

# NPMS (NCVP Production Management System) Overview

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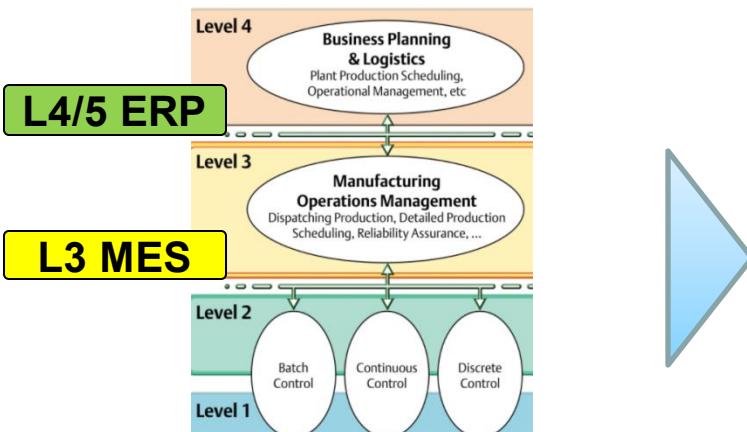
Dept: Production Engineering Center

Date: 20<sup>th</sup>Jan 2018

# NidecMES OverView Introduction

PE/C is steering the establishment of the standard model of MES(**Manufacturing Execution System**) as “NidecMES” to promote IoT in Nidec group. However, yielding the improvement by the utilization of information system at production site is difficult if PE/C work solely and only within the domain of MES. PE/C consider the close coordination with Information System Department is indispensable to create Nidec group wide synergy by the realization of data connection between NidecMES and Global SAP, the group standard ERP.

**NidecMES and Global SAP linkage is to be the core function of NidecMES**, referencing the fact that ISA95, the international standard model for factory system, define the data connection between MES and ERP as the core feature of enterprise control system integration



Interactive linkage between Global SAP as planning & logistics layer(L4/5) and NidecMes as operation management(L3) is the core feature of factory system.

# (Background)

## Nidec Smart Factory Vision: NIDEC Industry 4.0

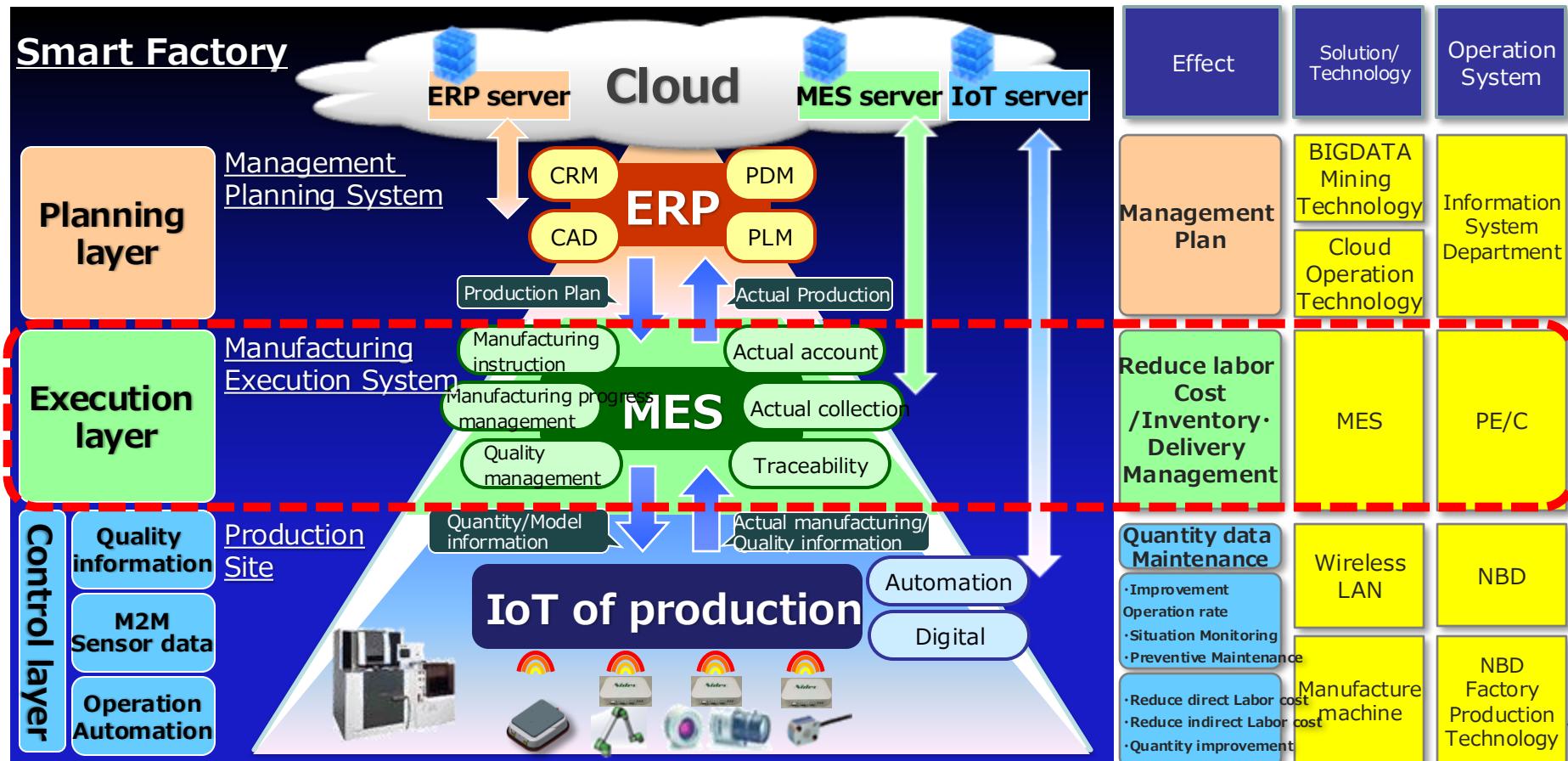


- To realize Labor saving, High quality, Productivity improvement base on pursuit of rationalization

### 〔Reform Cost structure〕 by 〔Manufacture Innovation〕

#### Automation production・IoT

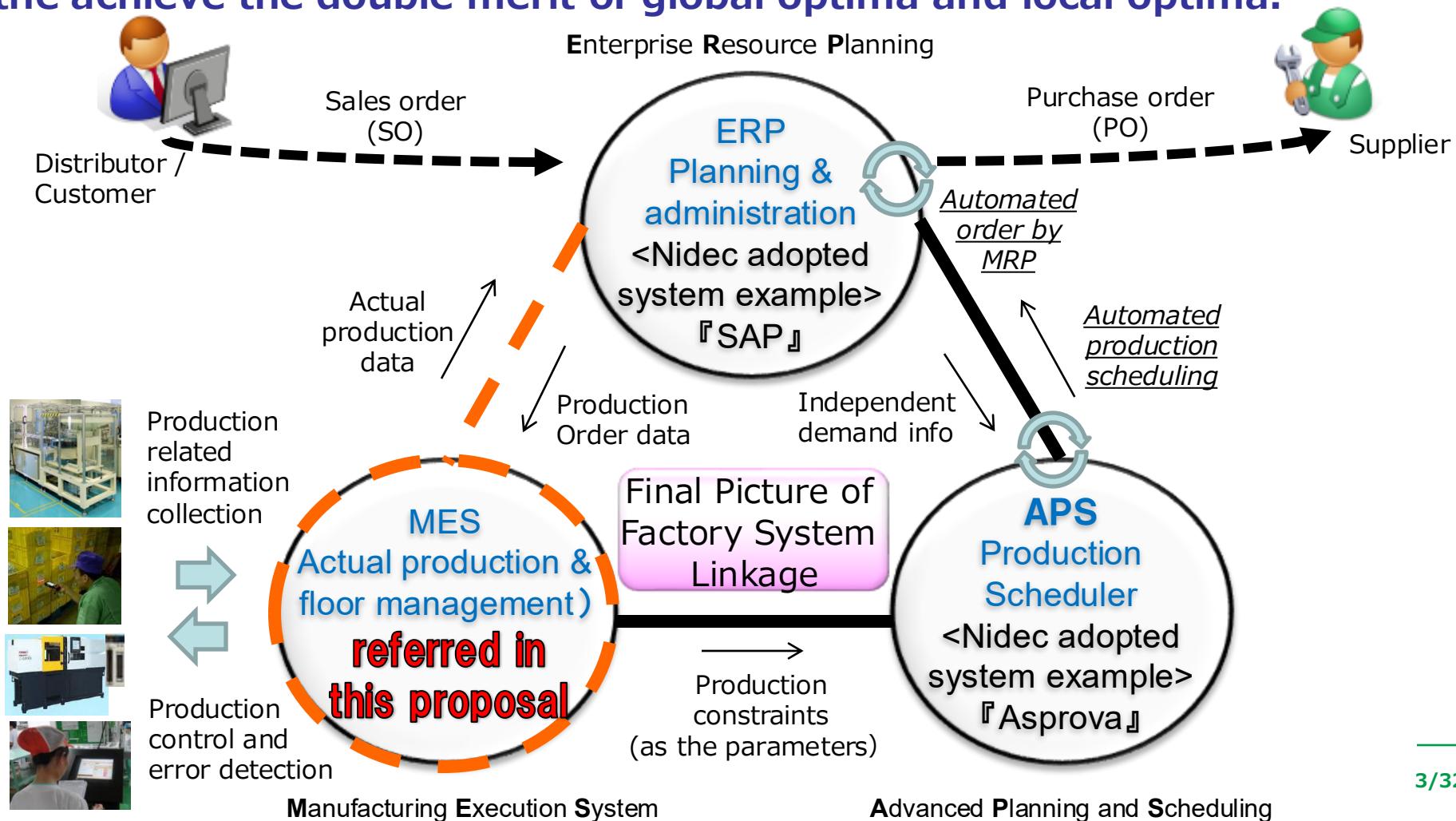
#### Reduce laborers/Reduce inventory/Shorten production time



## Overall synergy by linking factory systems

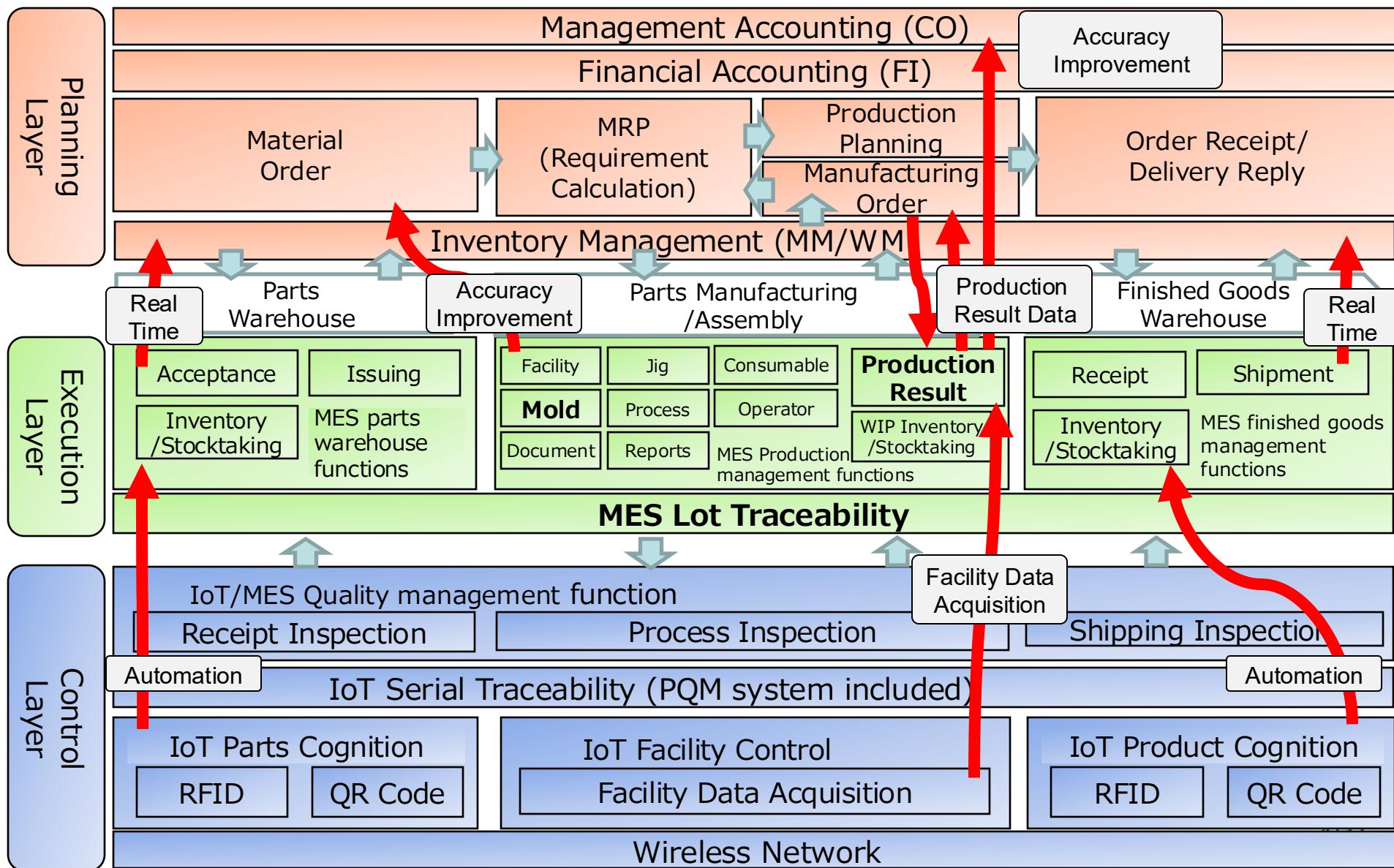
As the final picture of Nidec factory system, the linkage of ERP-MES-APS (scheduler) is indispensable to prevent the flood of closed and isolated systems.

**Especially, MES-ERP linkage (front-end back-end structure) is crucial for the achieve the double merit of global optima and local optima.**



# The overall picture of ERP(SAP)-MES-IoT linkage

Organic data linkage leads to global optima and factory system completion



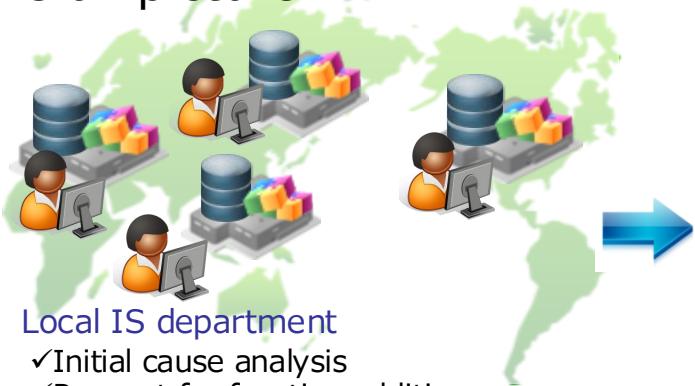
# Expected synergistic effect by ERP(SAP)-MES-IoT link

The improvement of data accuracy is the starting point for system utilization

	Synergistic Effects	Explanation	Improvements (ERP point of view )
①	<b>Data Accuracy Improvement</b>	Eliminate manual input operation and improve data accuracy by utilization of RFID & QR code and automated data linkage with facilities.	-More accurate inventory -Strict cost accounting -Solid Internal control
②	<b>Indirect Labor Reduction</b>	Reduce data input operation man hour by transferring inventory and finished goods data from MES & IOT into SAP.	-SAP operator reduction of 50% to 80%
③	<b>Material and Outsourcing Cost Reduction</b>	Inventory accuracy leads to MRP and purchase order accuracy. As the next step, utilization of APS (production scheduler) leads to production plan accuracy, which establish the system that enable the production of what's needed, when needed, and whatever volume needed.	Reduction of: -Material cost -Outsourcing cost -Loss on scrap -Inventory reduction
④	<b>Realization of IT Utilized Factory Management</b>	ERP-MES-IoT linkage secure the data accuracy (elimination of data input operation). SAP becomes the dashboard for fact based manufacturing management, rather than a financial statement data input tool.	-Better factory management -Quicker management cycle (PDCA) by data utilization

Considering that MES is the system for the optimization of production floor, we will pursue the stable operation, swift action at-site, and operation cost reduction, by providing concentrated 24H/365D operation support in coordination with partner vendor, building global development organization including each factory's IT personnel, and working together for the continuous improvement at-site (PDCA)

## Overall picture



### Local IS department

- ✓ Initial cause analysis
- ✓ Request for function addition
- ✓ Bug correction, program development (non-common, factory specific functions)
- ✓ Program transport request
- ✓ Hardware management, data backup

Inquiry & request

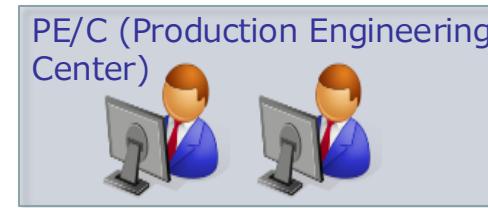


Initial cause analysis /Local handling



At-site User

Local IS dept.



