 裁板	None	tx_step_out	Jan. 21, 2019, 11:13 p.m.	
WO-01.2	發料_01	jc				050R Kitting	None	record	Jan. 23, 2019, 6:07 p.m.	testing
WO-01.2	裁板_01	EAP	裁板	PCB-8-LYS-A	PCB 8 LYS	060 裁板	20	tx_step_in	April 11, 2019, 11:18 p.m.	EAP testing
WO-01.2	裁板_01	EAP	裁板	PCB-8-LYS-A	PCB 8 LYS	060 裁板	20	tx_step_out	April 11, 2019, 11:20 p.m.	EAP testing

9.3.5. Lot Data Collection History

Query lot data collection history



9.3.6. Lot Run Card Query

Query Lot all Process Step at current Product

Query Run Card

LOT: ST-8-3

Confirm

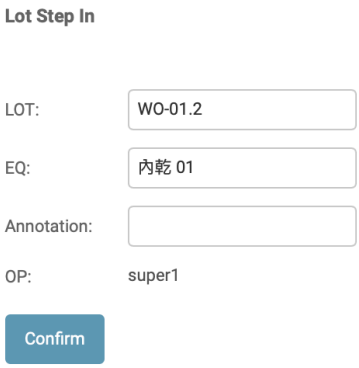
Process Step List

NAME	CATEGORY	RECIPE	EQ_GROUP	STEP_CHECK	DCPLAN	BINNING	INSTRUCTION
LED 100 Kitting	Kitting	LED Kitting	發料	None	LED Kitting	None	LED 100 Kitting Step Instruction
LED 200 鍍膜	Plating	LED 鍍膜	LED 鍍膜	None	None	None	LED 200 鍍膜 Step Intruction
LED 300 黃光	Photo	LED 黃光	LED 黃光	None	None	None	LED 300 黃光 Step Instruction
LED 400 蝕刻_1	Etching	蝕刻_1	LED 蝕刻	None	蝕刻 Plan	None	New DcPlan
LED 500 切割	Breaking	LED 切割	LED 切割	None	None	None	

9.4. Lot operations

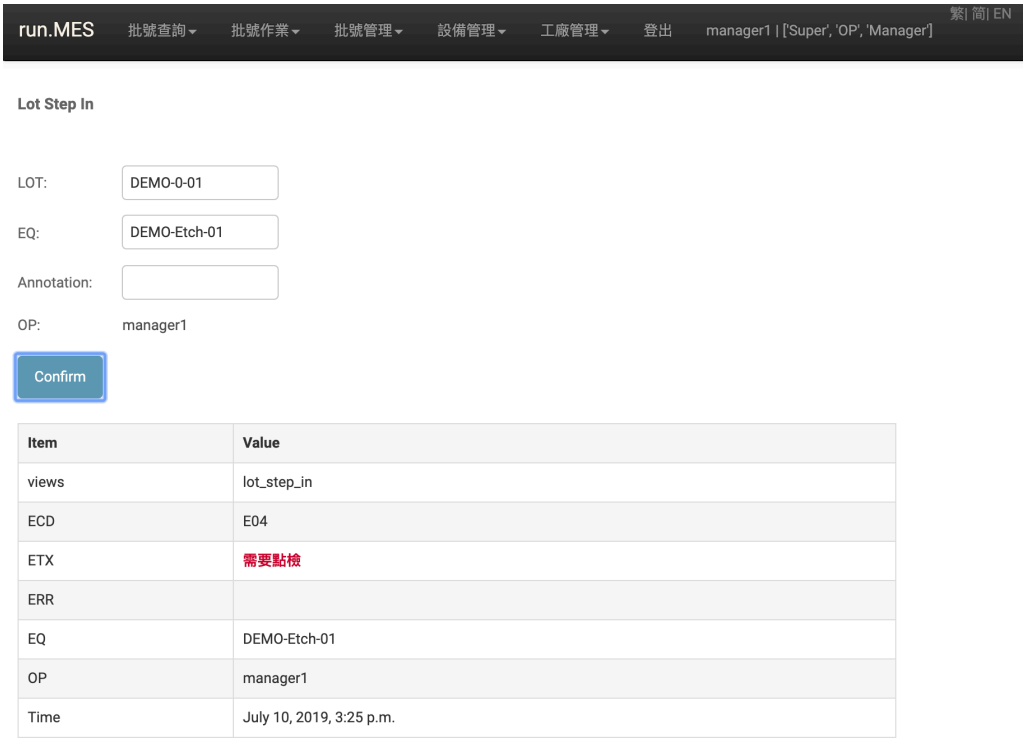
9.4.1. StepIn

- StepIn input fields: Lot Id, EQ and Annotation(option)
- runMES will validate lot's process, process step and correct EQ
- If the current process step require step check, StepIn will validate whether the target equipment has the same for Step Check data collection, recipe
- Reply message: ECD '0' stands for succeed otherwise it shows some errors happened
- Recipe, Qty, Step Instruction and Word Order instruction can set up in data modeling.



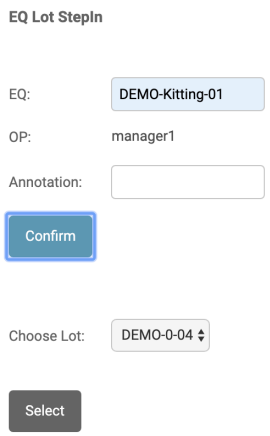
Item	Value
TNS	tx_step_in
ECD	0
ETX	Succeed
LOT	WO-01.2
RECIPE	內乾-8
QTY	20
EQ	內乾 01
OP	super1
STEP INSTRUCTION	110-8 內乾-8 instruction:
WO INSTRUCTION	None
Time	May 20, 2019, 12:56 a.m.

- Step Check
  if the process require step check for recipe or product change, user will see the following message when the step check (EQ Record) has not processed



9.4.2. EQ Lot StepIn

Input EQ and choose lot from a lot list, the lot list will arrange base on the lot priority



9.4.3. StepOut

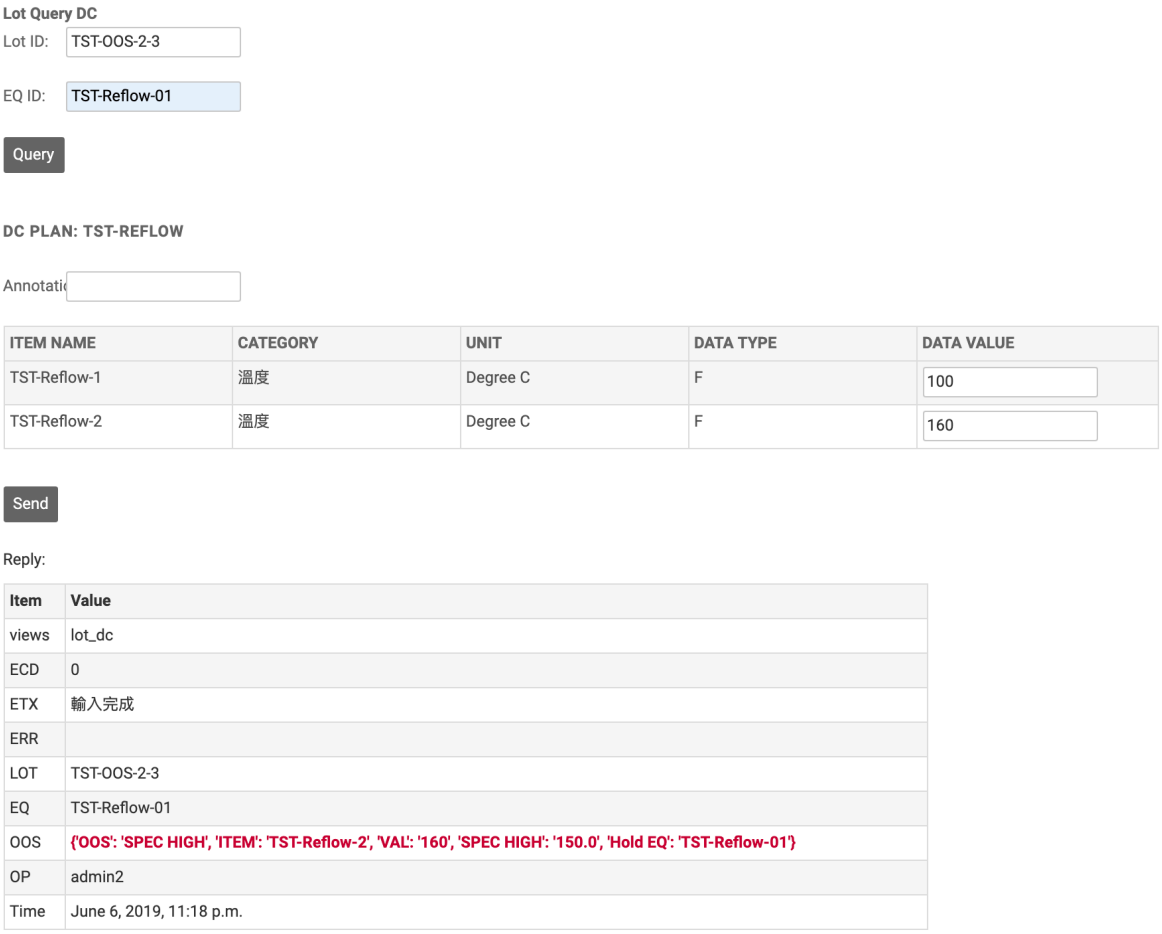
Similar to StepIn operation, input Lot and EQ, Annotation(option)

Item	Value
TNS	tx_step_out
LOT	WO-01.2
ECD	0
ETX	Succeed
EQ	內乾 01
QTY	20
OP	super1
NEXT STEP	160-8 內檢-8
PRODUCT	PCB-8-LYS-A
Time	May 20, 2019, 1:11 a.m.

Item	Value
TNS	tx_step_out
LOT	ST-8-6
ECD	0
ETX	Succeed
EQ	LED 切割-01
QTY	10000
OP	op1
NEXT STEP	LED 700 Binning
PRODUCT	LED BIN
Time	May 21, 2019, 11:05 a.m.