Conform to company-wide IT policy

Global Support



Overall monitoring and control



- ✓ Global 24hr/365days support (to be implemented stepwise)
- ✓ English and Chinese based service (Japanese base service added as needed)
- ✓ Prompt cause analysis and respond to inquiries
- ✓ New function requirement and Change Request reception
- ✓ Bug correction and program development
- ✓ Program transport (after approval)
- ✓ Overall management and control
- ✓ Judgment on Change Requests and new function requirements
- ✓ System development process control
- ✓ Program test result verification and evidence confirmation
- ✓ Program transport approval

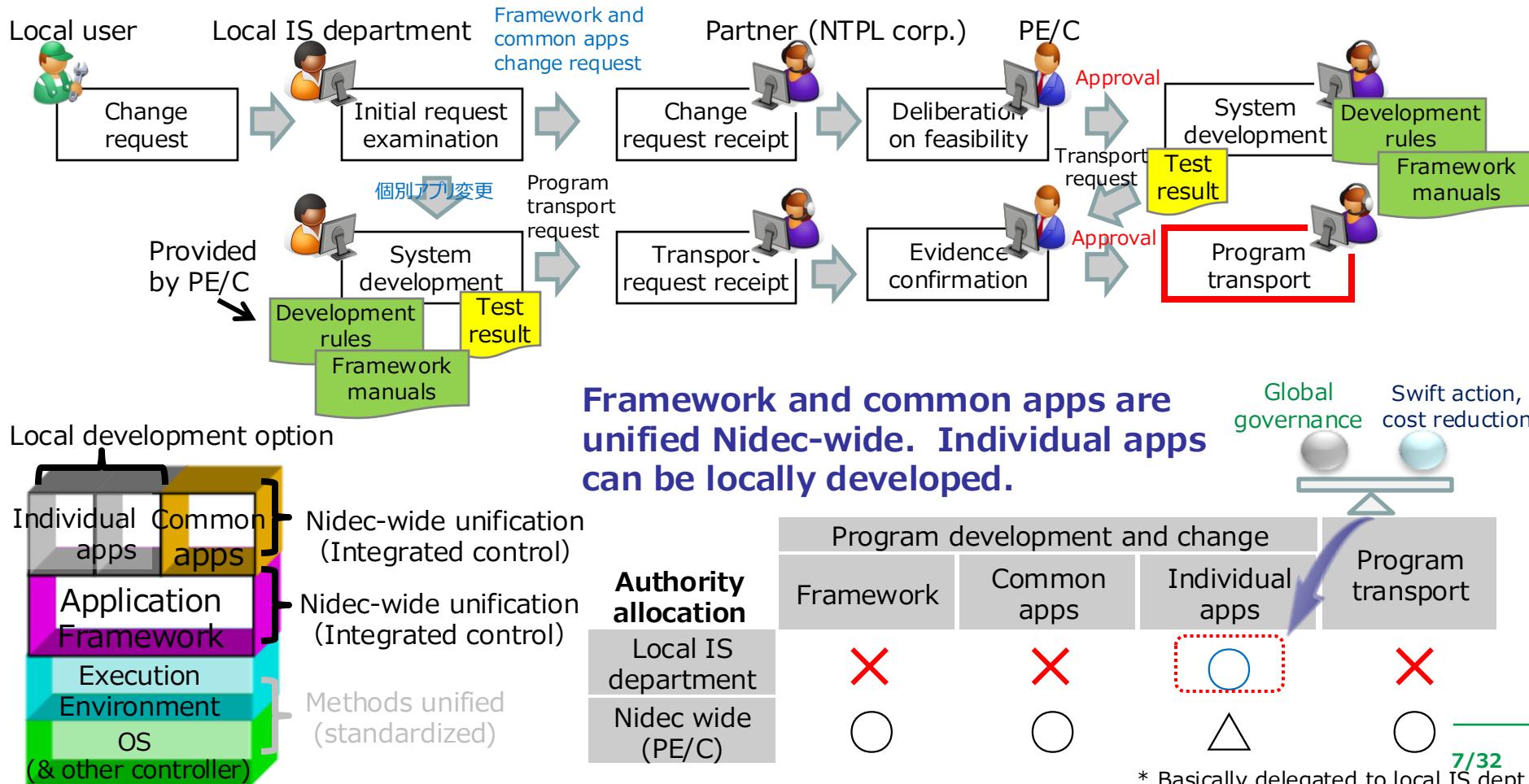
NCJ Information system department

The operation processes conform to the IT control of NCJ IS dept. (consistency of company-wide IT control is to be secured)

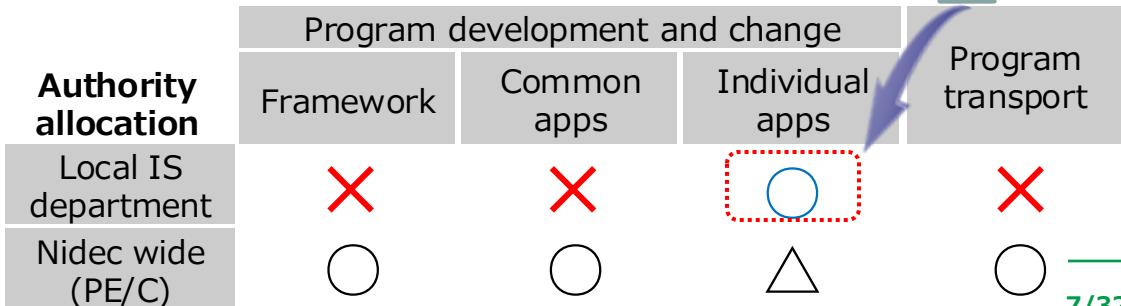
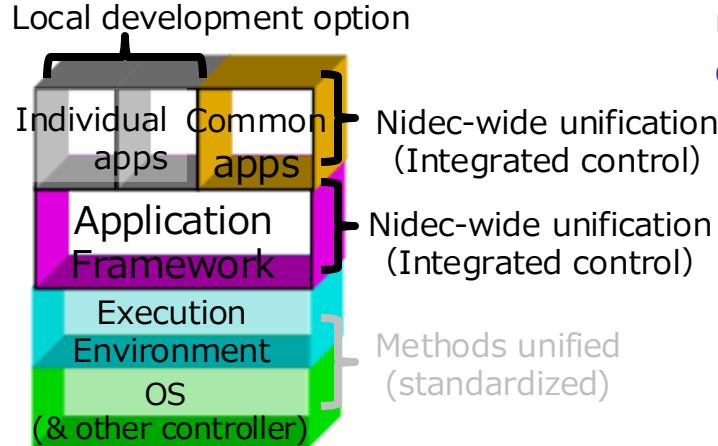
\*The involvement of local IS dept. is a must for MES implementing factories

# NidecMES program development and update control scheme

We pursue the best mix of global system control, swift action at site (at-site optimization), and cost reduction. **Program development and change processes shall conform to Nidec group wide IT process control**, especially chapter 2 "Information system implementation" and chapter 3 "Program change". **Authority control shall be partly delegated to local IS department**, without completely centralized, considering the characteristic of MES.



**Framework and common apps are unified Nidec-wide. Individual apps can be locally developed.**



\* Basically delegated to local IS dept.

# Nidec MES system quality control method (specific technology)

In-house MES development and standardization by manufacturer's system department and production engineering department is difference from IT vendors business which can hold countless number of engineers and their fixed costs. **If various technologies are used in MES development, the learning curve for each members is kept low and the technologies can not be the common language for standard development.**

⇒ Firstly, we adapt "specific technology focus strategy" which intestinally filter the target IT technology domains, to establish NidecMES development scheme as the common language of MES development, applying the major technologies with the ease of learning.

⇒ At the same time, we accumulate the wisdom of organization and know-how in the specified domains, and lower the learning load for the newly joining members. It ease the hiring of technician, eliminate the dependency on individual member's skill, and secure the system quality.

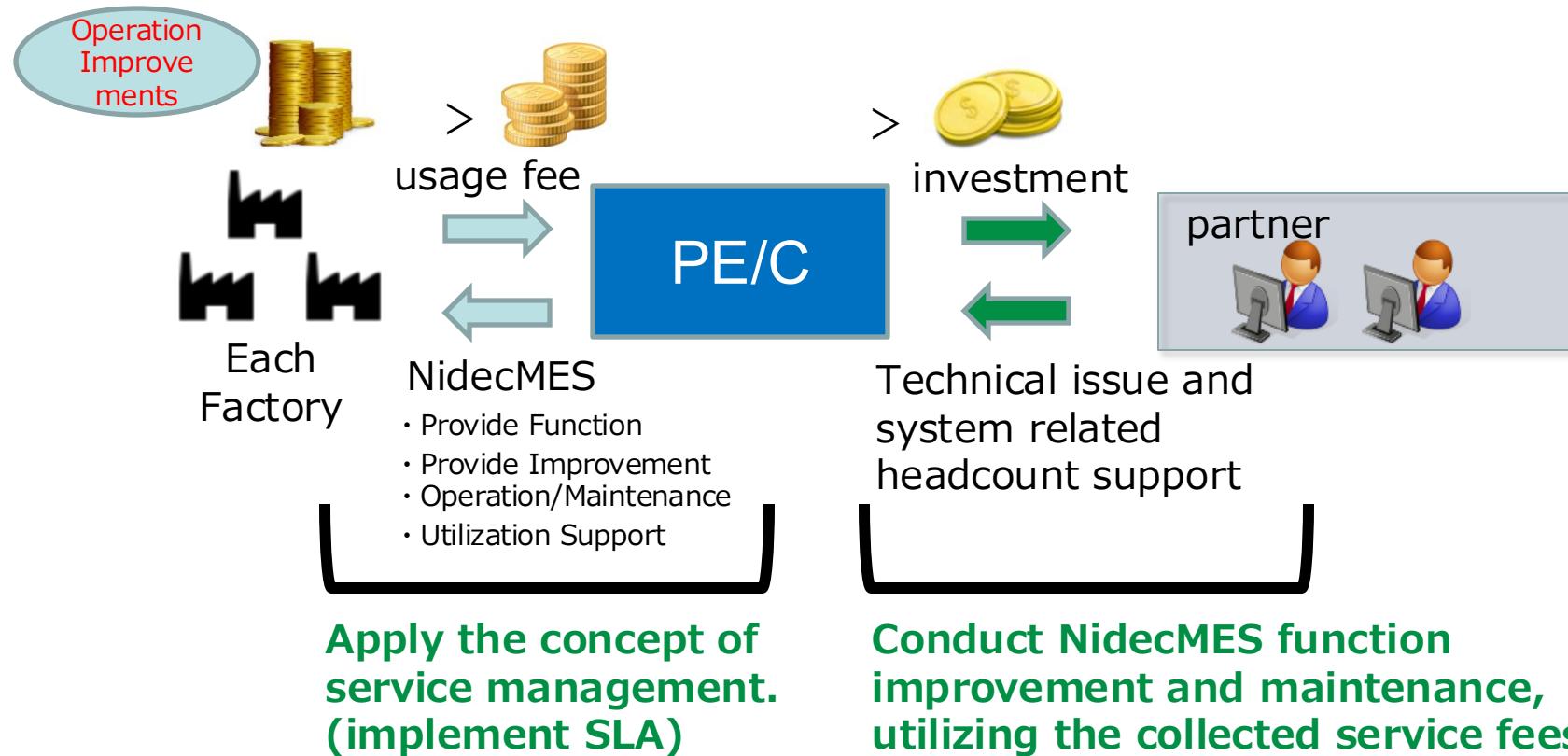
※As of August 2017

## Specific Technology Focus Strategy

Category	Technologies of Possible Options	NidecMES	Description
OS (server, client)	Linux, Android, etc.	Windows	We focus on Windows technology, as Windows is used in daily operations and technicians are easy to hire. License fee could be the bottle neck. Compatibility to other OS will be considered, in case daily operation PC transition to other OS.
System Architecture	WEB system (B/S), 3 layer architecture such as EJB (WEB-EJB-DB)	C/S (Client Server)	WEB system development requires HTML, JavaScript, CSS, security and communication technology, thus the technical hurdle is high. We choose C/S architecture for the purpose of factory wide closed environment MES development, not for a large scaled system. The architecture is also suitable for the data linkage among IOT domains and facility controls. The publication of the application is done through web by using "ClickOnce" technology.
Development Language	Java, PHP, Delphi, Python, Ruby, VB(.NET), etc.	.NET(C#)	C# is the standard language of Microsoft products. Both of its technical information and technicians are abundant and the technicians are relatively easy to hire. The object oriented syntax is similar to that of Java. VB.NET technician can also quickly learn it as it shares .NET.
Database	Oracle, SQL Server, DB2, MySQL, etc	PostgreSQL	PostgreSQL is a free, open source database. Nidec have the accumulation of know-how on its use through its use in PQM traceability system.
Version Control	CVS, SVN	Git	Git is supported as the standard version control tool for VisualStudio2015(C#.NET development environment).

## NidecMES Service Fee Concept

The collection of usage fee is necessary in the viewpoint of the prohibition on benefit provision and tax audit. It shall be conducted with the implementation of SLA (Service level agreement), based on the concept of service management.



NidecMES is the system used by multiple factories, thus it is not a scheme to let each factory bear all the system development cost incurred at PE/C. The service fee is to be collected based on the system's benefit recognized at each factory.

Purpose: Improve yield of base plate production process (quality improvement).

Standard equipment management and document management.

Follow up online machines working status

The main function of the system:

1. Drawing maintenance: Record the saving location of drawing and easy to access or open the drawing
2. Document management: Record the saving location of document and easy to access or open the document. In future, we will combine it with ISO system to create ISO electronics (online) without using papers.
3. Machine working status: Follow up the status of machines on production line by user. In future, it will be used in monitor room to view online the machines status
4. Account Equipment Management: Control the position, status, life, depreciation,... of equipment in ware house or production line

## Function Introduction

### *I. Master Menu*

- 1. System Masters*
- 2. Local Masters*
  - 2.1. Master*
  - 2.2. Account-WH*
  - 2.3. Working Status*
  - 2.4. Jig - Draw*

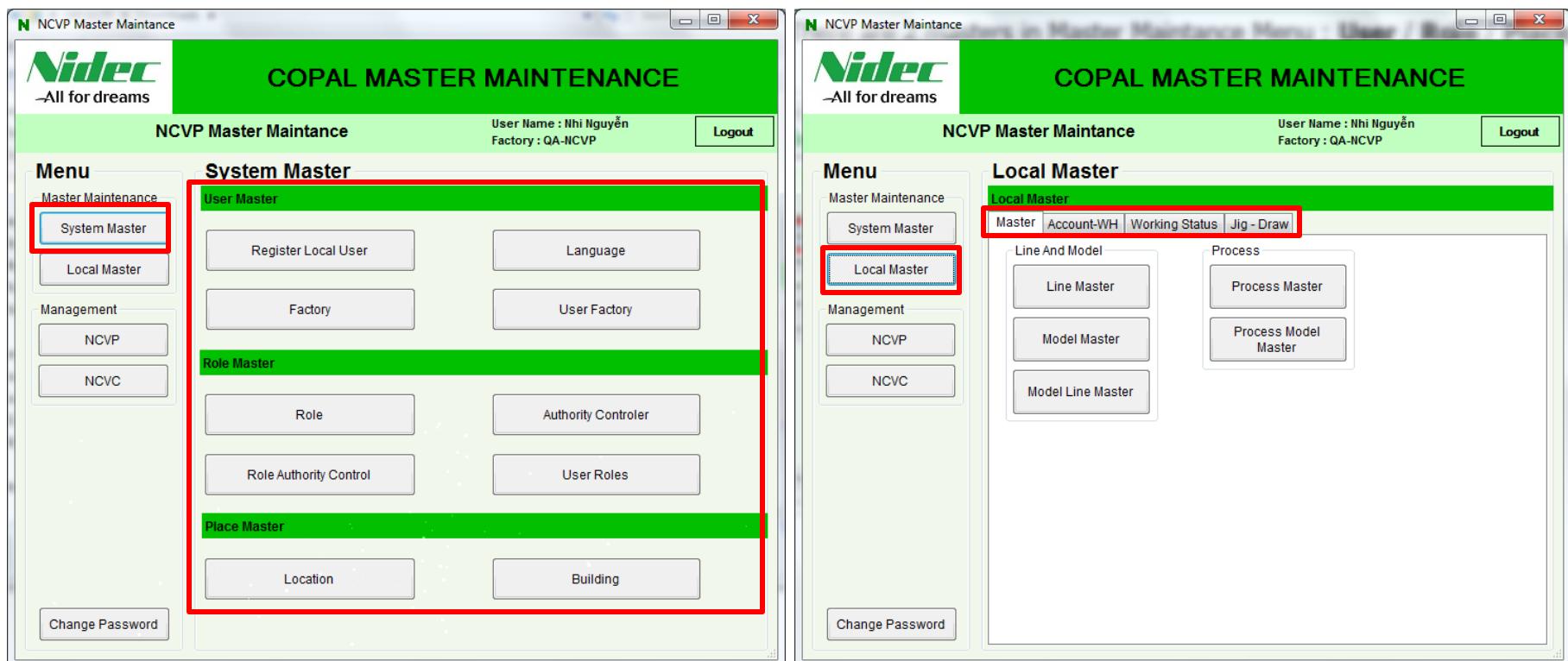
### *II. NPMS Application Menu*

- 1. Technical Maintenance*
- 2. Control Management*
- 3. Warehouse - Equipment*

# I. Master Maintenance Menu

Setting basic information and user, that is divided into two parts:

1. System Master: Basic data set from NIDEC-MES
2. Facility Master: Globalization Data settings related to user and privilege the basic data used in the system settings



# I.1 System Masters Relation

- System Master: Basic data set from NIDEC-MES
  - System tab can be divided into 3 parts: **User part** / **Role part** / **Place Part**
- When registering the master data, please follow the order shown in below picture.



- User has the field of country and language
- User-Factory defines the relation of User and Factory
- Role-Authority-Control defines the relation of Role and Authority
- User-Role defines the relation of User and Role
- Location has the field of Building

## I.1.1 Basic data

Basic data of system: User, Factory, Country  
Language

User Master

COPAL MASTER MAINTENANCE

User Master

User Name : Nhi Nguyễn  
Factory : QA-NCVP

Logout

User Code      User Name  
Country      Factory Code

Search    Add    Clear

User Code	User Name	Country	Multi Login	Factory Code
0004	Trần Hữu Đức	en-VN		FA-NCVP
0063	Nguyễn Văn Bình	en-VN		QA-NCVP
0217	Nguyễn Hải Quang	en-VN		NCVP
077	Dương Quốc Thuận	en-VN		NCVP
10363	Nhi Nguyễn	en-VN		QA-NCVP
1038	Nguyễn Hữu Nghị	en-VN		FA-NCVP
10859	Mai Thị An	en-VN		NCVP
11015	Đỗ Vũ Thảo My	en-VN		QA-NCVP
121	Phan Văn Dũng	en-VN		QA-NCVP
12466	Tử Thị Bích Vân	en-VN		FA-NCVP
13010	Nguyễn Thị Hồng Cường	en-VN		NCVP

Update    Exit

Add User

User Name : Nhi Nguyễn  
Factory : QA-NCVP

User Code su (\*)  
User Name super user (\*)  
Password \*\*\*\*\* (\*)  
Country en-VN (\*)  
Factory Code NCVP (\*)  
Multi Login

Update User

User Name : Nhi Nguyễn  
Factory : QA-NCVP

User Code admin (\*)  
User Name Administrator (\*)  
Password \*\*\*\*\* (\*)  
Country en-VN (\*)  
Factory Code PE/C (\*)  
Multi Login

## I.1.2 Authority and Role User relation

Role has Authority(right to use specific menus) as its sub-component.

User has Role as its sub-component.

**Role Authority Control**

User Name : Nhi Nguyễn  
Factory : QA-NCVP

Role Name

Search Clear

Role Authority

- + account: Account Using
- admin: Administrator
  - + cpmb001: System Master
  - + cpmb002: Local Master
  - + cpmb003: NCVP Function
  - + cpmb004: NCVC Function
  - + ffob012: Change Password
- dcment: Document Using
  - + cpmb001: System Master
  - + cpmb002: Local Master
  - + cpmb003: NCVP Function
  - + cpmb004: NCVC Function
  - + ffob012: Change Password
- + drw: Drawing Using
- dwntm: DownTime Using

Update

**User Role**

User Name :  
Factory : C

User

Search

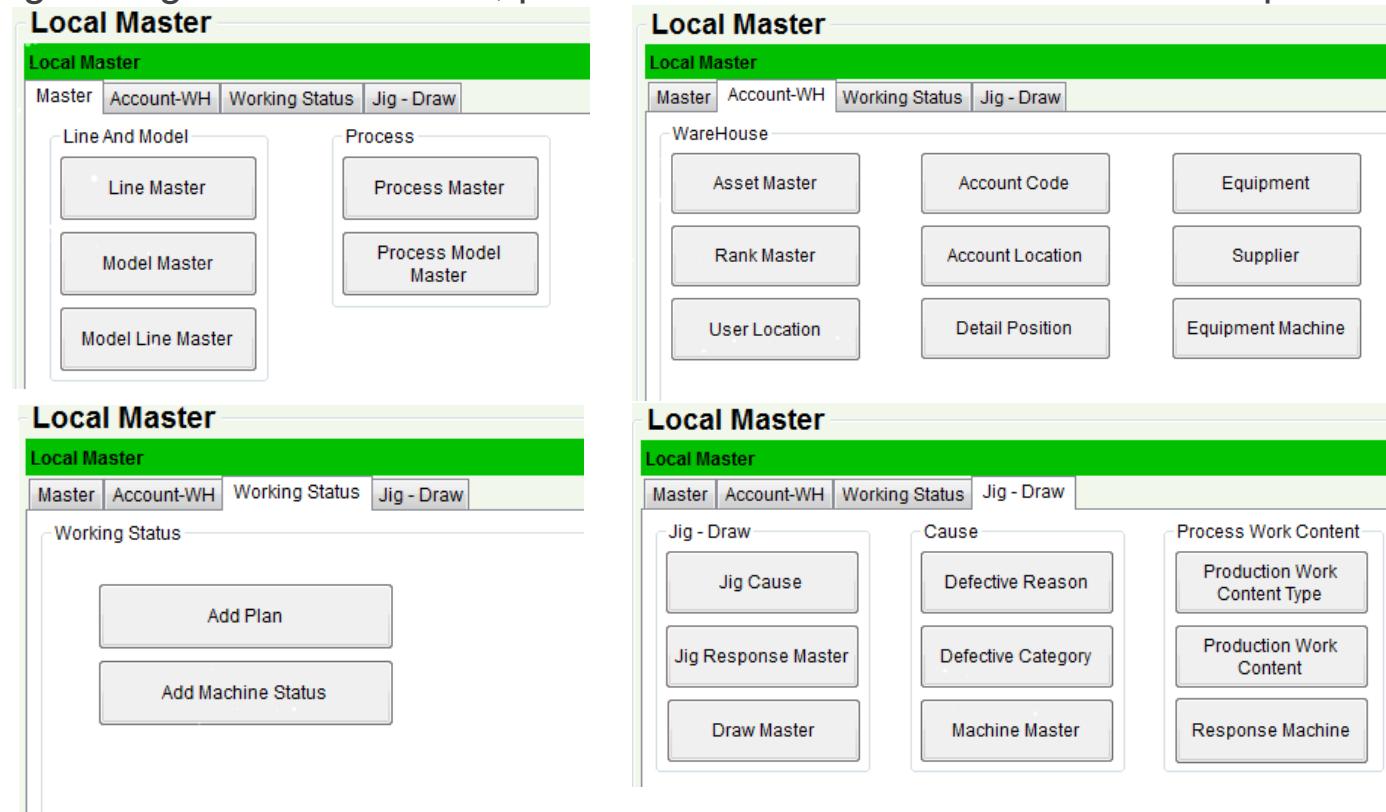
- admin: Administrator
  - + account: Account Using
  - + admin: Administrator
  - + dcment: Document Using
  - + drw: Drawing Using
  - + dwntm: DownTime Using
  - + jig: Jig Using
  - + mgr: Manager (Viewer)
  - + su: Super User
  - + wh: Warehouse Using
  - + ws: Working Status
- CT: Cutting
  - + account: Account Using
  - + admin: Administrator
  - + dcment: Document Using
  - + drw: Drawing Using
  - + dwntm: DownTime Using
  - + jig: Jig Using
  - + mgr: Manager (Viewer)
  - + su: Super User
  - + wh: Warehouse Using
  - + ws: Working Status

User

Role

## I.2 Local Masters

Local masters can be divided into 4 tabs: Master / Account-WH / Working Status / Jig - Draw  
When registering the master data, please follow the order shown in below picture.

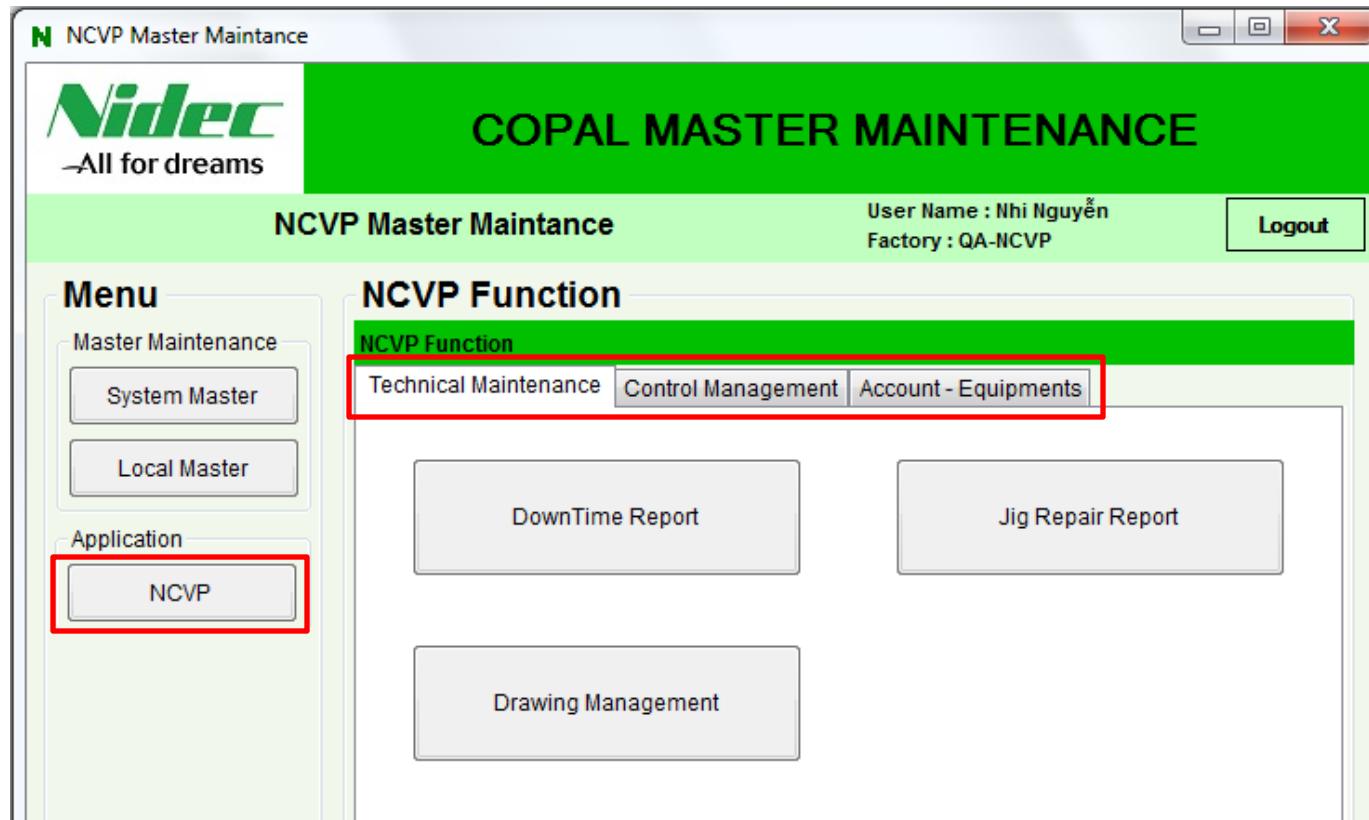


- Model Line defines the relation of Line and Model, Process Model defines the relation of Process and Model.
- Account-WH, Working Status tabs have the item fields.
- Response Machine has the item field, Production Work Content and Production Work Content Type defines the relation with each other.

## II. NPMS Application Menu Overview

There are 3 tabs in NPMS application menu:

Technical Maintenance / Control Management / Warehouse - Equipment



## *II.1.1 Drawing Management*

Drawing Naming Rule is created like below information at NCVP and NCVC

### 【Drawing code】

[NCVC]

NCVC 2 FA D – LS – 1473

①

②

③

④

[NCVP]

NCVP2FAD + PM-MA-OO

①

②

③

④

① Factory

② Department

③ Model

④ Drawing Number

## II.1.1 Drawing Management

### 【Management Folder】

parent folder



NCVP2FAD PM-  
MA-OO  
Drawing Code

①Drawing

②List

③calculation

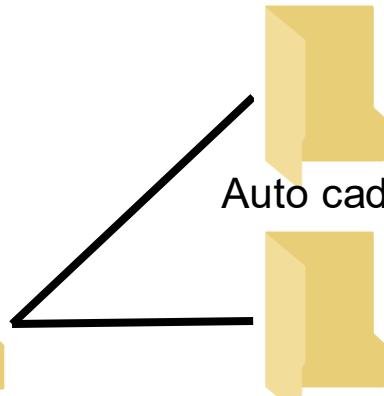
⑤ Reversion data



Include ①②

④Improvement·failure

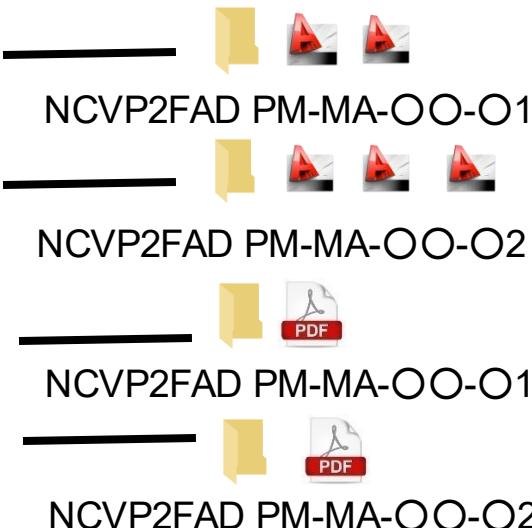
NCVP2FAD PM-MA-  
OOKaizen.xls



NCVP2FAD PM-MA-  
OOList.xls



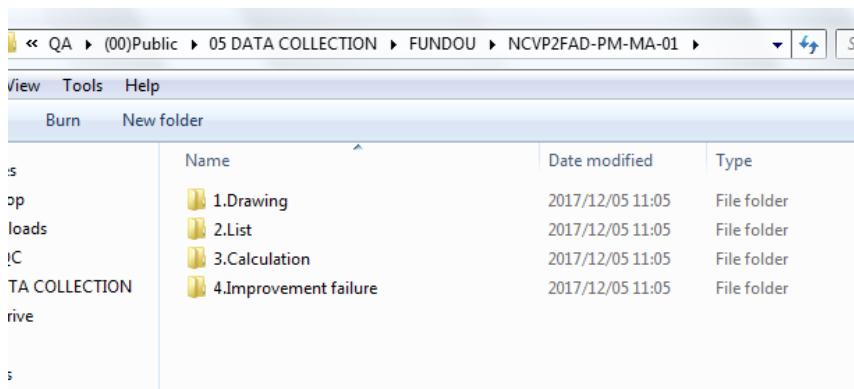
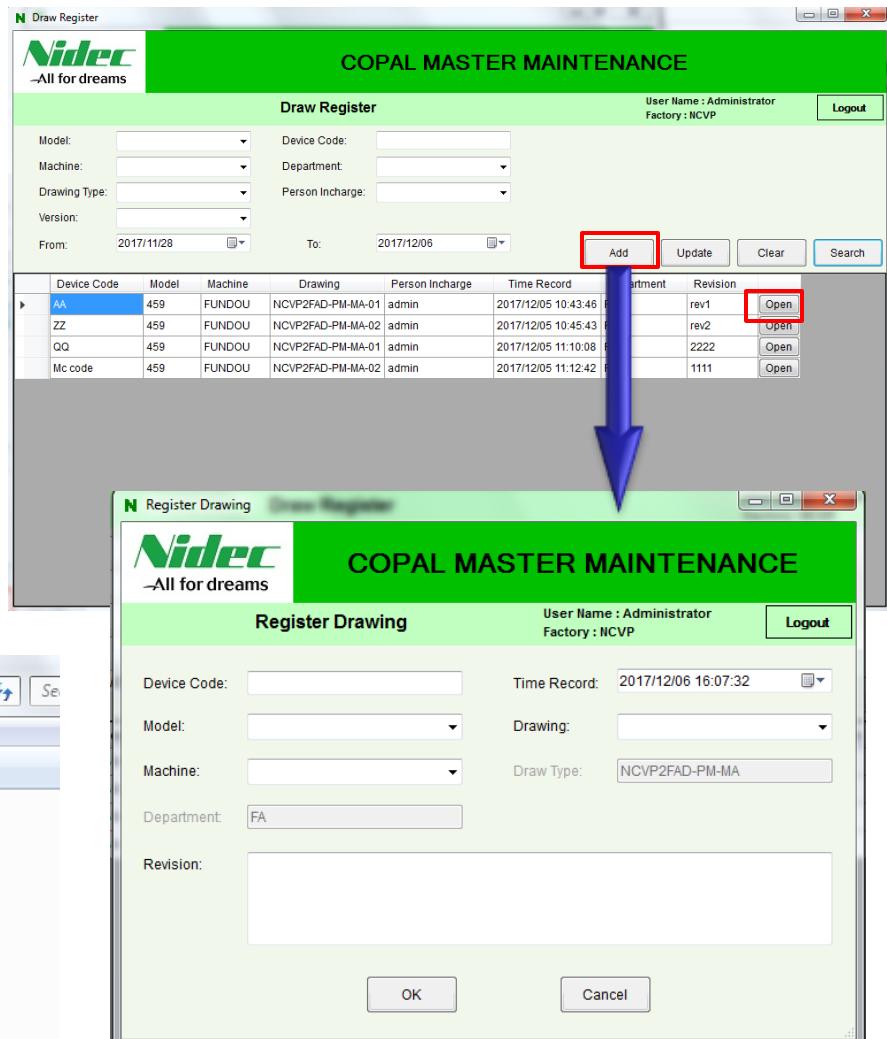
NCVP2FAD PM-MA-  
Oocalculation.xls



Only  
authorized  
people can  
create folders

## II.1.1 Drawing Management

- Draw Register Function:
- You can search by each combo box in the interface (model, machine, drawing type, version, device code, department, person in charge and time)
- Input the information in Register Drawing form then click OK, the data will be recorded in database and the save folder will be created follow Drawing Save Folder standard.
- Click into Open button in datagridview to open drawing folder location and save the pdf file, auto cad file, .....



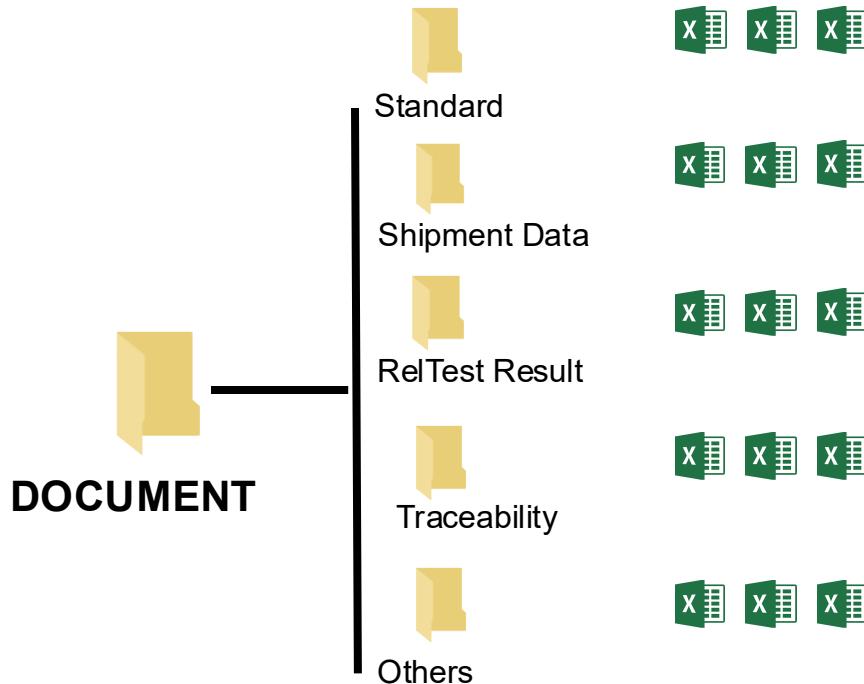
# Document Naming Rule

- ***Model + “\_” + Filename + “\_” + DocumentNo***

## 【Management Folder】

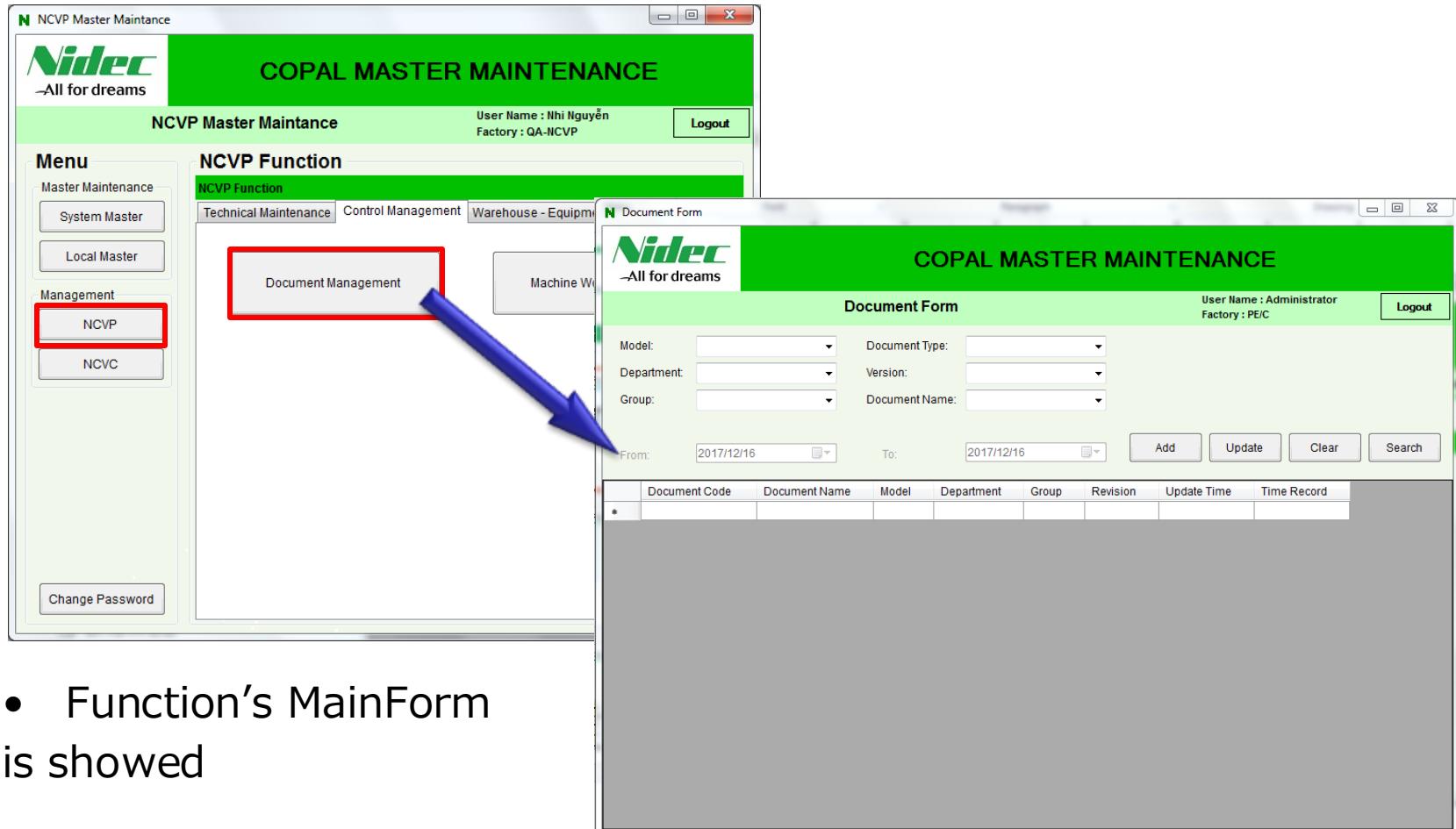
parent folder:

Z:\(01)KK03\QA\(00)Public\DOCUMENT\



## II.1.2 Document Management

- Login by your account and click on “NCVP” button → click on “Document Management” button



- Function's MainForm is showed

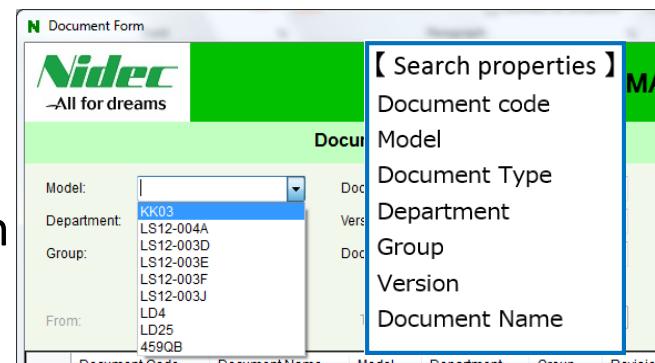
## II.1.2 Document Management

- Select model before searching information
- You can search by properties in slide 2
- Click “Search” button to show the information