9.4.4. Data collections

Require to input Lot ID, EQ ID the press Query, runMES will show data collection items for you to input data, after data input press Send, runMES will reply data collection result, if there are SPEC checks error, it will show in OOS field



Lot Query DC

Lot ID: TST-OOS-2-3

EQ ID: TST-Reflow-01

Query

DC PLAN: TST-REFLOW

Annotati

ITEM NAME	CATEGORY	UNIT	DATA TYPE	DATA VALUE
TST-Reflow-1	溫度	Degree C	F	100
TST-Reflow-2	溫度	Degree C	F	160

Send

Reply:

Item	Value
views	lot_dc
ECD	0
ETX	輸入完成
ERR	
LOT	TST-OOS-2-3
EQ	TST-Reflow-01
OOS	{'OOS': 'SPEC HIGH', 'ITEM': 'TST-Reflow-2', 'VAL': '160', 'SPEC HIGH': '150.0', 'Hold EQ': 'TST-Reflow-01'}
OP	admin2
Time	June 6, 2019, 11:18 p.m.

9.4.5. Breaking

The Lot must has a breaking operation the current process step and current operation is breaking, user need to input Lot ID and EQ ID,
Breaking will change lot qty base on data modeling, the product will also change after StepOut

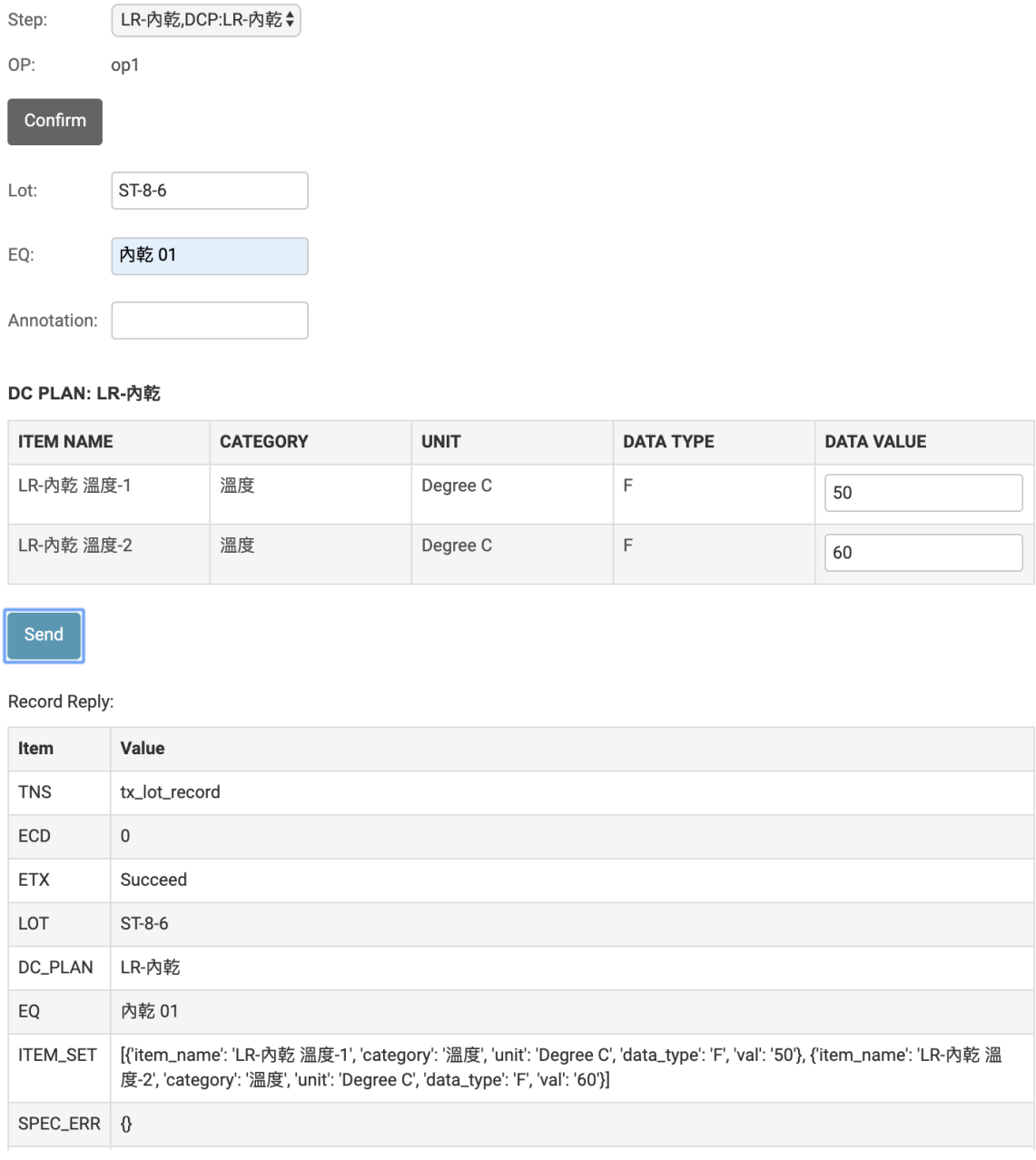
Item	Value
TNS	tx_lot_breaking
ECD	0
ETX	Succeed
LOT	ST-8-6
NEW QTY	10000
Time	May 21, 2019, 11 a.m.

9.4.6. Binning

Lot binning require to input Lot ID, EQ ID the press query for binning grades, then input each grade's qty.
The lot will split into the child lots, the original lot will be terminate.
StepOut for child lots

9.4.7. Lot Record

Lot record is for pure data collection base on Lot and EQ, it will not validate Lot, EQ status or any rules.
User can collect any information base on data modeling
Choose pre-defined Step for Lot Record, input Lot, EQ and the data in input fields

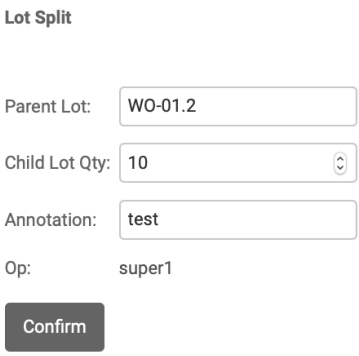


9.5. Lot managements

Lot management functions are limited for supervisor

9.5.1. Lot Split

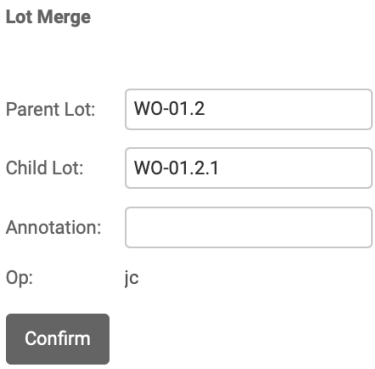
Lot can not manually split lot during ‘RUN’ state(between StepIn and StepOut) unless build in Process Step binning process
If Parent lot quantity equal to child lot quality, the parent lot will be terminated



Item	Value
TNS	tx_split_lot
ECD	0
ETX	Succeed
PARENT LOT	WO-01.2
PARENT QTY	10
NEW LOT	WO-01.2.1
NEW LOT QTY	10
OP	super1
Time	May 21, 2019, 3:49 p.m.

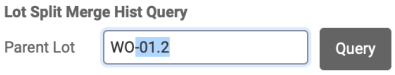
9.5.2. Lot Merge

2 Lots merge are limited to same Product, Process and Process Step, the lot state needs to be in 'IDLE' state
Child lot will be terminated
Merge lots will cause future traceability difficulty, be caution of use merge function



Item	Value
TNS	tx_merge_lot
ECD	0
ETX	Succeed
PARENT LOT	WO-01.2
CHILD LOT	WO-01.2.1
OP	jc
Time	May 21, 2019, 4 p.m.

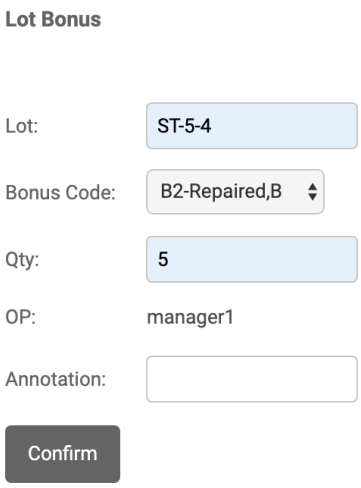
9.5.3. Lot SplitMerge Hist



PARENT	P_QTY	CHILD	C_QTY	S/M	OP	TID	TIME	ANNOTATION
WO-01.2	20	WO-01.2.1	10	S		RQ7M6wMm6theD4VWSkQHak	May 21, 2019, 3:49 p.m.	test
WO-01.2	10	WO-01.2.1	10	M		ma2CBTAjDtDYBXsAQHmpjQ	May 21, 2019, 4 p.m.	

9.5.4. Lot Bonus

Lot bonus is to add quantity to lot, user need to choose code from UI for the reason

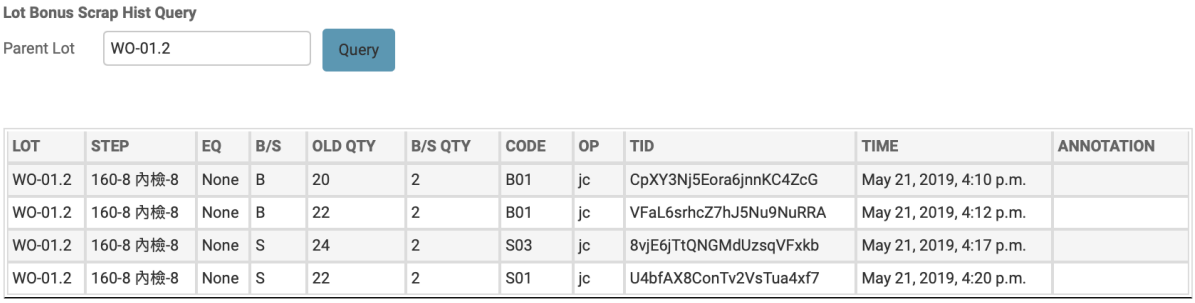


9.5.5. Lot Scrap

Lot scrap is to remove quantity from lot, normal cases is inspection result out of spec.