**COPAL MASTER MAINTENANCE**

Document Form      User Name : Nhi Nguyễn      Factory : NCVP      Logout

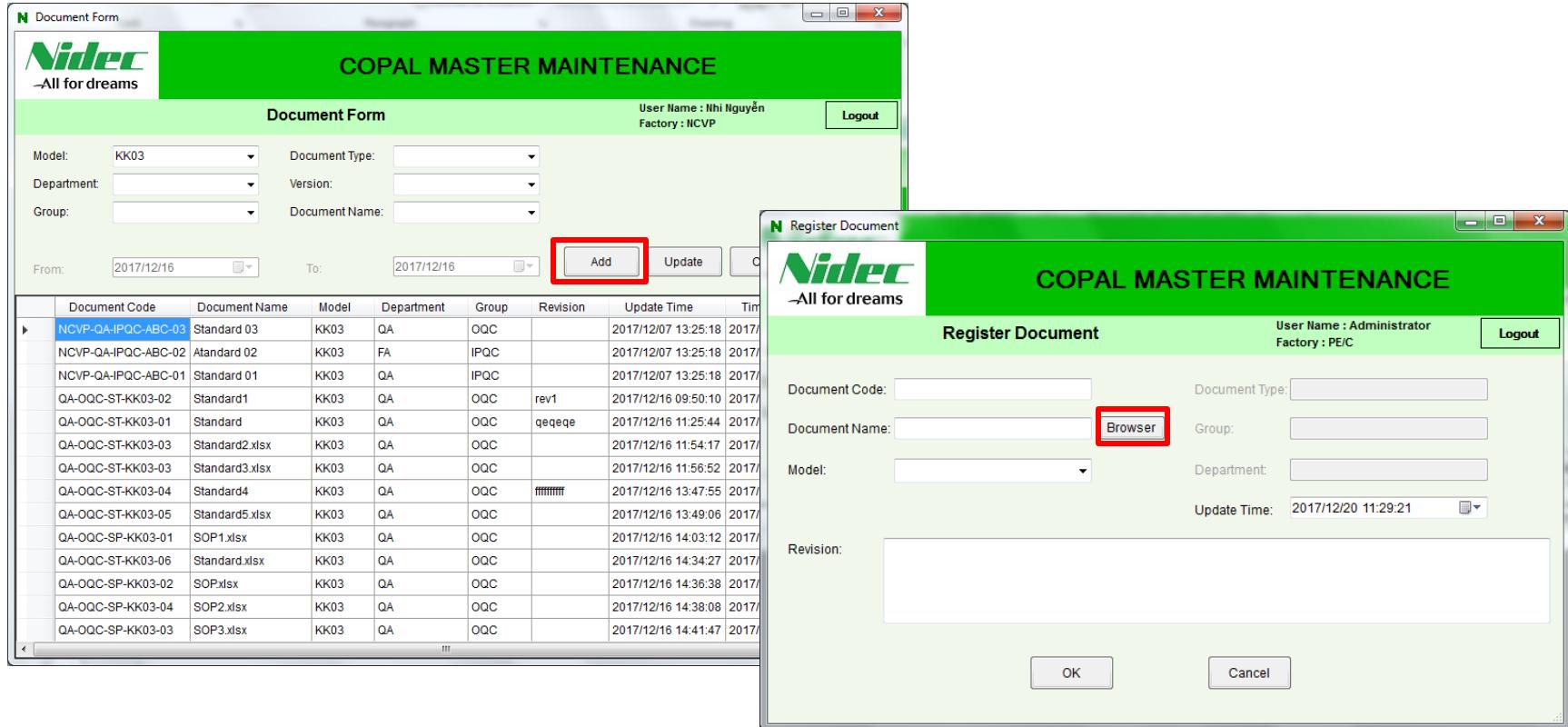
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From:	2017/12/16	To:	2017/12/16																																																																																																																								
<input type="button" value="Add"/> <input type="button" value="Update"/> <input type="button" value="Clear"/> <input style="border: 2px solid red; border-radius: 5px; padding: 2px 10px;" type="button" value="Search"/>																																																																																																																											
<table border="1"> <thead> <tr> <th>Document Code</th> <th>Document Name</th> <th>Model</th> <th>Department</th> <th>Group</th> <th>Revision</th> <th>Update Time</th> <th>Time Record</th> </tr> </thead> <tbody> <tr> <td>NCVP-QA-IPQC-ABC-03</td> <td>Standard 03</td> <td>KK03</td> <td>QA</td> <td>OQC</td> <td></td> <td>2017/12/07 13:25:18</td> <td>2017/12/07 13:25:18</td> </tr> <tr> <td>NCVP-QA-IPQC-ABC-02</td> <td>Standard 02</td> <td>KK03</td> <td>FA</td> <td>IPQC</td> <td></td> <td>2017/12/07 13:25:18</td> <td>2017/12/07 13:25:18</td> </tr> <tr> <td>NCVP-QA-IPQC-ABC-01</td> <td>Standard 01</td> <td>KK03</td> <td>QA</td> <td>IPQC</td> <td></td> <td>2017/12/07 13:25:18</td> <td>2017/12/07 13:25:18</td> </tr> <tr> <td>QA-OQC-ST-KK03-02</td> <td>Standard1</td> <td>KK03</td> <td>QA</td> <td>OQC</td> <td>rev1</td> <td>2017/12/16 09:50:10</td> <td>2017/12/16 09:49:12</td> </tr> <tr> <td>QA-OQC-ST-KK03-01</td> <td>Standard</td> <td>KK03</td> <td>QA</td> <td>OQC</td> <td>qeque</td> <td>2017/12/16 11:25:44</td> <td>2017/12/16 09:34:43</td> </tr> <tr> <td>QA-OQC-ST-KK03-03</td> <td>Standard2.xlsx</td> <td>KK03</td> <td>QA</td> <td>OQC</td> <td></td> <td>2017/12/16 11:54:17</td> <td>2017/12/16 11:54:17</td> </tr> <tr> <td>QA-OQC-ST-KK03-03</td> <td>Standard3.xlsx</td> <td>KK03</td> <td>QA</td> <td>OQC</td> <td></td> <td>2017/12/16 11:56:52</td> <td>2017/12/16 11:56:52</td> </tr> <tr> <td>QA-OQC-ST-KK03-04</td> <td>Standard4</td> <td>KK03</td> <td>QA</td> <td>OQC</td> <td>fffffff</td> <td>2017/12/16 13:47:55</td> <td>2017/12/16 12:46:06</td> </tr> <tr> <td>QA-OQC-ST-KK03-05</td> <td>Standard5.xlsx</td> <td>KK03</td> <td>QA</td> <td>OQC</td> <td></td> <td>2017/12/16 13:49:06</td> <td>2017/12/16 13:49:06</td> </tr> <tr> <td>QA-OQC-SP-KK03-01</td> <td>SOP1.xlsx</td> <td>KK03</td> <td>QA</td> <td>OQC</td> <td></td> <td>2017/12/16 14:03:12</td> <td>2017/12/16 14:03:12</td> </tr> <tr> <td>QA-OQC-ST-KK03-06</td> <td>Standard.xlsx</td> <td>KK03</td> <td>QA</td> <td>OQC</td> <td></td> <td>2017/12/16 14:34:27</td> <td>2017/12/16 14:34:27</td> </tr> <tr> <td>QA-OQC-SP-KK03-02</td> <td>SOP.xlsx</td> <td>KK03</td> <td>QA</td> <td>OQC</td> <td></td> <td>2017/12/16 14:36:38</td> <td>2017/12/16 14:36:38</td> </tr> <tr> <td>QA-OQC-SP-KK03-04</td> <td>SOP2.xlsx</td> <td>KK03</td> <td>QA</td> <td>OQC</td> <td></td> <td>2017/12/16 14:38:08</td> <td>2017/12/16 14:38:08</td> </tr> <tr> <td>QA-OQC-SP-KK03-03</td> <td>SOP3.xlsx</td> <td>KK03</td> <td>QA</td> <td>OQC</td> <td></td> <td>2017/12/16 14:41:47</td> <td>2017/12/16 14:41:47</td> </tr> </tbody> </table>				Document Code	Document Name	Model	Department	Group	Revision	Update Time	Time Record	NCVP-QA-IPQC-ABC-03	Standard 03	KK03	QA	OQC		2017/12/07 13:25:18	2017/12/07 13:25:18	NCVP-QA-IPQC-ABC-02	Standard 02	KK03	FA	IPQC		2017/12/07 13:25:18	2017/12/07 13:25:18	NCVP-QA-IPQC-ABC-01	Standard 01	KK03	QA	IPQC		2017/12/07 13:25:18	2017/12/07 13:25:18	QA-OQC-ST-KK03-02	Standard1	KK03	QA	OQC	rev1	2017/12/16 09:50:10	2017/12/16 09:49:12	QA-OQC-ST-KK03-01	Standard	KK03	QA	OQC	qeque	2017/12/16 11:25:44	2017/12/16 09:34:43	QA-OQC-ST-KK03-03	Standard2.xlsx	KK03	QA	OQC		2017/12/16 11:54:17	2017/12/16 11:54:17	QA-OQC-ST-KK03-03	Standard3.xlsx	KK03	QA	OQC		2017/12/16 11:56:52	2017/12/16 11:56:52	QA-OQC-ST-KK03-04	Standard4	KK03	QA	OQC	fffffff	2017/12/16 13:47:55	2017/12/16 12:46:06	QA-OQC-ST-KK03-05	Standard5.xlsx	KK03	QA	OQC		2017/12/16 13:49:06	2017/12/16 13:49:06	QA-OQC-SP-KK03-01	SOP1.xlsx	KK03	QA	OQC		2017/12/16 14:03:12	2017/12/16 14:03:12	QA-OQC-ST-KK03-06	Standard.xlsx	KK03	QA	OQC		2017/12/16 14:34:27	2017/12/16 14:34:27	QA-OQC-SP-KK03-02	SOP.xlsx	KK03	QA	OQC		2017/12/16 14:36:38	2017/12/16 14:36:38	QA-OQC-SP-KK03-04	SOP2.xlsx	KK03	QA	OQC		2017/12/16 14:38:08	2017/12/16 14:38:08	QA-OQC-SP-KK03-03	SOP3.xlsx	KK03	QA	OQC		2017/12/16 14:41:47	2017/12/16 14:41:47
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Click “Open” button on the row you want to view the document

## II.1.2 Document Management

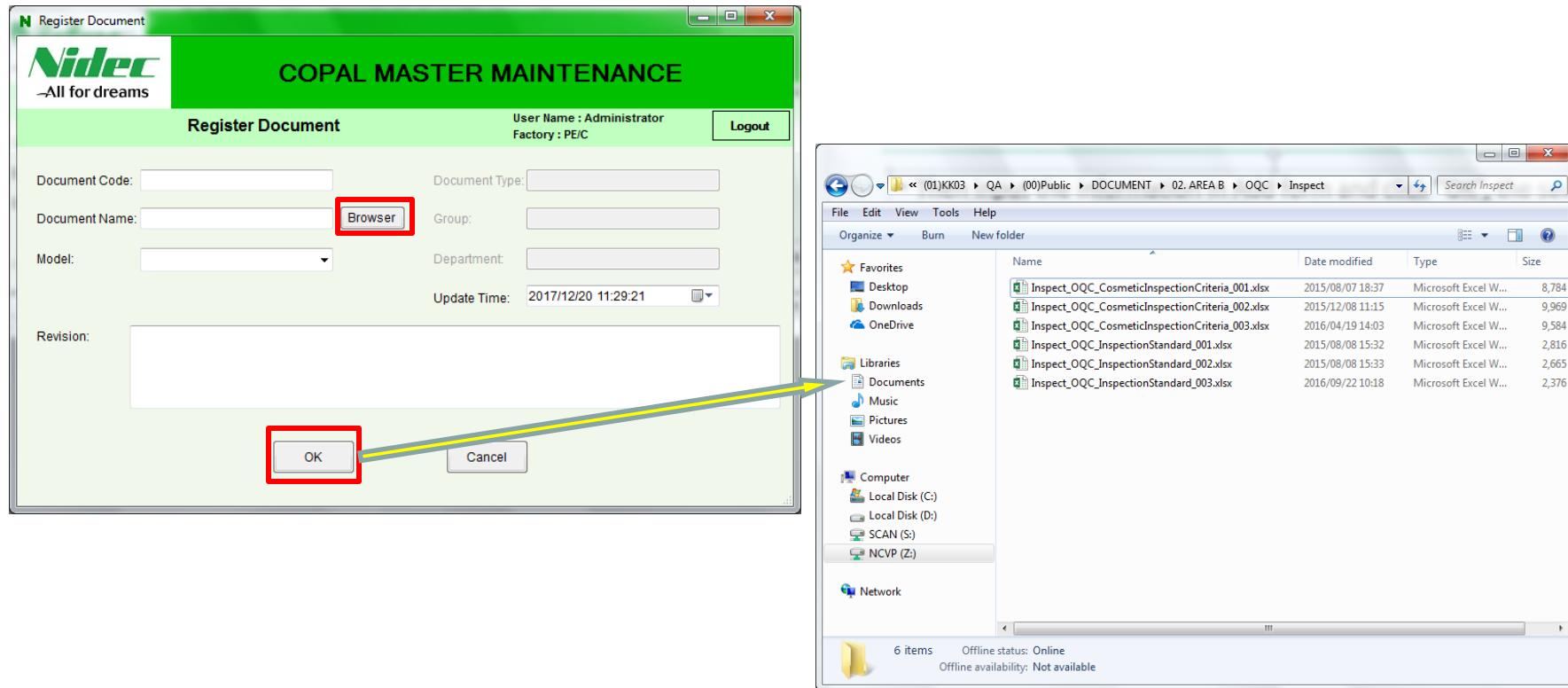
- Click “Add” button to register new document



- Click “Browser” button to chose the document file you want to save

## II.1.2 Document Management

- Then input the information in Add form and click “OK”, the saving folder will be showed and the document file will be auto saved in that

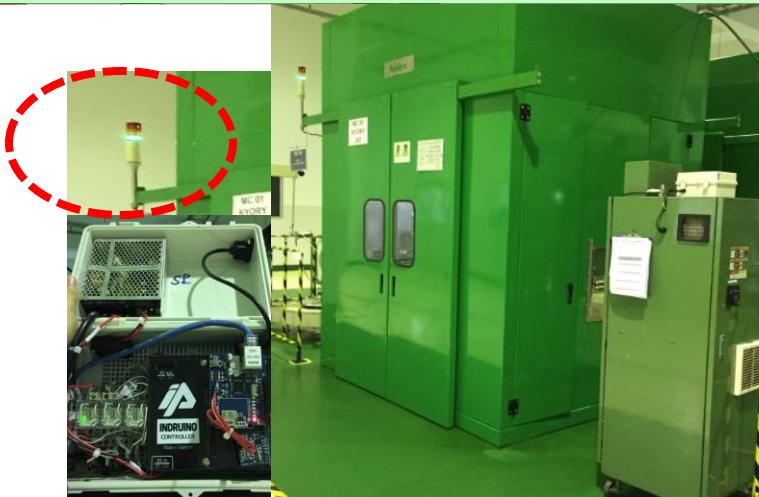
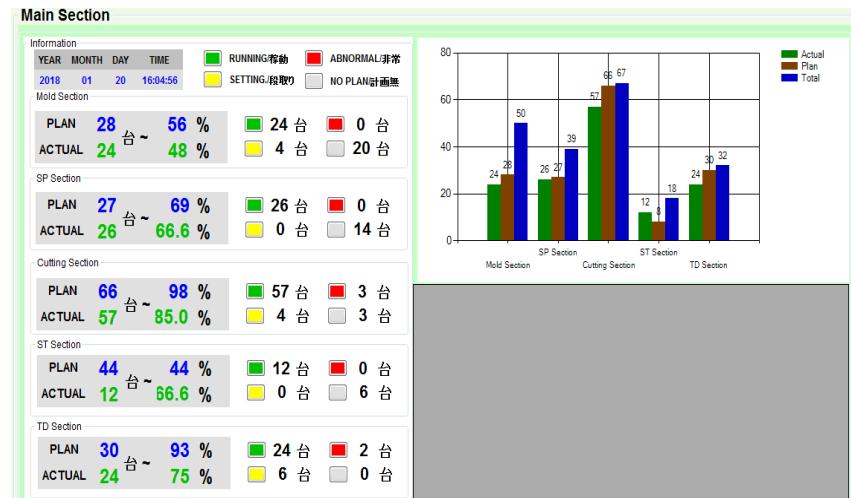
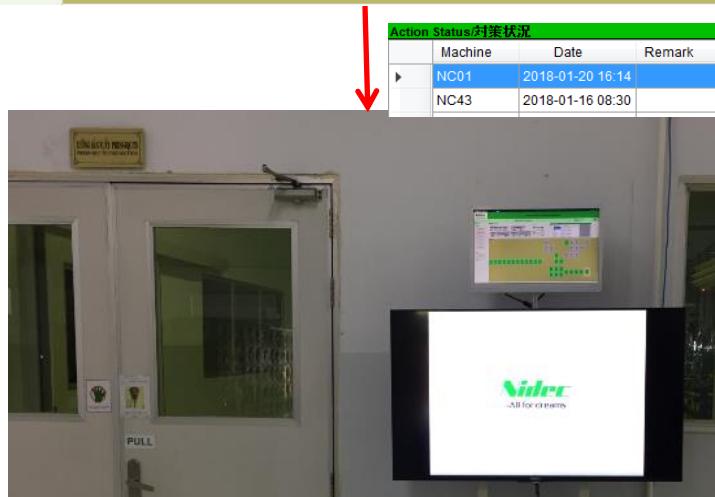


## II.2.1 Working machine status

It applied in 5 section in NCVP (ST, TD, SP, Cutting, Mold section with 250 machines).  
 Function: Showing auto working machine status and comments. (Timer >21 second)  
 Showing light machine status in software. Connecting by hardware (FM 2.4G)



Action Status/对策状况		
Machine	Date	Remark
NC01	2018-01-20 16:14	
NC43	2018-01-16 08:30	



## *II.2.2 Equipment Management*



**Equipment Management** using for follow all equipment in the company about their position, price, life cycle and depreciation.

The information will be linked with each section and accounting can show and follow the data without asking everyone like the way before.

Depreciation will be calculate for each section and send the information to account department by NidecMES

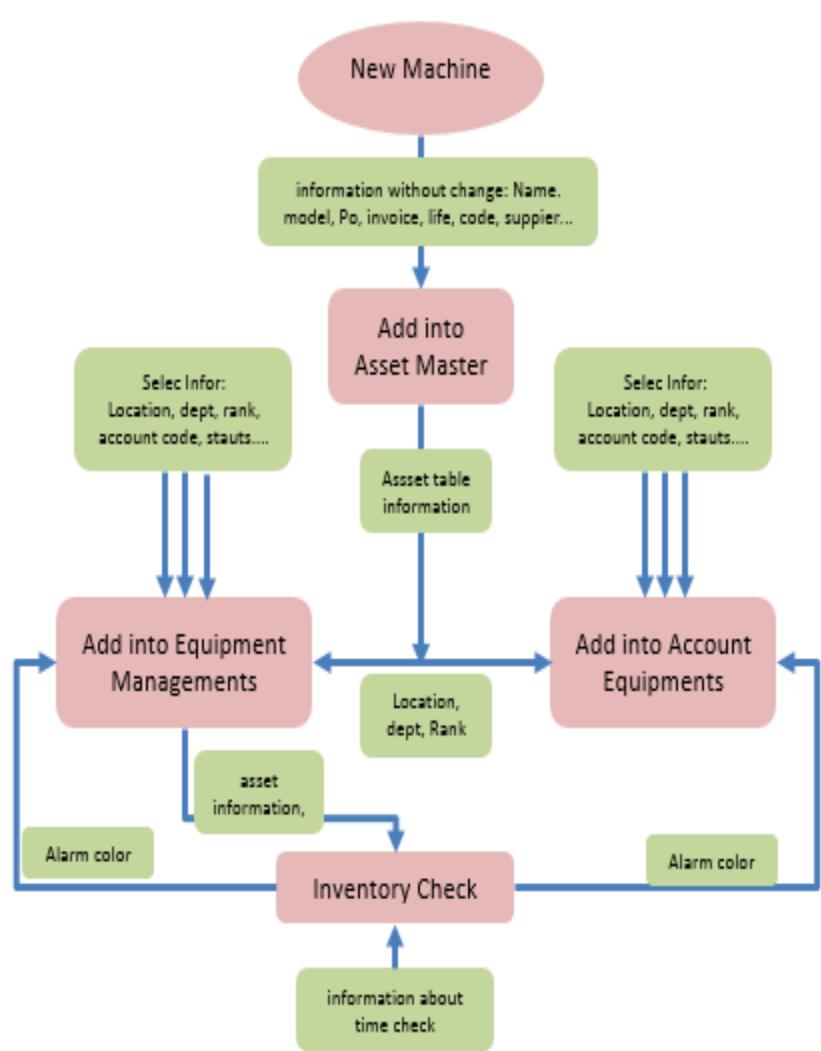
1. Control equipment type : asset account managements and equipment without account managements (asset, tool, jig…)
2. control equipment information: asset label, invoice, Po, acquisition cost, supplier…
3. Equipment manager by each departments, and easy to find.
4. Update equipment net value cost by auto.
5. Divide sum equipment cost by rank and account name.
6. Sort by rank, account code, account location, detail position…
7. Transfer equipment: process transfer will be approved the same NCVP evalue.
8. Inventory function: support inventory and alarm by color status.
9. Support export csv file to save.

What is change function into version 2:

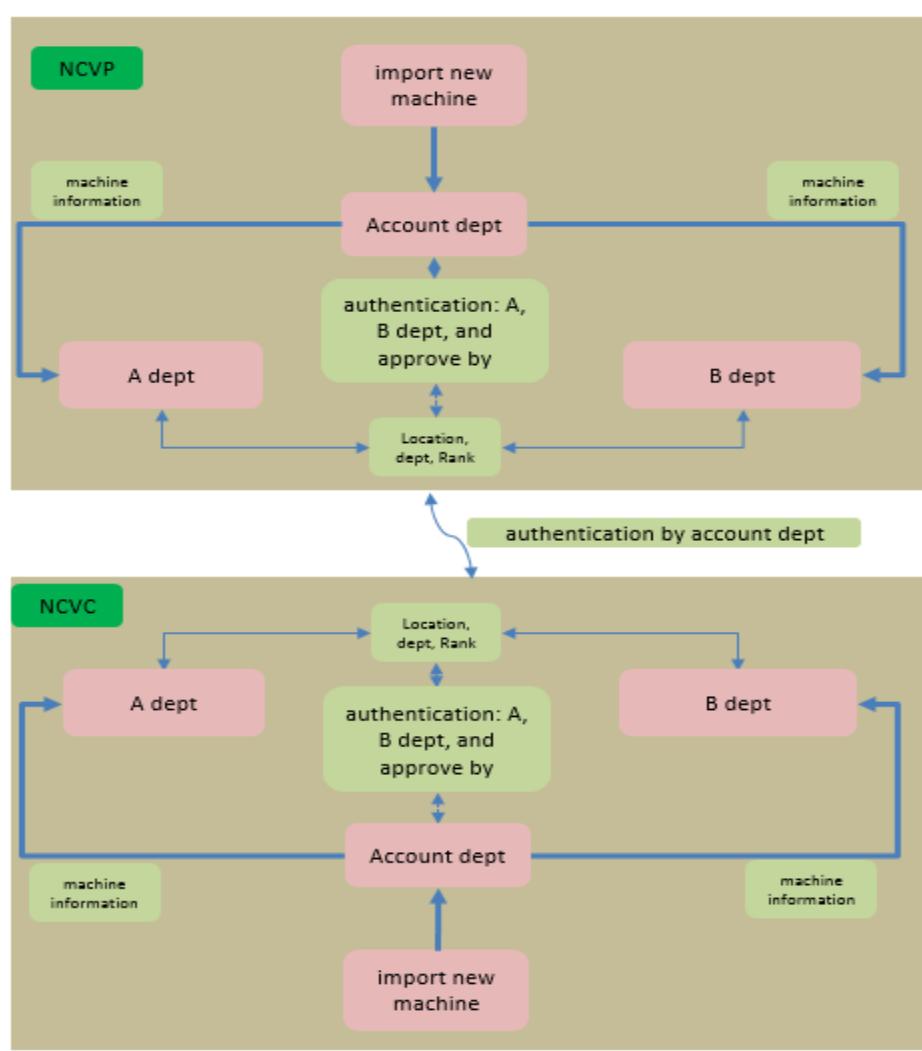
- 1. Add PO** into asset master table. And it can be search into main form.
- 2. Add label status** into asset table and it can be defined by color status.
  - a. Passed:** the asset label is passed. Defined into soft by white color
  - b. Not Paste:** The asset label is can paste. And waiting account Paste to define. It shown by **Violet** color
  - c. Cannot Paste:** It applied for small machine, can not find space area to paste. It defined by **Light Coral** color
- 3. Inventory function:** support inventory and alarm by color status.
  - a. Inventoried for this time:** defined by **Pale Green** color
  - b. Non inventory for this time:** defined by **red** color
- 4. Export data format .csv file <last time is excel file>**

## *II.2.2 Equipment Management*

## Layout of machine database



## **Layout of trucking machine**



## II.2.2 Equipment Management

### Equipment Management:

#### Function:

- Equipment cost management (add, update, cost, and account report form)
- Check in- out person using.
- Using: warehouse, section, account room.

The diagram illustrates the integration of Nidec's equipment management system. It shows three screenshots of software interfaces:

- COPAL MASTER MAINTENANCE**: This interface includes a 'Master Maintenance' menu, 'NCVP Function' (Technical Maintenance, Control Management, Warehouse - Equipment), and 'Equipment Management' and 'Equipment Management New' buttons.
- Equipment Management**: This interface allows users to search, add, update, clear, transfer assets, and export CSV files. It includes fields for Asset Code, Asset Model, Asset Name, Inventory, Label Status, and various status dropdowns.
- COPAL MASTER MAINTENANCE**: This interface is used for updating equipment details, showing fields like User Code, No Number, Qty, Detail Position, Asset Code, Rank Code, Unit, Start Depreciation, End Depreciation, User Name, Account Code, Before Location, After Location, Asset Model, Serial Code, Date Time New, Value Cost, Life Year, Current Depreciation, Accum Depreciation, Acquisition Cost, Monthly Depreciation, Net Value, and Comment.

Two yellow arrows connect the 'COPAL' screens. Two yellow arrows also point from the 'Equipment Management' screen down to two photographs: one showing a person using a handheld barcode scanner to scan a label, and another showing a close-up of a blue industrial machine with a label.

Asset Code	Asset No	Asset Name	Asset Model	Asset Serial	Asset Supplier	Label	Inventory	Qty	Unit	Asset Type	User Name	Date Time
M30B2CH003	0	COMU HEAT CAULKING	001-H0116200	—	NIDEC COPAL CORPORATION	Pasted	Lan 01	1	PCS	MC_AST	Hồ Nhu Ngọc	2018/05/29
M30B2CH006	0	COMU HEAT CAULKING	001-H0116200	—	NIDEC COPAL CORPORATION	Pasted	Lan 01	1	PCS	MC_AST	Hồ Nhu Ngọc	2018/05/29
M30B2CH009	0	COMU HEAT CAULKING	001-H0116200	—	NIDEC COPAL CORPORATION	Pasted	Lan 01	1	PCS	MC_AST	Hồ Nhu Ngọc	2018/05/29
M30B2CH007	0	COMU HEAT CAULKING	001-H0116200	—	NIDEC COPAL CORPORATION	Pasted	Lan 01	1	PCS	MC_AST	Hồ Nhu Ngọc	2018/05/29
M30B2CH001	0	COMU HEAT CAULKING	001-H0116200	—	NIDEC COPAL CORPORATION	Pasted	Lan 01	1	PCS	MC_AST	Hồ Nhu Ngọc	2018/05/29
M30B2CH008	0	COMU HEAT CAULKING	001-H0116200	—	NIDEC COPAL CORPORATION	Pasted	Lan 01	1	PCS	MC_AST	Hồ Nhu Ngọc	2018/05/29
M30B2CH004	0	COMU HEAT CAULKING	001-H0116200	—	NIDEC COPAL CORPORATION	Pasted	Lan 01	1	PCS	MC_AST	Hồ Nhu Ngọc	2018/05/29
M30B2CH005	0	COMU HEAT CAULKING	001-H0116200	—	NIDEC COPAL CORPORATION	Pasted	Lan 01	1	PCS	MC_AST	Hồ Nhu Ngọc	2018/05/29
M30B2CH002	0	COMU HEAT CAULKING	001-H0116200	—	NIDEC COPAL CORPORATION	Pasted	Lan 01	1	PCS	MC_AST	Hồ Nhu Ngọc	2018/05/29

## II.2.2 Equipment Management

### Local Master:

All equipment information  
Detail location, Dept I

Barcode, cost, date input..

Status: can use, working, NG..

User ID

ost, Account Code, Dept. selection ...

Account code: Office, Machine..

Shelt, pallet no....

**COPAL MASTER MAINTENANCE**

**ADD**

User Name : Administrator  
Factory : PE/C

Logout

Asset Code: M30A2AT002 (\*)

No: 0 (\*)

Asset Name: AIR TANK (\*)

Asset Model: 2000L (\*)

Asset Serial: AA/11P-0001100 (\*)

Invoice: AA/11P-0001100 (\*)

P/O:  (\*)

Life: 8 (\*)

Acquisition Date: 2012/04/01 (\*)

Acquisition Cost: 2204.43 (\*)

Asset Supplier: TAN DAI PHU SY CO.,LTD (\*)

Asset Type: MC\_AST (\*)

Label Status:  Pasted  Not Paste  Cannot Paste

OK Exit

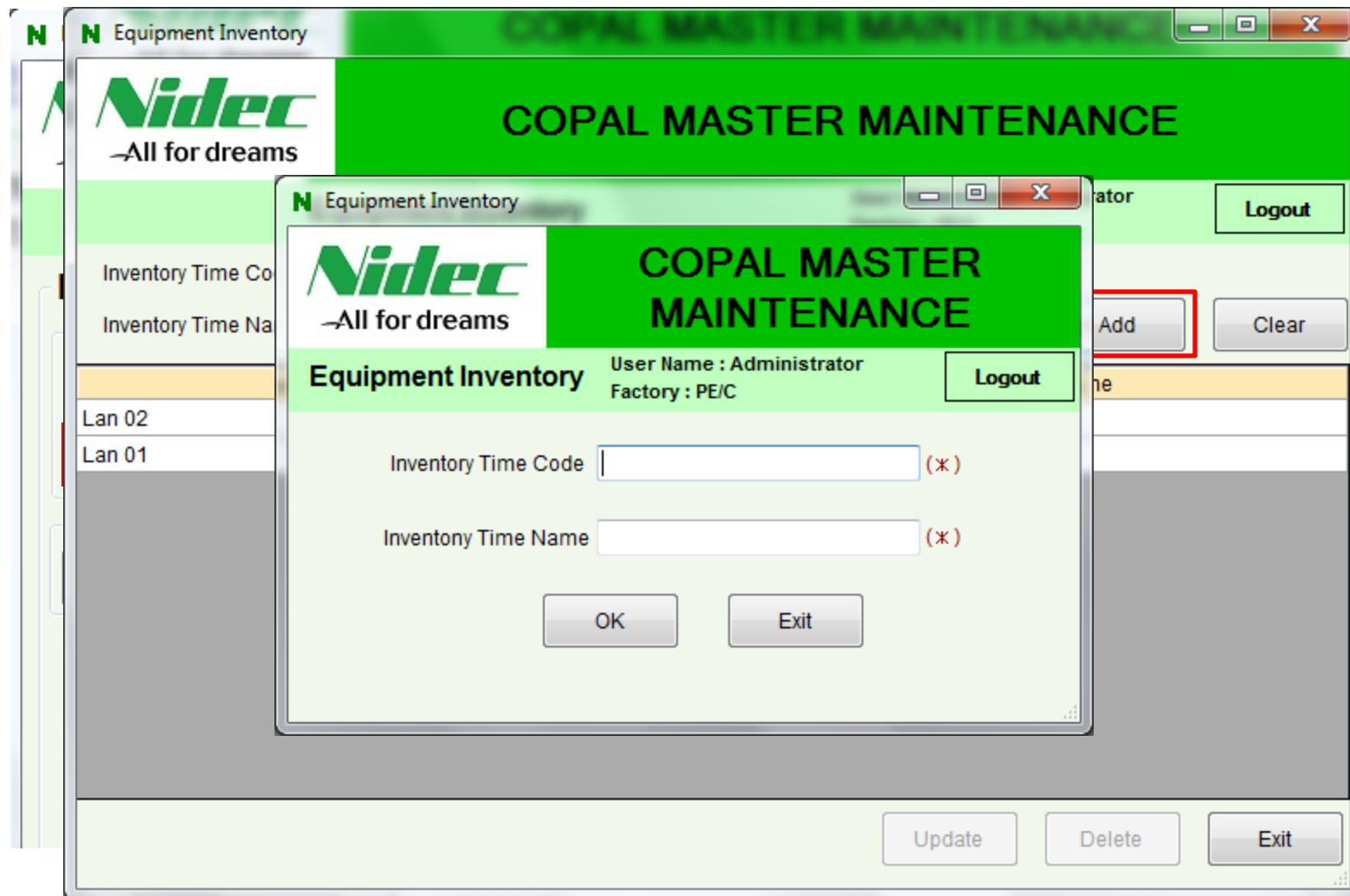
Logout Clear

Exit

## II.2.2 Equipment Management

### Inventory Time:

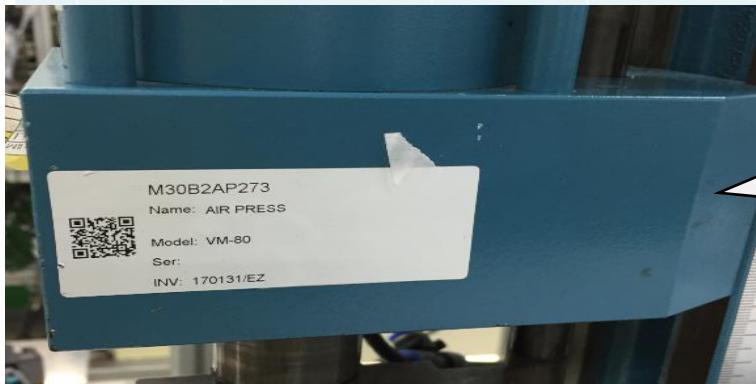
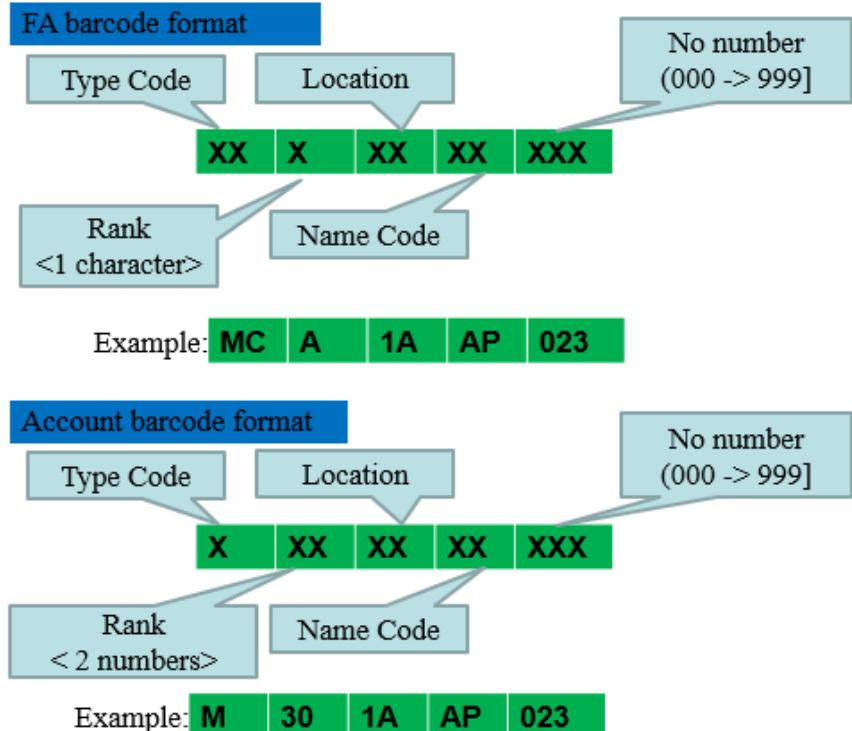
Register the inventory times in each month, year or something.....



## II.2.2 Equipment Management

### Barcode ruler

No.	Type Code Asset	Barcode Format Form (10words)	Type Name Asset	Description
1.	MC_AST	Mxxxxxxxxx	Machine	Account code (existed)
2.	EQ_AST	Exxxxxxxxx	Equipment	Account code (existed)
3.	JG_AST	Jxxxxxxxxx	Jig	Account code (existed)
4.	MC	MCxxxxxxxx	Machine	FA code (new)
5.	EQ	EQxxxxxxxx	Equipment	FA code (new)
6.	EE	EExxxxxxxx	Equipment electronic	FA code (new)
7.	EM	EMxxxxxxxx	Equipment mechanical	FA code (new)
8.	EA	EAxxxxxxxx	Equipment Air	FA code (new)
9.	TL	TLxxxxxxxx	Tool general	FA code (new)
10.	JG	JGxxxxxxxx	JIG	FA code (new)



**Barcode example**

## II.2.2 Equipment Management

Full Asset Code \_\_\_\_\_ Rank Code: \_\_\_\_\_  
Asset Code: \_\_\_\_\_ Asset Type: \_\_\_\_\_  
Click **Add** **Update** **Clear**

- Click 'Add' to open form Add Equipment
- Input items: User Code, Asset Code, User Name, No, Rank Code, Account Code, Section Code, Qty, Unit, Location, Start Depreciation, end Depreciation, Comment then click "OK"

**COPAL MASTER MAINTENANCE**

**ADD**

User Name : Administrator  
Factory : PE/C **Logout**

User Code:	No Number:	Qty:	Detail Position:
Asset Code:	Rank Code:	Unit:	Start Depreciation: 2018/07/31
User Name:	Account Code:	Before Location:	End Depreciation: 2043/07/30
Asset Model:	Section Code:	After Location: 2P-ST	DateTime View: 2018/07/31

**Value Cost**

Life (Year): 25	Current Depreciation: 0	Accum Depreciation: 0
Acquisition Cost: 135000	Monthly Depreciation: 450	Net Value: 135000

**Comment:** Add

Click **OK** **Exit**

## II.2.2 Equipment Management

Input value in one of items: Asset Code Rank Code, Asset Type, Account Code, Section Code, Invoice No, Asset Model, Location, Asset Name then click Search

Click

Asset Code	Asset No	Asset Name	Asset Model	Asset Serial	Asset Supplier	Label	Inventory	Qty	Unit	Asset Type	User Name	Date Time
M30B2CH003	0	COMU HEAT CAULKING	001-H0116200	---	NIDEC COPAL CORPORATION	Pasted	Lan 01	1	PCS	MC_AST	Hồ Nhu Ngọc	2018/05/29
M30B2CH006	0	COMU HEAT CAULKING	001-H0116200	---	NIDEC COPAL CORPORATION	Pasted	Lan 01	1	PCS	MC_AST	Hồ Nhu Ngọc	2018/05/29
M30B2CH009	0	COMU HEAT CAULKING	001-H0116200	---	NIDEC COPAL CORPORATION	Pasted	Lan 01	1	PCS	MC_AST	Hồ Nhu Ngọc	2018/05/29
M30B2CH007	0	COMU HEAT CAULKING	001-H0116200	---	NIDEC COPAL CORPORATION	Pasted	Lan 01	1	PCS	MC_AST	Hồ Nhu Ngọc	2018/05/29
M30B2CH001	0	COMU HEAT CAULKING	001-H0116200	---	NIDEC COPAL CORPORATION	Pasted	Lan 01	1	PCS	MC_AST	Hồ Nhu Ngọc	2018/05/29
M30B2CH008	0	COMU HEAT CAULKING	001-H0116200	---	NIDEC COPAL CORPORATION	Pasted	Lan 01	1	PCS	MC_AST	Hồ Nhu Ngọc	2018/05/29
M30B2CH004	0	COMU HEAT CAULKING	001-H0116200	---	NIDEC COPAL CORPORATION	Pasted	Lan 01	1	PCS	MC_AST	Hồ Nhu Ngọc	2018/05/29
M30B2CH005	0	COMU HEAT CAULKING	001-H0116200	---	NIDEC COPAL CORPORATION	Pasted	Lan 01	1	PCS	MC_AST	Hồ Nhu Ngọc	2018/05/29
M30B2CH002	0	COMU HEAT CAULKING	001-H0116200	---	NIDEC COPAL CORPORATION	Pasted	Lan 01	1	PCS	MC_AST	Hồ Nhu Ngọc	2018/05/29

When the equipment's location is updated in each department by the person in charge, the equipment's location will be updated in the account list and they can view and manage them without finding one by one.