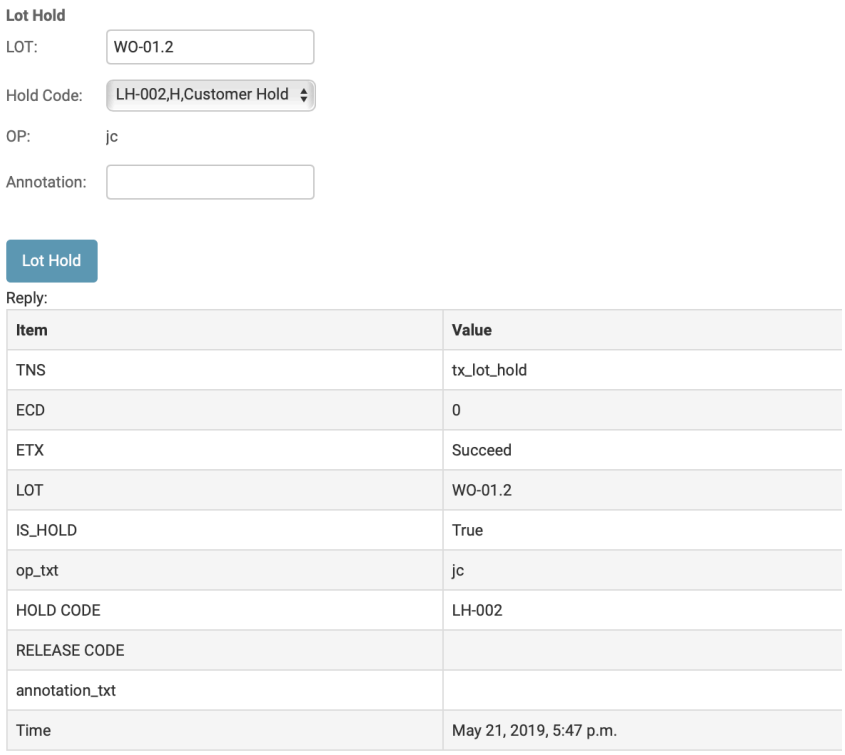
Item	Value
TNS	tx_bonus_scrap
ECD	0
ETX	Succeed
NEW QTY	20
LOT	WO-01.2
QTY	2
BONUS_SCRAP	S
CODE	S01
OP	jc
ANNOTATION	
Time	May 21, 2019, 4:20 p.m.

9.5.6. Lot BonusScrap Hist



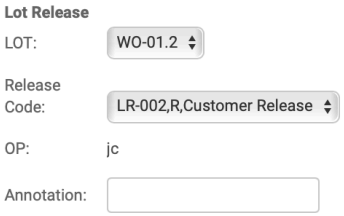
LOT	STEP	EQ	B/S	OLD QTY	B/S QTY	CODE	OP	TID	TIME	ANNOTATION
WO-01.2	160-8 內檢-8	None	B	20	2	B01	jc	CpXY3Nj5Eora6jnnKC4ZcG	May 21, 2019, 4:10 p.m.	
WO-01.2	160-8 內檢-8	None	B	22	2	B01	jc	VFaL6srhcZ7hJ5Nu9NuRRA	May 21, 2019, 4:12 p.m.	
WO-01.2	160-8 內檢-8	None	S	24	2	S03	jc	8vjE6jTtQNGMdUzsqVFxkb	May 21, 2019, 4:17 p.m.	
WO-01.2	160-8 內檢-8	None	S	22	2	S01	jc	U4bfAX8ConTv2VsTua4xf7	May 21, 2019, 4:20 p.m.	

9.5.7. Lot Hold



Item	Value
TNS	tx_lot_hold
ECD	0
ETX	Succeed
LOT	WO-01.2
IS_HOLD	True
op_txt	jc
HOLD CODE	LH-002
RELEASE CODE	
annotation_txt	
Time	May 21, 2019, 5:47 p.m.

9.5.8. Lot Release



Reply:

Item	Value
TNS	tx_lot_hold
ECD	0
ETX	Succeed
LOT	WO-01.2
IS_HOLD	False
op_txt	jc
HOLD CODE	
RELEASE CODE	LR-002
annotation_txt	
Time	May 21, 2019, 5:53 p.m.