## II.2.2 Equipment Management

Click Account Depr or Rank Depr to show items: Acquisition Cost, Current Depreciation, Month Depreciation, Net Book by Account Name

		Search	Add	Update	Clear	Transfer Asset	Account.Depr	Rank.Depr	Browser	Export CSV
--	--	--------	-----	--------	-------	----------------	--------------	-----------	---------	------------

	Account Name	Acquisition Cost (\$)	Current Depreciation (\$)	Month Depreciation (\$)	Accum Depreciation (\$)	NetBook (\$)	
▶	Machinery and Equipment	37724321.3	25694862.8589998	425333.565000002	26094723.0369999	11629598.24	
	Other F.A	5174.26	3332.248	66.674	3398.923	1775.337	
	Plants and Building	19571148.37	5605168.07	79653.241	5684821.305	13886327.066	
	Factory tool and Office equipments	1298599.65	946139.64	21643.332	961230.701	337368.949	
	Total	58599243.58	32249502.8169998	526696.812000002	32744173.9659999	25855069.592	

		Search	Add	Update	Clear	Transfer Asset	Account.Depr	Rank.Depr	Browser	Export CSV
--	--	--------	-----	--------	-------	----------------	--------------	-----------	---------	------------

	Rank Name	Acquisition Cost (\$)	Current Depreciation (\$)	Month Depreciation (\$)	Accum Depreciation (\$)	NetBook (\$)	
▶	Can Use	6479656.83	3781640.453	73933.2929999999	3855573.661	2624083.16499999	
	Can Repair	1405160.02	1071405.158	15715.664	1085535.469	319624.551	
	Not Found	4101142.71	3283618.007	56202.741	3313810.574	787332.136	
	Working	44222796.9300001	22307917.8449999	355943.875	22659431.647	21563365.269	
	Not Repair	2390487.09	1804921.35400001	24901.2389999999	1829822.615	560664.470999999	
	Total	58599243.5800001	32249502.8169999	526696.812	32744173.966	25855069.592	

## II.2.2 Equipment Management

**Inventory Check:** Using to check and update the inventory times of each equipment

**COPAL MASTER MAINTENANCE**

Equipment Inventory

User Name : Administrator  
Factory : PE/C      Logout

Asset Code: Lan 02      Inventory Value

Asset Code	Asset Name	Inventory Value	User Add	Date Time
M70B1AN001	HIGH SPEED PRESS	<input checked="" type="checkbox"/>	Administrator	2018/07/31 15:30:03
M70B1AN001	HIGH SPEED PRESS-CORE DIE	<input checked="" type="checkbox"/>	Administrator	2018/07/31 15:30:03
M70B1AN001	HIGH SPEED PRESS-DIE INSERT	<input checked="" type="checkbox"/>	Administrator	2018/07/31 15:30:03
M70B1AN001	HIGH SPEED PRESS-LA4-503,1...	<input checked="" type="checkbox"/>	Administrator	2018/07/31 15:30:03
M70B1AN001	HIGH SPEED PRESS-LA4-503AB...	<input checked="" type="checkbox"/>	Administrator	2018/07/31 15:30:03
M70B1AN001	HIGH SPEED PRESS-LA4-503AB...	<input checked="" type="checkbox"/>	Administrator	2018/07/31 15:30:03
M70B1AN001	HIGH SPEED PRESS-LA4-504AB...	<input checked="" type="checkbox"/>	Administrator	2018/07/31 15:30:03
M70B1AN001	HIGH SPEED PRESS-MATERIAL ...	<input checked="" type="checkbox"/>	Administrator	2018/07/31 15:30:03

The information of this equipment will be appear in below list

## II.2.2 Equipment Management

**Inventory Check:** Using to check and update the inventory times of each equipment

**COPAL MASTER MAINTENANCE**

**Equipment Management**

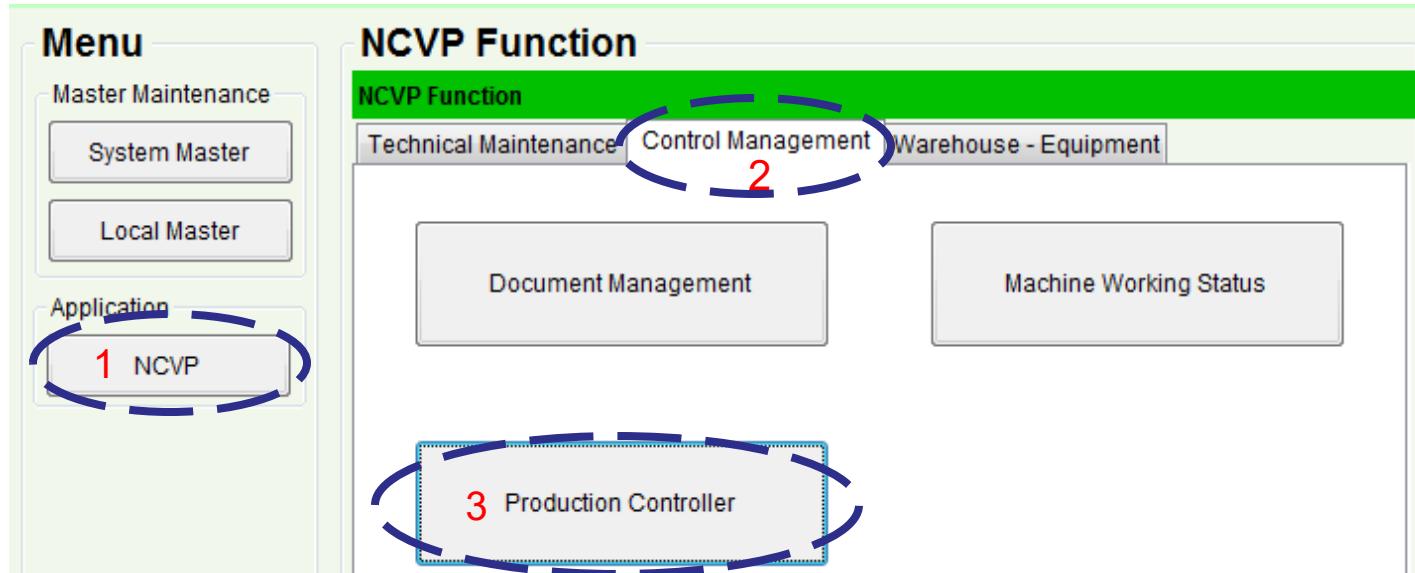
User Name : Administrator  
Factory : PE/C      Logout

Asset Code	Asset No	Asset Name	Asset Model	Asset Serial	Asset Supplier	Label	Inventory	Qty	Unit	Asset Type	User Name	Date Time
M30B2CH003	0	COMU HEAT CAUKLING	001-H0116200	***	NIDEC COPAL CORPORATION	Pasted	Lan 01		PCS	MC_AST	Hồ Nhu Ngọc	2018/05/29
M30B2CH006	0	COMU HEAT CAUKLING	001-H0116200	***	NIDEC COPAL CORPORATION	Pasted	Lan 01		PCS	MC_AST	Hồ Nhu Ngọc	2018/05/29
M30B2CH009	0	COMU HEAT CAUKLING	001-H0116200	***	NIDEC COPAL CORPORATION	Pasted	Lan 01		PCS	MC_AST	Hồ Nhu Ngọc	2018/05/29
M30B2CH007	0	COMU HEAT CAUKLING	001-H0116200	***	NIDEC COPAL CORPORATION	Pasted	Lan 01		PCS	MC_AST	Hồ Nhu Ngọc	2018/05/29
M30B2CH001	0	COMU HEAT CAUKLING	001-H0116200	***	NIDEC COPAL CORPORATION	Pasted	Lan 01		PCS	MC_AST	Hồ Nhu Ngọc	2018/05/29
M30B2CH008	0	COMU HEAT CAUKLING	001-H0116200	***	NIDEC COPAL CORPORATION	Pasted	Lan 01		PCS	MC_AST	Hồ Nhu Ngọc	2018/05/29
M30B2CH004	0	COMU HEAT CAUKLING	001-H0116200	***	NIDEC COPAL CORPORATION	Pasted	Lan 01		PCS	MC_AST	Hồ Nhu Ngọc	2018/05/29
M30B2CH005	0	COMU HEAT CAUKLING	001-H0116200	***	NIDEC COPAL CORPORATION	Pasted	Lan 01		PCS	MC_AST	Hồ Nhu Ngọc	2018/05/29
M30B2CH002	0	COMU HEAT CAUKLING	001-H0116200	***	NIDEC COPAL CORPORATION	Pasted	Lan 01		PCS	MC_AST	Hồ Nhu Ngọc	2018/05/29

The equipment have been  
inventoried will be show in Pale  
Green color and have been yet  
inventoried will be show in red  
color

## II.2.3 Production Controller

The Production Controller support the user check and export production data safely and security. Follow the qty INPUT, OUTPUT and NG in line production. It is also support search and drawing the follow chart standard condition



The interface of Production Controller

Production Controller												User Name : Lê Quang Đăng Factory : FA-NCVP	Logout											
Search		Extant[Input (Output+NG)]						Export																
Model:	LA459	Date	Time From:	2018/04/12	Time To:	2018/04/12	Search	Chart	Browser:	Export Excel														
Line:	All Line	Time	Total	Input	Output	NG																		
							Line	Star Day	End Day	Input	Output	Total NG	Rate NG	Holder	App Check	En2	Fundou	En1	Insert Case	RA	Solder Ring	Solder Wire	Wingding	Welding

## II.2.3 Production Controller

Double click on column process in table info to view detail. Ex: double click on column 'RA' in a row with time is 2018/04/09 detail data of process RA in 2018/04/09 will be show like bellow

The screenshot shows a production control interface. At the top, there's a summary table with columns for Input, Output, NG, and Extant[Input (Output+NG)]. Below this is a larger table with rows for different dates (e.g., L01 from 4/5/2018 to 4/12/2018) and columns for various processes. A green callout labeled "Table info" points to the header of the main table. A large green arrow labeled "Double click" points from the main table down to a smaller, detailed table below. This detailed table has its own header with fields for Model, Line, Process, and Action buttons for Browser, Export Excel, and Chart. It lists specific events or data points for each date.

Input		Output		NG		Extant[Input (Output+NG)]	
Total	55900		54020		2835		-955
Line	Star Day	End Day	Input	Output	Total NG	Rate NG	Holder
L01	4/5/2018	4/5/2018 1:59 PM	8000	7701	319	4.142	0
L01	4/6/2018	4/6/2018 1:57 PM	8000	7786	361	4.636	0
L01	4/7/2018	4/7/2018 2:23 PM	8000	7746	506	6.532	0
L01	4/9/2018	4/9/2018 1:58 PM	8000	7677	534	6.955	0
L01	4/10/2018	4/10/2018 1:58 PM	7900	7726	285	3.688	0
L01	4/11/2018	4/11/2018 2:07 PM	8000	7598	254	3.342	0
L01	4/12/2018	4/12/2018 1:53 PM	8000	7786	576	7.397	0

Info	Action											
Model: LA459	Line: L01	Process: RA	Browser:			Export Excel			Chart			
Line	Date	Time	Com Pb Sticky	Wire Pb Sticky	Com Slip	Renew Ring	Break Wire Final App	Wire Combine Wrong	Core NG	Segment Hole	Glue Sticky	Loose Wire Fi
L01	4/9/2018	6:03 AM	0	0	0	0	0	0	0	0	0	0
L01	4/9/2018	7:03 AM	1	0	0	3	16	0	0	3	5	0
L01	4/9/2018	8:03 AM	2	0	0	8	22	0	0	5	7	0
L01	4/9/2018	9:03 AM	2	0	0	10	24	1	0	6	9	0
L01	4/9/2018	10:03 AM	3	1	0	11	29	1	2	8	9	0
L01	4/9/2018	11:03 AM	3	1	0	11	39	1	3	8	9	1
L01	4/9/2018	12:03 PM	3	1	0	13	50	1	4	9	10	2
L01	4/9/2018	1:03 PM	3	2	0	13	62	3	5	10	10	2

Table info

Double click

Table info detail data of process

## II.2.3 Production Controller

Search data by Date then click 'Chart' to show the follow chart. Select type of chart and view

Search

Model: LA459

Date Time From: 4/ 6/2018

Time To: 4/12/2018

Line: All Line

Search  

Chart

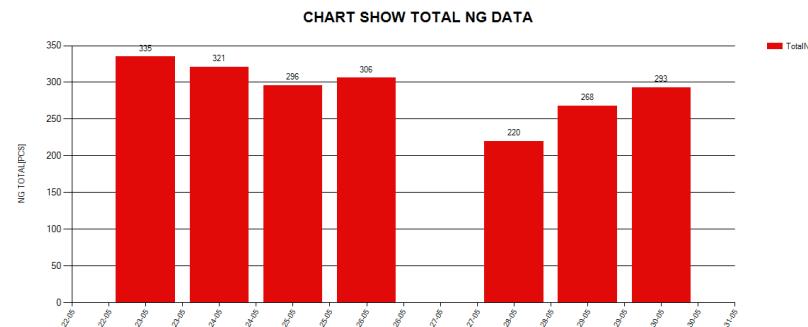
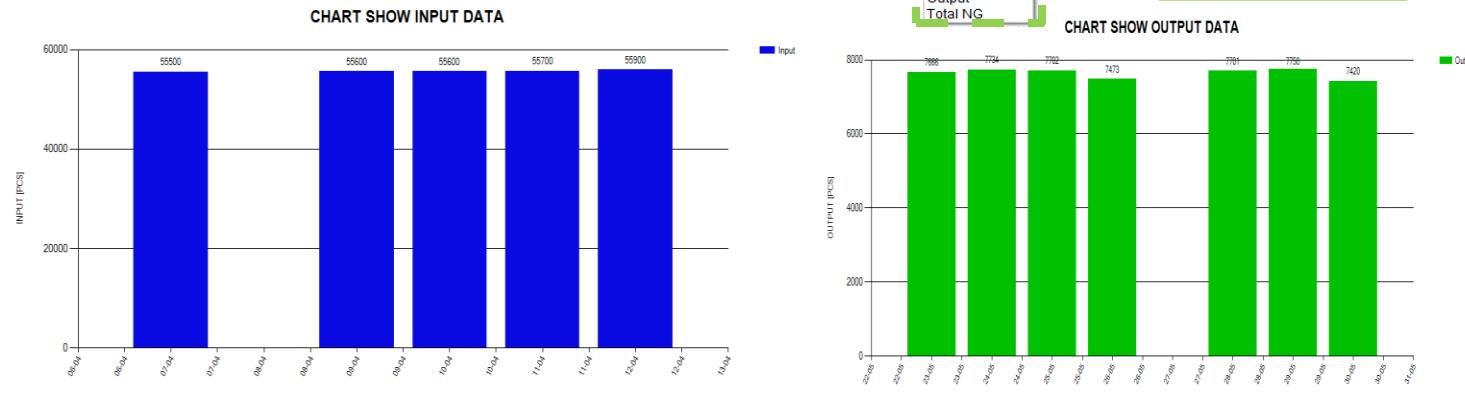
Export

Browser:

Export Excel

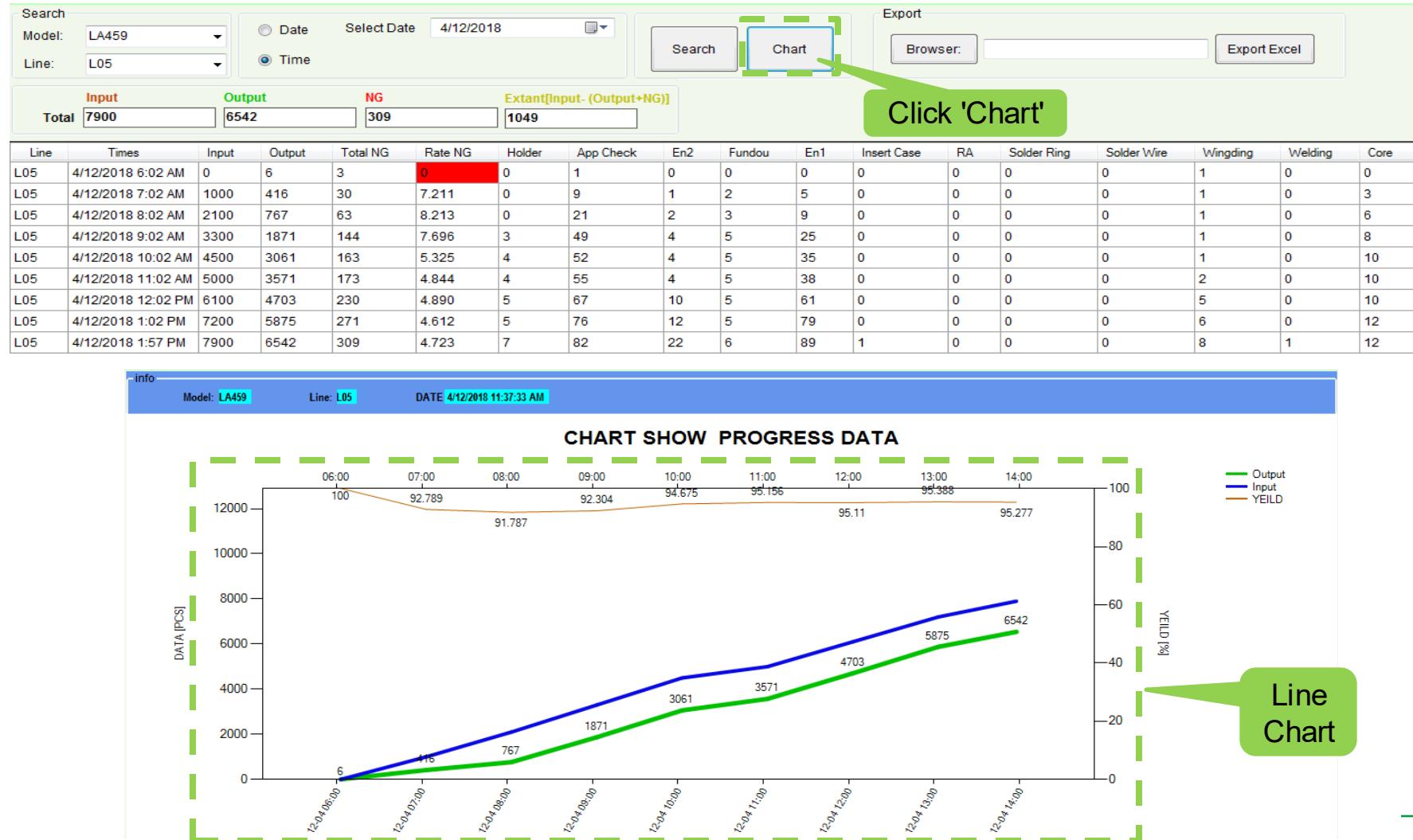
Input		Output		NG		Extant[Input (Output+NG)]											
Total	278300	264534	7355	6411													
Line	Star Day	Input	Output	Total NG	Rate NG	Holder	App Check	En2	Fundou	En1	Insert Case	RA	Solder Ring	Solder Wire	Wingding	Welding	Core
All Line	4/7/2018	55500	53501	1467	2.742	6	201	167	24	707	176	527	40	29	45	48	24

info  
 Model: LA459 Line: All Line From: 4/6/2018 4:23:30 PM To 4/12/2018 4:23:30 PM Select Chart Data:



## II.2.3 Production Controller

**Time Chart:** Search data by Time then click 'Chart' to show the follow chart. Select type of chart and view



## II.2.3 Production Controller

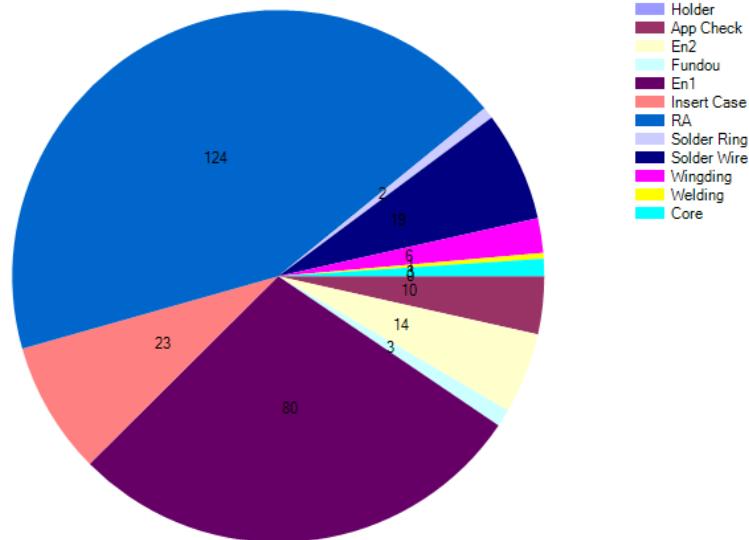
- ❖ **Pie chart by all process:** This chart will show the NG qty data of all process base on Input qty data

Line	Star Day	End Day	Input	Output	Total NG	Rate NG	Holder	App Check
L01	4/7/2018	4/7/2018 2:23 PM	8000	7746	506	6.532	0	19
L01	4/9/2018	4/9/2018 1:58 PM	8000	7677	534	6.955	0	14
L01	4/10/2018	4/10/2018 1:58 PM	7900	7726	285	3.688	0	10
L01	4/11/2018	4/11/2018 2:07 PM	8000	7598	254	3.342	0	4
L01	4/12/2018	4/12/2018		7825	577	7.373	0	7

Double click

-info  
Model: LA459 Line: L01 Date: 4/10/2018 12:00:00 AM

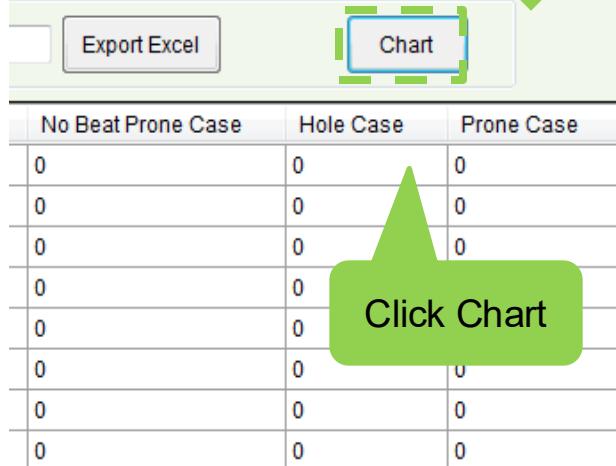
Chart NG Process in date



## II.2.3 Production Controller

**Pie chart by detail process:** This chart will show the NG qty data for each process

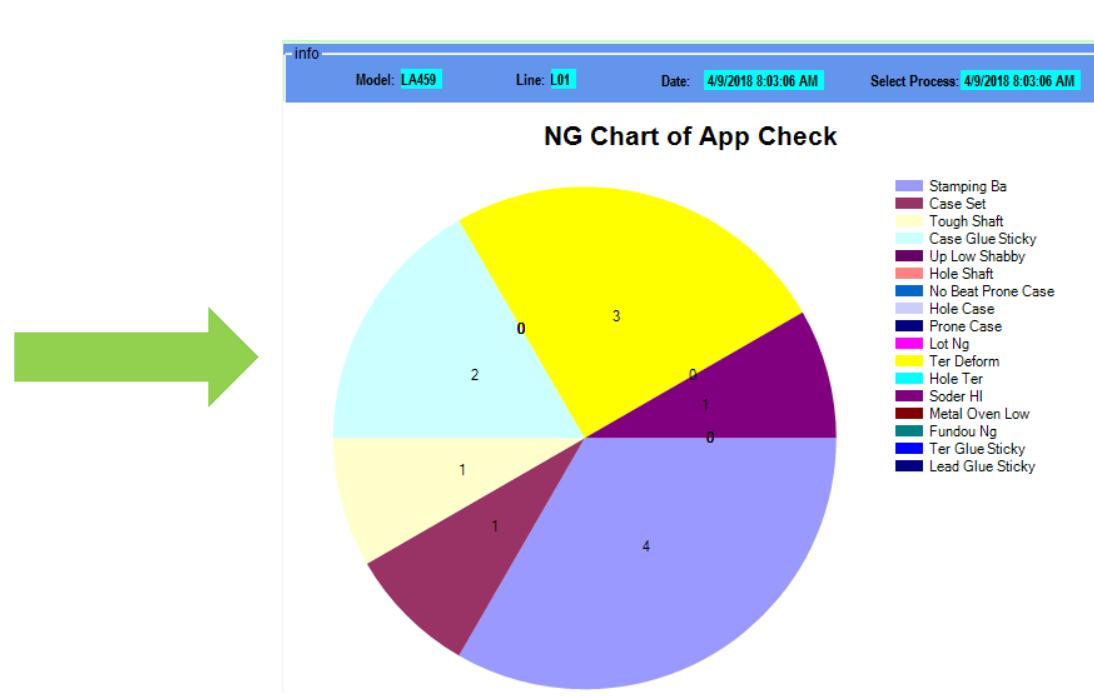
Line	Star Day	End Day	Total NG	Rate NG	Holder	App Check	En2	Fundou	En1	Insert Case	RA
L01	4/7/2018	4/7/2018 2:23 PM	506	6.532	0	19	16	8	247	32	123
L01	4/9/2018	4/9/2018 1:58 PM	534	6.955	0	14	21	4	173	70	206
L01	4/10/2018	4/10/2018 1:58 PM	285	3.688	0	10	14	3	80	23	124
L01	4/11/2018	4/11/2018 2:07 PM	254	3.342	0	4	19		50	75	
L01	4/12/2018	4/12/2018 1:58 PM	577	7.373	0	7	28		134	77	



Export Excel

Chart

No Beat Prone Case	Hole Case	Prone Case
0	0	0
0	0	0
0	0	0
0	0	0
0	0	0
0	0	0
0	0	0
0	0	0



## II.2.3 Production Controller

**Control person in line:** This function will control the numbers of operation in line production about absent, present, target,.....

**Production Controller**

Search

Model: LA459

Line: All Line

Date Time From: 2018/05/25

Time To: 2018/06/01

Person

**COPAL MASTER MAINTENANCE**

**Production Controller**

Info

Model: LA459	Lot: J61	H/D Co: 0	H/D Ra: 0	H/D Ca: 0	H/D Ba: 0	H/D Ma: 0
Line:	Kế Hoạch: 0	Vắng Mát Co: 0	Vắng Mát Ra: 0	Vắng Mát Ca: 0	Vắng Mát Ba: 0	Vắng Mát Ma: 0
Ngày: 2018/06/01	ST Dư Tính: 0	Leader:	T/G Tầng Ca: 0	T/G Bù Hàng: 0	Tổng T/G: 0	Output T/T: 2512
Shift: 1	ST Thực Tế: 0	<input type="button" value="Cập Nhật"/> <input type="button" value="Xóa Đóng"/>				

User Name : Nhi Nguyễn  
Factory : QA-NCVP

Logout

Export

Tìm Kiếm Từ Ngày: 2018/05/25 Đến Ngày: 2018/06/04

Đường Dẫn Xuất Excel

Line	Ngày Cập Nhật	Số Lot	Leader	Shift	Kế Hoạch	ST Dư Tính	ST Thực Tế	H/D Core	Vắng Core	H/D Case	Vắng Case	H/D Bracket	Vắng Bracket	H/D Ra	Vắng Ra	H/D Ma	
L03	2018/05/30 11:08:41	J5Y	SA	1	7600	0.781	1.113	1.75	0	0	0	0	0	6	0	5	0
L04	2018/05/30 11:08:41	J5Y	SA	1	7600	0.781	1.164	1.75	0	0	0	0	0	6	0	5	0
L05	2018/05/30 13:18:27	J5Y	TIEN	1	7600	0.781	0.79	2	0	0	0	0	0	6	0	5	0
L01	2018/05/30 13:39:43	J5Y	TUYET	1	7600	0.802	0.732	1.75	0	0	0	0	0	6	0	5	0
L02	2018/05/31 09:59:21	J5Z	TUYET	1	7600	0.781	1.331	1.75	0	0	0	0	0	6	0	5	0
L03	2018/05/31 09:59:21	J5Z	SA	1	7600	0.781	1.279	1.75	0	0	0	0	0	6	0	5	0
L02	2018/05/30 09:59:21	J5Y	TUYET	1	7600	0.781	0.704	1.75	0	0	0	0	0	6	0	5	0
L04	2018/05/31 09:59:21	J5Z	SA	1	7600	0.781	1.362	1.75	0	0	0	0	0	6	0	5	0
L01	2018/05/31 07:38:22	J5Z	TIEN	1	7600	0.781	0.714	1.75	0	0	0	0	0	6	0	5	0
L05	2018/05/31 07:38:22	J5Z	TIEN	1	7600	0.781	0.715	1.75	0	0	0	0	0	6	0	5	0
L06	2018/05/31 07:38:22	J5Z		1	7600	0.781	0.999	1	0	0	0	0	0	4	0	3	0
L06	2018/05/31 07:38:22	J5Z		1	7600	0.781	0	0	0	0	0	0	0	0	0	0	0

Signal 2.4 GHz and IoT application.

# 1. Purpose of development IoT for GA1

---

1. To create a database for GA1 model.
2. To build a system from hardware to software by NCVP
3. To support update data automatically, accurately, safely, promptly.
4. To support department in private form access.
5. To support get and analyze data → chart
6. To monitor data online. Show problems coming soon.
7. Cut-down OP and increase accuracy of data.

## 2. The process need to connect to IoT

Qty	Process	Detail Process	Data	Now	After applying IoT
1	FRAME ASSY	Ball bearing - Leadscrew	Input Line (NG4)	1. Data is updated by hand (one hour/ time)  2. Data saved by excel files, -->the file can read and edit by everyone (not security).	1. Data will be updated for auto real-time (show monitor and it can be seen by Laptop/PC)  2. Data saved into NCVP database. We can see by software, permissions by user and admin (read/view and update)  3. The system is auto, → Data is secured → Saved timer/OP
2		Shaft - Nut - Frame	NG(4)		
3		Bearing bonding	NG		
4		Panel, shaft welding	NG (4)		
5		Appearance check	Output/NG(6)		
6	GEAR CASE	GEAR CASE ASSY (X4)	NG(9)	3. Production have one person to input data and one person to manage the data	3. The system is auto, → Data is secured → Saved timer/OP
7		Output Shaft (X2)	Output/NG		
8	MOTOR COMP	Gear case - Frame	Input/NG(3)		
9		STM - Module assy			
10		FPC soldering	NG(3)		
11		Grease apply & aging	NG		
12		FPC (soldering) bonding	NG		
13		Marking	NG(1)		
14		Thrust check	NG(2)		
15		Noise check	NG(1)		
16		Appearance check	Output Line/NG(8)		

### 3. Signal 2.4GHz comparison with WLAN

#### WLAN

Using network wires → Lost so much time and OP for change new layout.



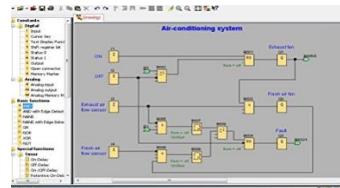
All device connect into a system → when a device stop. The system can be problem



Expensive:  
 + Using PLC  
 + Each line: connect 20 LAN wires, Electronic wires.  
 EX: Code for one PLC device about 2500usd.

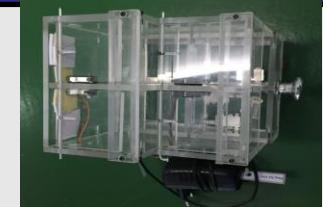


Using PLC: so difficult make new data form.



#### Signal 2.4 Ghz

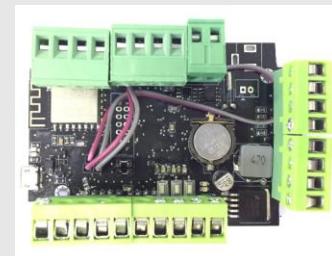
Not use network wires  
 → Easy to change layout



Working independent  
 → insert, add, remove a device, the system no problem



Cheap.  
 + using electronic board  
 + Each line using a wifi hub.  
 EX: Cost for one board about 100 usd



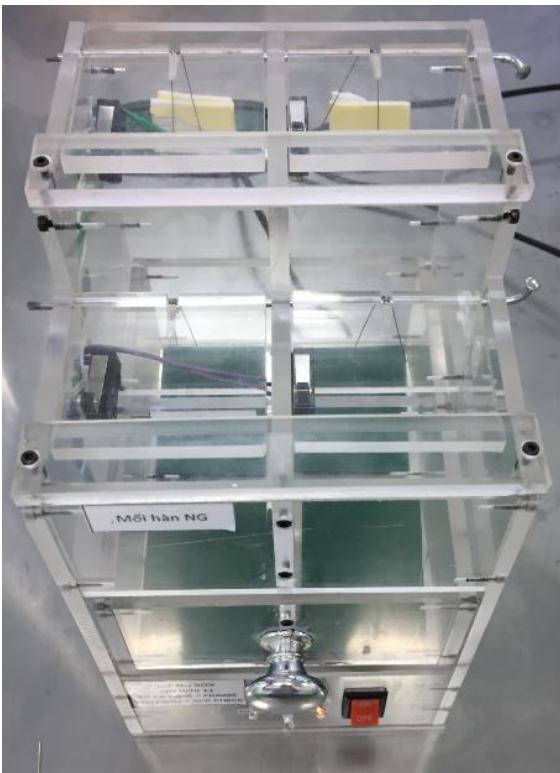
Using electronic board:  
 Program code by C/C++ → easy to do.

```
double testScores[5], sum=0;
double* pTestScores;
pTestScores = testScores;
for (int i = 0; i < 5; i++)
{
    cout << "Enter the test score: ";
    cin >> *(pTestScores + i);
    sum += *(pTestScores + i);
```

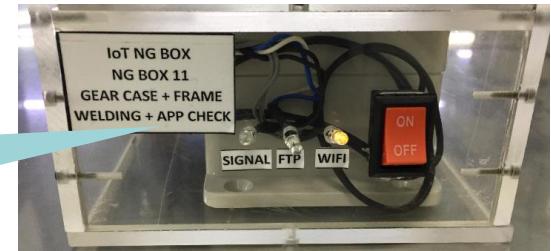
## 4. NG Box

### 1. IoT Box

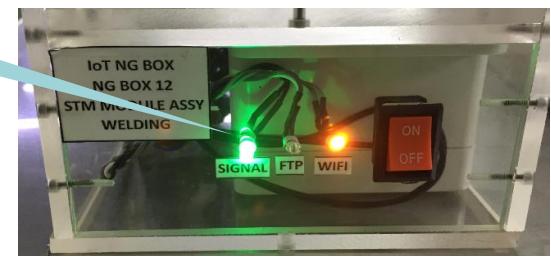
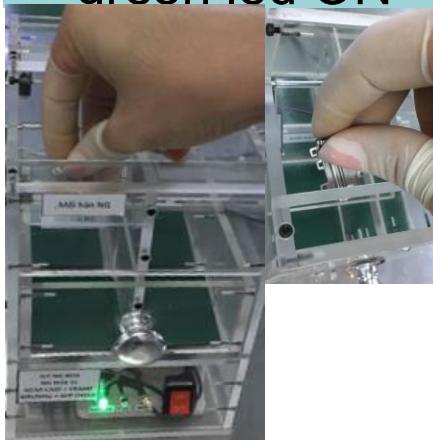
Input: 12 volt, 2 mA.  
Output: csv file.