9.5.9. Lot HoldRelease Hist

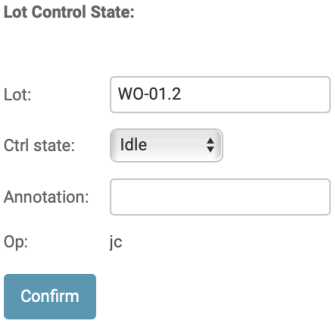
Lot Hold Release Hist Query

Lot WO-01.2 Query

LOT	H/R	HOLDCODE	RELEASECODE	OP	TID	TIME	ANNOTATION
WO-01.2	H	LH-002		jc	UaViSjnbtKvDxmVVa4PNo6	May 21, 2019, 5:47 p.m.	None
WO-01.2	R		LR-002	jc	svF2rrUmYbX3fT8kTPqTk3	May 21, 2019, 5:53 p.m.	None

9.5.10.Lot State

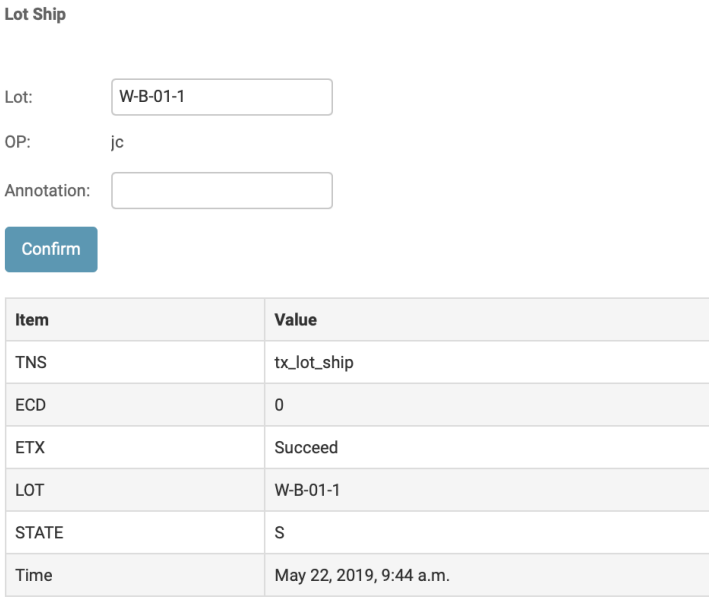
Lot state is for manual change Lot Control State, this is only used for trouble shooting purpose



Item	Value
TNS	tx_lot_ctrl_state_change
ECD	0
ETX	Succeed
lot_txt	WO-01.2
op_txt	jc
old_state	R
new_state	I
annotation_txt	
Time	May 21, 2019, 6:15 p.m.

9.5.11.Lot Ship

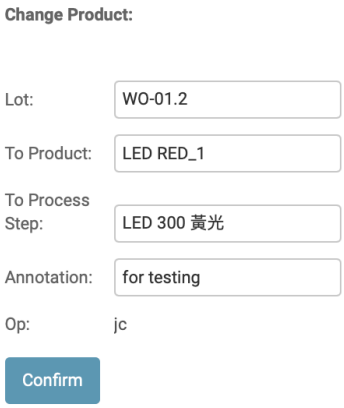
Lot only in ‘F’(Finished) state can be ship



Item	Value
TNS	tx_lot_ship
ECD	0
ETX	Succeed
LOT	W-B-01-1
STATE	S
Time	May 22, 2019, 9:44 a.m.

9.5.12.Change Product

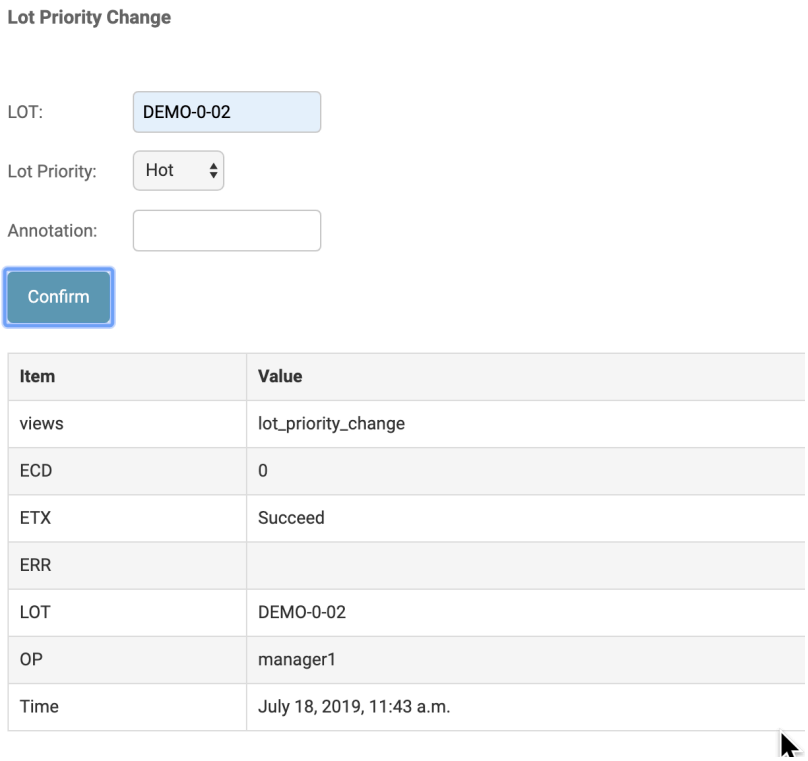
This is a function for trouble shooting, it should be carefully input the new product and process step.
If some lots in production and process need to be changed(ECN), one way is use change product to new product and process step to fix it.



Item	Value
TNS	tx_change_product
ECD	0
ETX	Succeed
LOT	WO-01.2
FROM PRODUCT	PCB-8-LYS-A
FROM PROCESS	PCB 8 LYS
FROM STEP	160-8 內檢-8
TO_PRODUCT	LED RED_1
TO_PROCESS_STEP	LED 300 黃光
OP	jc
Time	May 22, 2019, 10:15 a.m.

9.5.13.Lot Priority Change

Lot priority has 5 grades (‘Urgent’, ‘Hot’, ‘High’, ‘Regular’,’Low’), user can alter the priority.



Item	Value
views	lot_priority_change
ECD	0
ETX	Succeed
ERR	
LOT	DEMO-0-02
OP	manager1
Time	July 18, 2019, 11:43 a.m.

9.6. EQ management

9.6.1. EQ List

List all equipment

EQ List Query

Show 10 entries

Search:

NAME	DESCRIPTION	EQ_TYPE	PARENT	AREA	GROUP	CTRL_STATE	IS_HOLD	IS_VIRTUAL	ACTIVE
文字-1	None	A	None	Fab1-2F	文字	RA	False	False	True
文字-2	None	A	None	Fab1-2F	文字	ID	False	False	True
裁板_01	None	A	None	Fab1-1F	裁板	ID	False	False	True
裁板_02	None	A	None	Fab1-1F	裁板	RA	False	False	True
內檢_01	None	A	None	Fab1-1F	內檢	ID	False	False	True
外乾_01	None	A	None	Fab1-1F	外乾	ID	False	False	True
Dummy	None	A	None	Fab1-2F	裁板	ID	False	True	False
發料_01	Virtual EQ	A	None	Fab1-1F	發料	RA	False	True	True
內乾 01	None	A	None	Fab1-1F	內乾	ID	False	False	True
內乾 02	None	A	None	Fab1-1F	內乾	ID	False	False	True

Showing 1 to 10 of 53 entries

Previous 1 2 3 4 5 6

Next

9.6.2. EQ Query Lot

Find available lots for the equipment

EQ Query Lot for StepIn

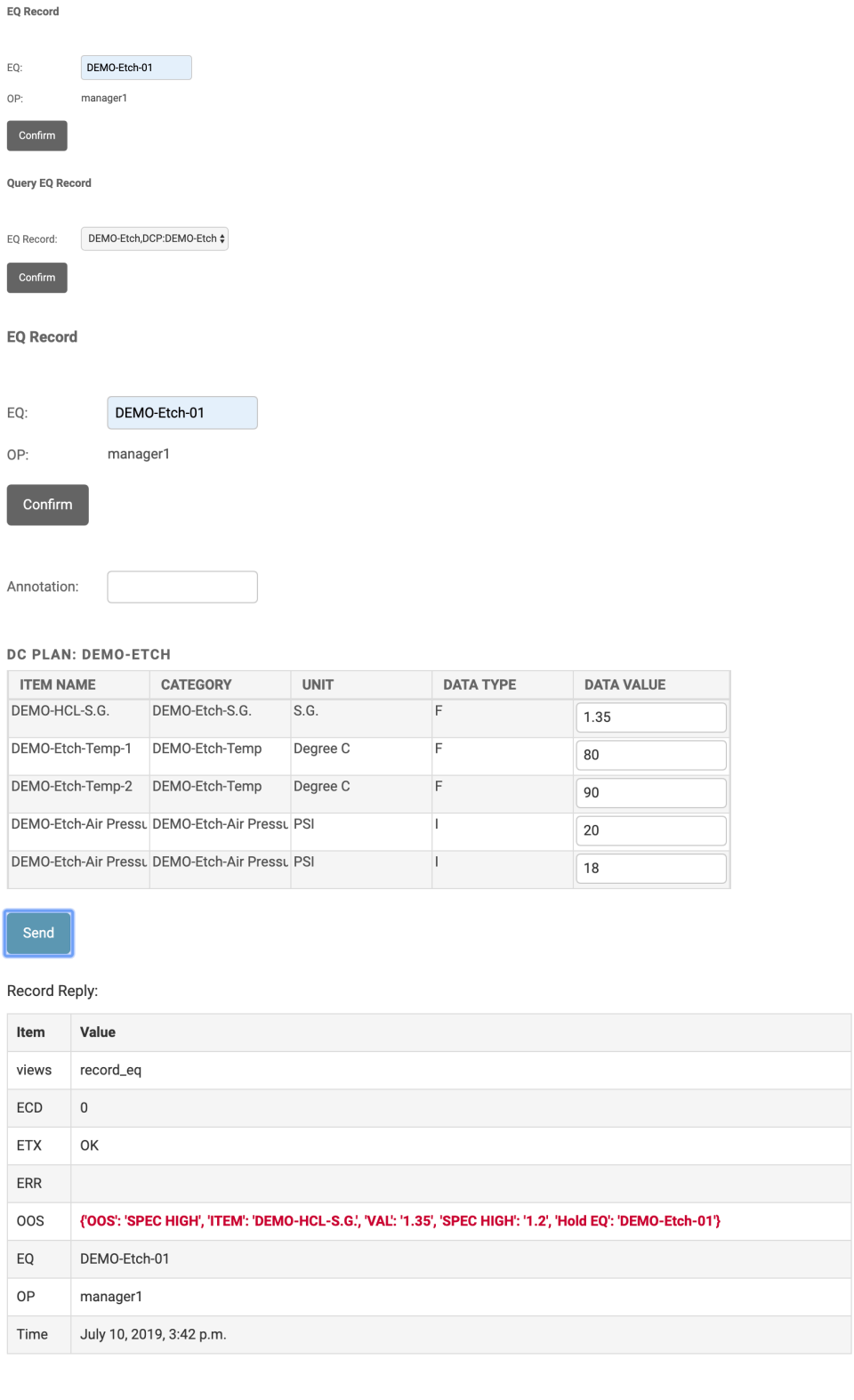
EQ ID: LED 切割-02 Query

Available Lot List

NAME	PRODUCT	WO	CURR_EQ	STEP	RECIPE	CHECK	DC	BREAK	BIN	HOLD	STATE	NEXT	QTY
ST-8-3	LED RED_1	StressTest-8	None	LED 500 切割	LED 切割			LED Breaking		False	I	SI	20

9.6.3. EQ Record

This function is used to input data collection for equipment base on data modeling, typical application is for step check, equipment daily check or equipment SPC/FDC in EAP automation, one eq can have many kinds of EQ Record.



9.6.4. EQ Record Hist

List eq record history for last 200 records

EQ	DCPLAN	TRAN	TIME	ANNOTATION	OP	ITEM	TYPE	UNIT	VALUE	TID
內蝕_01	蝕刻 Plan	E	May 10, 2019, 9:54 a.m.		None	蝕刻液比重	F	SG	1.31	ELxLguEkvWWMJKVBUTSdFF
內蝕_01	蝕刻 Plan	E	May 10, 2019, 9:54 a.m.		None	蝕刻液鹽酸濃度	F	HCL	16.7	ELxLguEkvWWMJKVBUTSdFF
內蝕_01	蝕刻 Plan	E	May 10, 2019, 9:54 a.m.		None	蝕刻液氯酸鈉濃度	I	NaClO3	13	ELxLguEkvWWMJKVBUTSdFF
內蝕_01	蝕刻 Plan	E	May 10, 2019, 9:54 a.m.		None	蝕刻液溫度	F	Degree C	66.9	ELxLguEkvWWMJKVBUTSdFF
內蝕_01	蝕刻 Plan	E	May 10, 2019, 9:54 a.m.		None	蝕刻液上噴壓力	F	Kg/cm square	18.3	ELxLguEkvWWMJKVBUTSdFF
內蝕_01	蝕刻 Plan	E	May 10, 2019, 9:54 a.m.		None	蝕刻液下噴壓力	F	Kg/cm square	20.2	ELxLguEkvWWMJKVBUTSdFF
內蝕_01	蝕刻 Plan	E	May 10, 2019, 9:54 a.m.		None	蝕刻滾輪清洗	B	手動作業	True	ELxLguEkvWWMJKVBUTSdFF

9.6.5. EQ Hold

This function will change EQ status of hold, it will block any lot to StepIn in this EQ
User have to assign hold code

Reply:

Item	Value
TNS	tx_eq_hold
ECD	0
ETX	Success
EQ	內蝕_01
IS_HOLD	True
op_txt	jc
HOLD CODE	EH-002
RELEASE CODE	
annotation_txt	Joshua test
Time	May 22, 2019, 11:19 a.m.

9.6.6. EQ Release

To release EQ from Hold status, user have to assign release code

Reply:

Item	Value
TNS	tx_eq_hold
ECD	0
ETX	Success
EQ	內蝕_01
IS_HOLD	False
op_txt	jc
HOLD CODE	
RELEASE CODE	ER-002
annotation_txt	Joshua test
Time	May 22, 2019, 11:22 a.m.

9.6.7. EQ State Change

Choose the new EQ state

- ('RA','Run Available')
- ('RN','Run Not Available')
- ('PM','Maintenance')
- ('ID','Idle')
- ('DM','Down')
- ('LN','Lend')
- ('SU','Setup')

Only RA,ID and LN states are allow to StepIn

Item	Value
TNS	tx_eq_change_state
ECD	0
ETX	Succeed
EQ	內蝕_01
OP	jc
STATE	SU
ANNOTATION	
Time	May 22, 2019, 11:37 a.m.

Appendix A – Hardware reference

1. For testing and development

- Celeron J1900 Processor
- 4G RAM
- 120G SSD

Or Above

2. For production

It is depends on your production volume, process steps and data collection frequency, it should base on some test result from a testing machine for hardware sizing

- HA architecture is recommended
- a mirrored disk for database
- A replicated database for reporting
- backup database every day
- for a massive data collection for EQ Record(e.g. 100 values/sec FDC data collection), you should consider an independent runMES for each area and only for EQ Record.