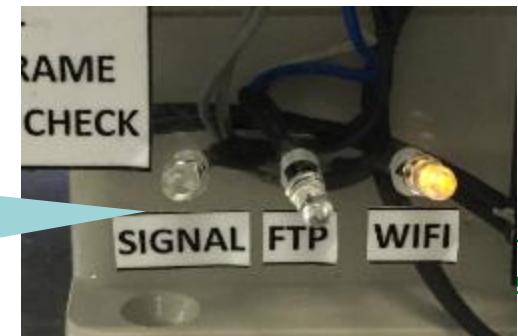
Waiting status  
<only yellow led ON>



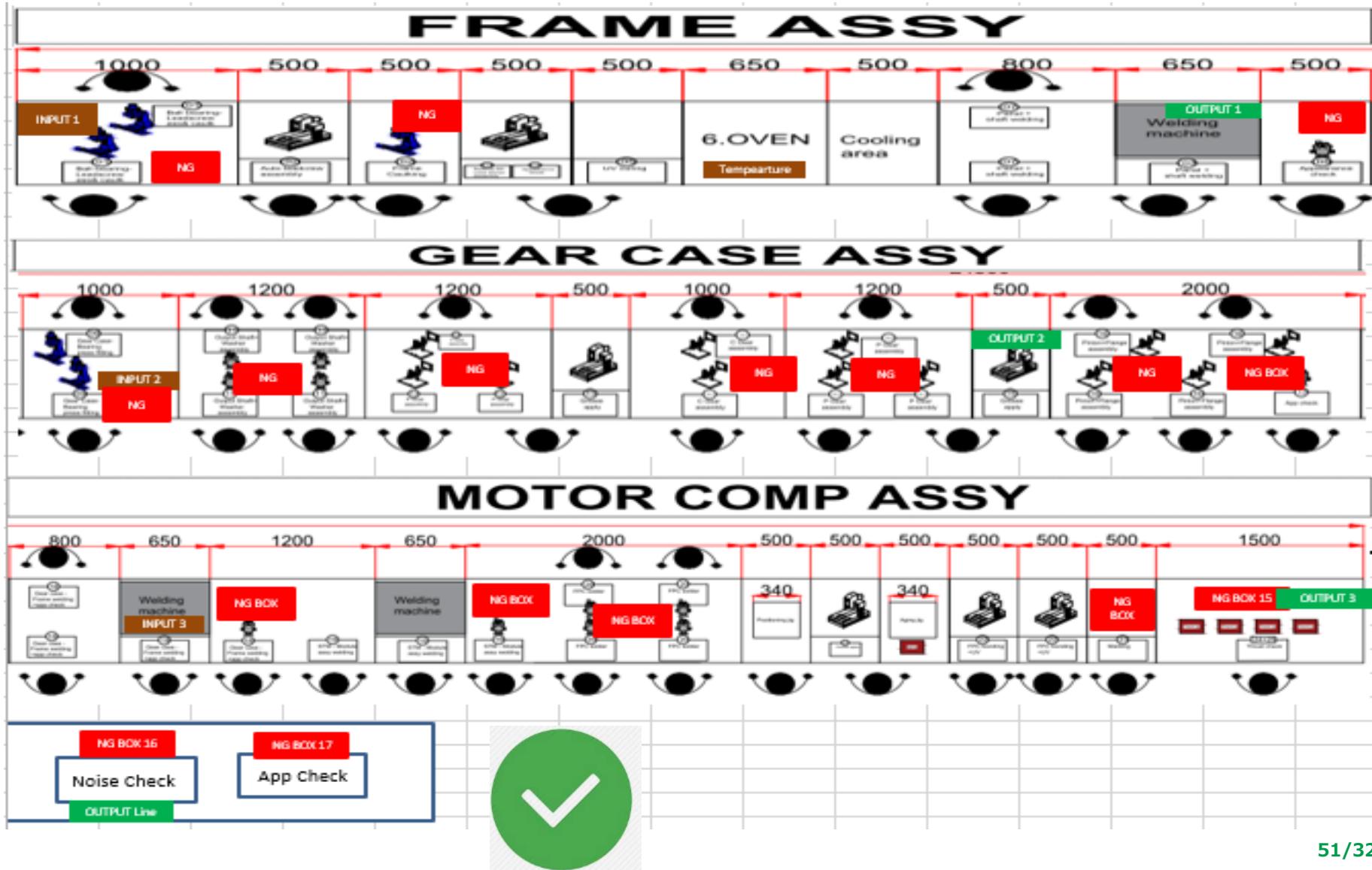
Input NG  
<green led ON>



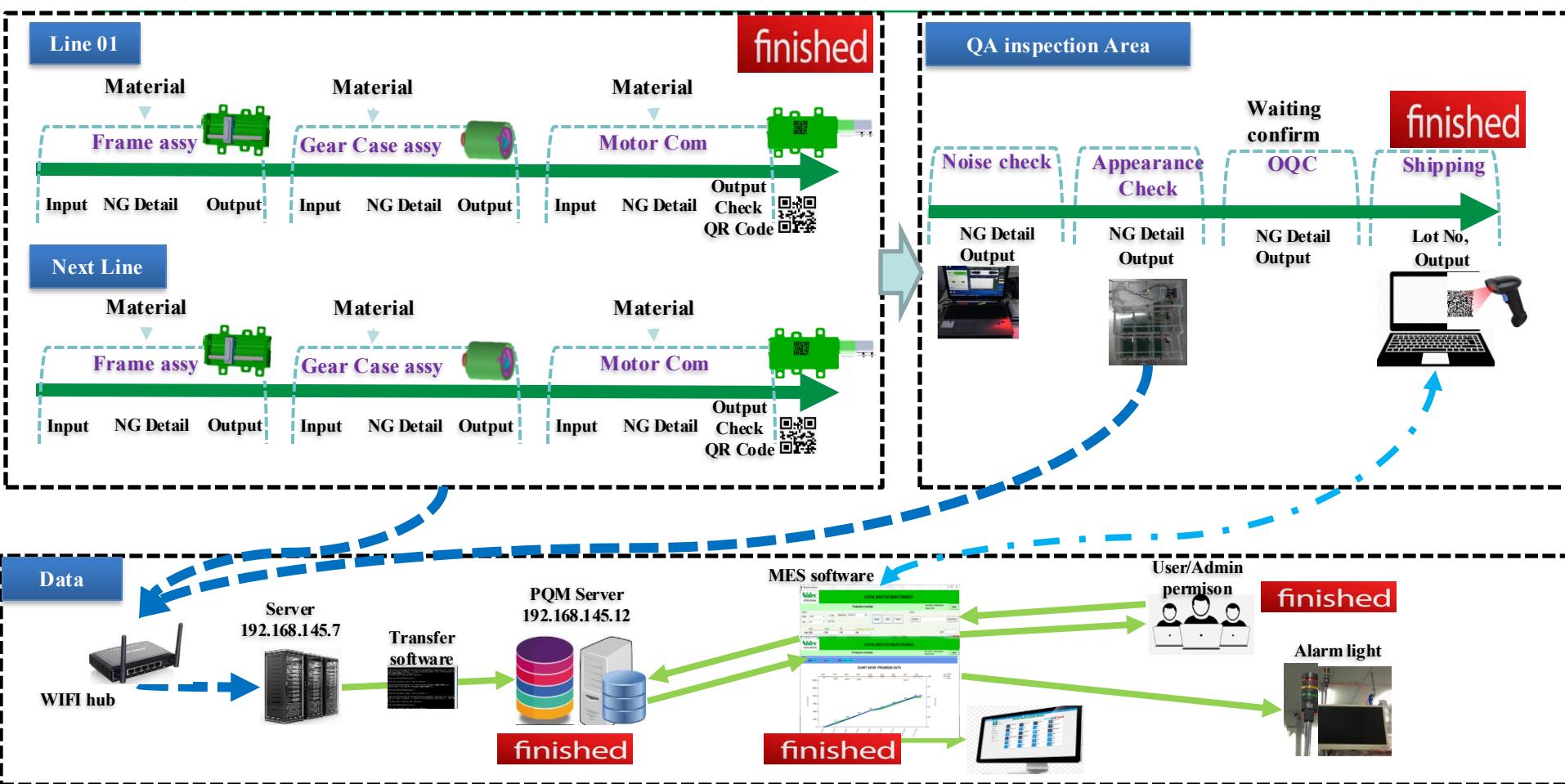
Wifi disconnect  
<Yellow led On-  
OFF>  
Transfer Error <Red  
led On>



## 5. Layout NG Box in line



## 6. Layout data and layout product



In Line: Information management: Material <QR code>; input, output, NG detail <Counter, Date-time, Line>

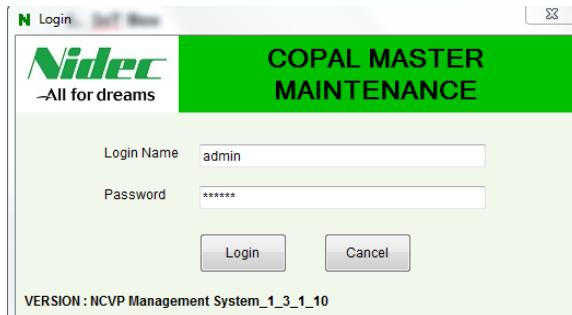
In QA inspection Area: Information management: Barcode of product, Output, date-time, username, Line, lot shipping...

Alarm light: It detect casual high NG rate, and warring for OP, Leader, Manager.

→ Advantages: when the products have a problems in the customer area, we can search all the product information.

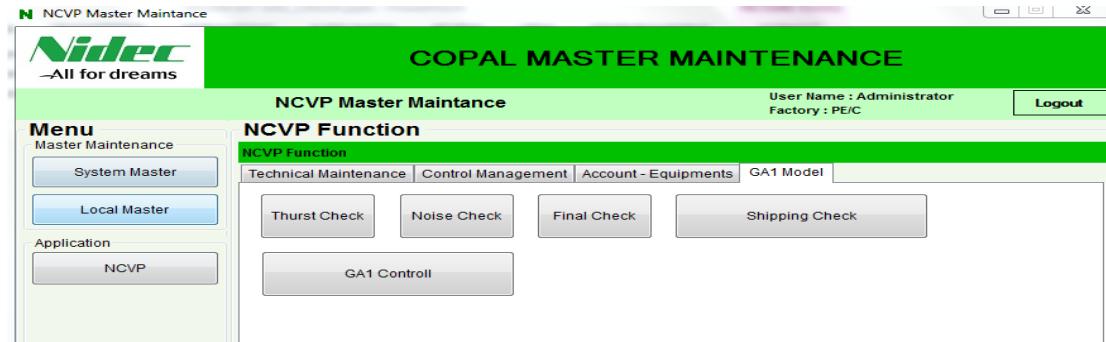
## 7. NCVP Software

Login Form



The screenshot shows a login interface for the COPAL MASTER MAINTENANCE system. It features a green header with the Nidec logo and the text 'COPAL MASTER MAINTENANCE'. Below the header is a form with fields for 'Login Name' (admin) and 'Password' (\*\*\*\*\*). There are 'Login' and 'Cancel' buttons at the bottom. At the very bottom, it says 'VERSION : NCVP Management System\_1\_3\_1\_10'.

GA1 Main Page.  
Showing by permission.



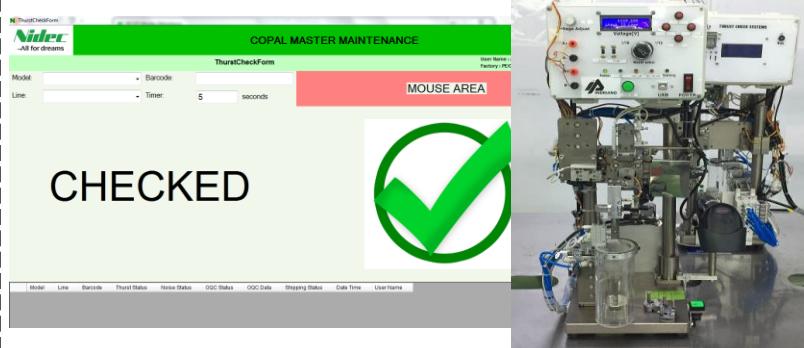
The screenshot shows the COPAL MASTER MAINTENANCE main page. It has a green header with the Nidec logo and the text 'COPAL MASTER MAINTENANCE'. The left sidebar contains a 'Menu' section with 'Master Maintenance' and 'NCVP Function' tabs. Under 'Master Maintenance', there are 'System Master' and 'Local Master' buttons. Under 'NCVP Function', there are 'Technical Maintenance', 'Control Management', 'Account - Equipments', and 'GA1 Model' buttons. On the right, there is a 'Logout' button and a status bar showing 'User Name : Administrator' and 'Factory : PE/C'. Below the menu, there are several buttons for 'Thrust Check', 'Noise Check', 'Final Check', 'Shipping Check', and 'GA1 Controll'.

### THUSRT CHECK Machine:

Controller and counter by barcode reader. If the product change one more, data will be exported by the final check

It have 2 option:

- Auto machine. The same line 1
- Check by Laptop: the same as sample line

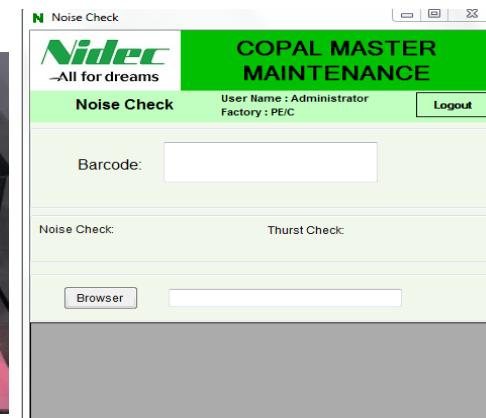


CHECKED

### Noise check Machine:

Controller by Barcode: Counter NG, OutPUT, Line, Machine No.

Check thusrt check status before



## 7. NCVP Software

Shipping: Controller by barcode, lot, all product information

The screenshot shows the 'Shipping Form' window with a green header bar containing the title 'COPAL MASTER MAINTENANCE'. The main area is titled 'Shipping Form' and includes fields for 'Print Date' (2019/03/04), 'Product Serial', and 'Ship Date' (2019-03-04). On the right, there are user details ('User Name: Administrator', 'Factory: PE/C') and a 'Logout' button. Below these are buttons for 'Add BoxID', 'Search', 'Register Box ID', 'Delete Box ID', 'Delete Selection', 'Delete All', and 'Close'. A table below the search area has columns for 'BoxID', 'User', 'Print Date', 'Ship Date', 'Open', and 'Ship'. Another table to the right lists products with columns for 'Serial No', 'Model', 'Line', 'Lot', 'Thrust', and 'Noise'.

### DATA SHOW MAIN PAGE

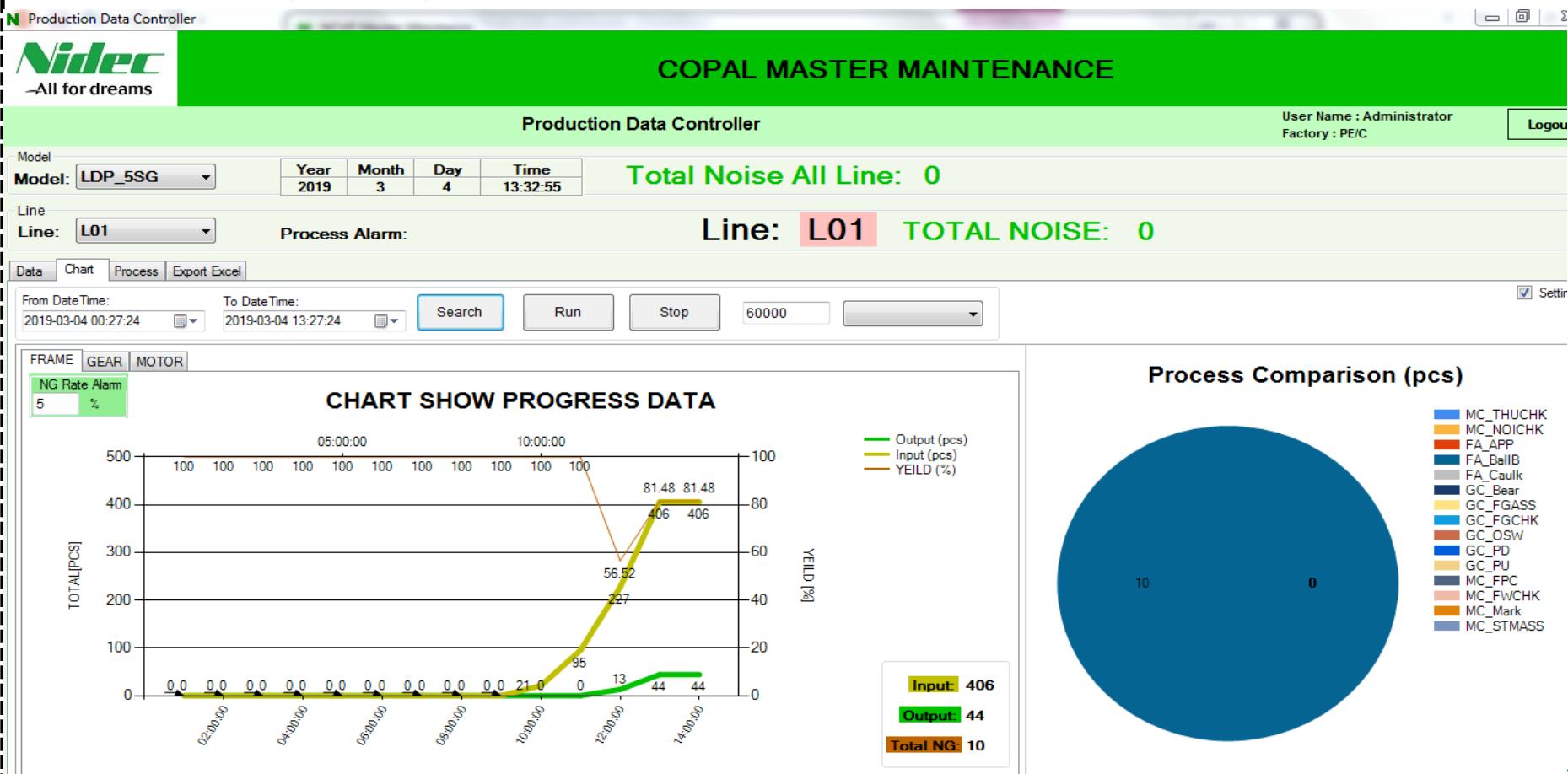
- Data all LINE
- Show data line by line
- Show data all process.
- Alarm HIGH NG Process by red color, yellow color.

The screenshot shows the 'Production Data Controller' window with a green header bar containing the title 'COPAL MASTER MAINTENANCE'. It displays 'Total Noise All Line: 0' and 'Line: L01 TOTAL NOISE: 0'. The interface includes a dropdown for 'Model' (LDP\_5SG) and date/time fields (Year: 2019, Month: 3, Day: 4, Time: 13:32:17). Below this are tabs for 'Data', 'Chart', 'Process', and 'Export Excel'. The main area is divided into three sections: 'FRAME ASSY' (INPUT: 406, OUTPUT: 44, Total NG: 10, 18.52%), 'GEAR CASE ASSY' (INPUT: 3, OUTPUT: 0, Total NG: 0), and 'MOTOR ASSY' (INPUT: 0, OUTPUT: 0, Total NG: 0). Other listed items include Gear Case + Bearing, Output Shaft Assy, P Gear Down, C Gear, P Gear Up, Pinion + Flange Assy, Pinion Flange + App Check, Gear Case + Frame Welding, STM Assy, FPC Solder, Marking, Thrust Check, Noise, and Appearance.

## 7. NCVP Software

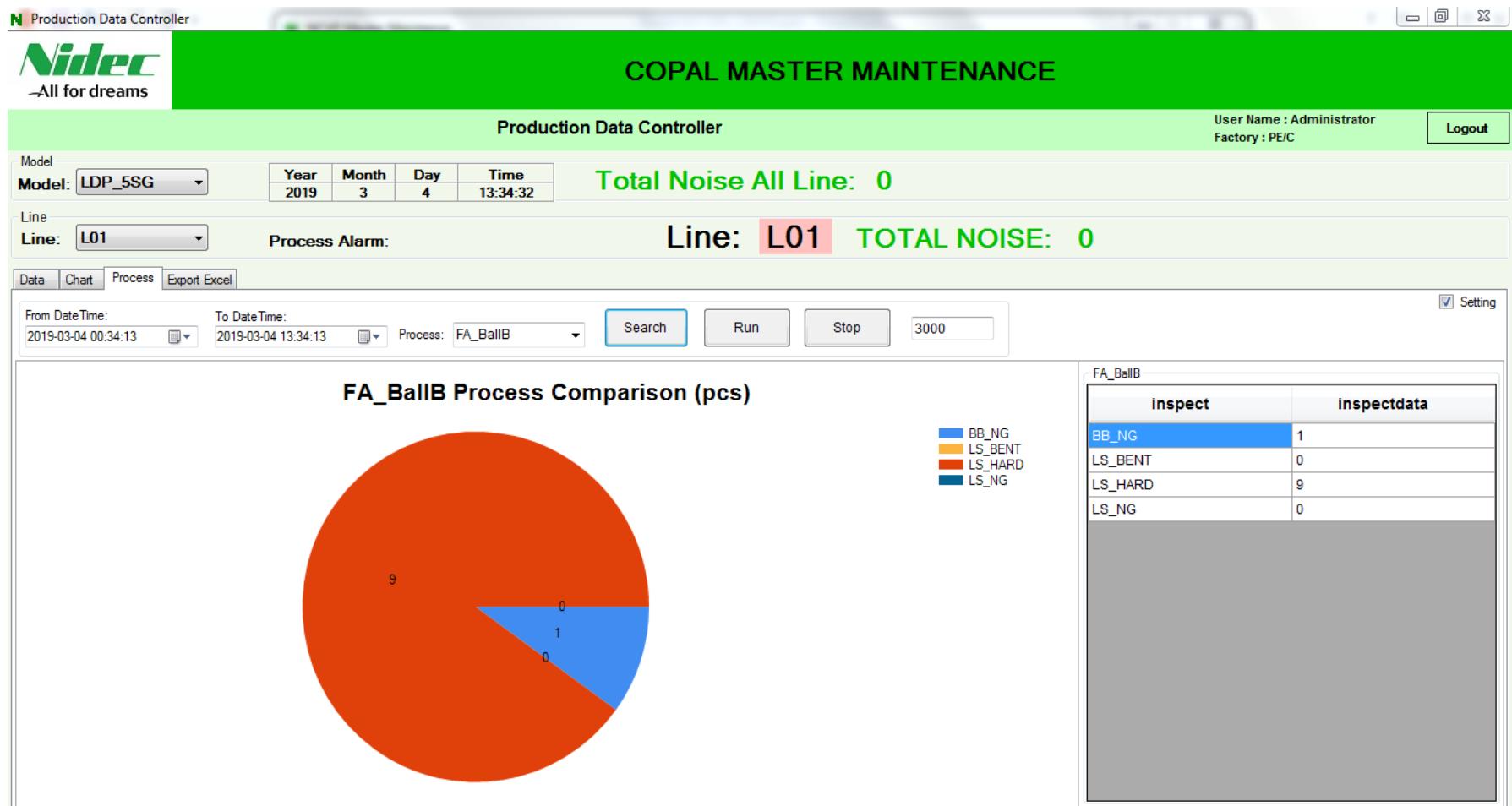
Chart Frame, Gear, Motor process. <hour by hour>

- InPUT
- OuTput
- NG
- Process comparison by PIE Chart



## 7. NCVP Software

- PIE chart compare details each process.
- Auto change process by 3 seconds.



## 7. NCVP Software

- Data to export excel.
- <INPUT, OUPUT, details NG all process.

Production Data Controller

**COPAL MASTER MAINTENANCE**

Production Data Controller

User Name : Administrator  
Factory : PE/C

Logout

Model: LDP\_5SG    Year: 2019    Month: 3    Day: 4    Time: 13:37:15

Total Noise All Line: 0

Line: L01    Process Alarm: Line: L01 TOTAL NOISE: 0

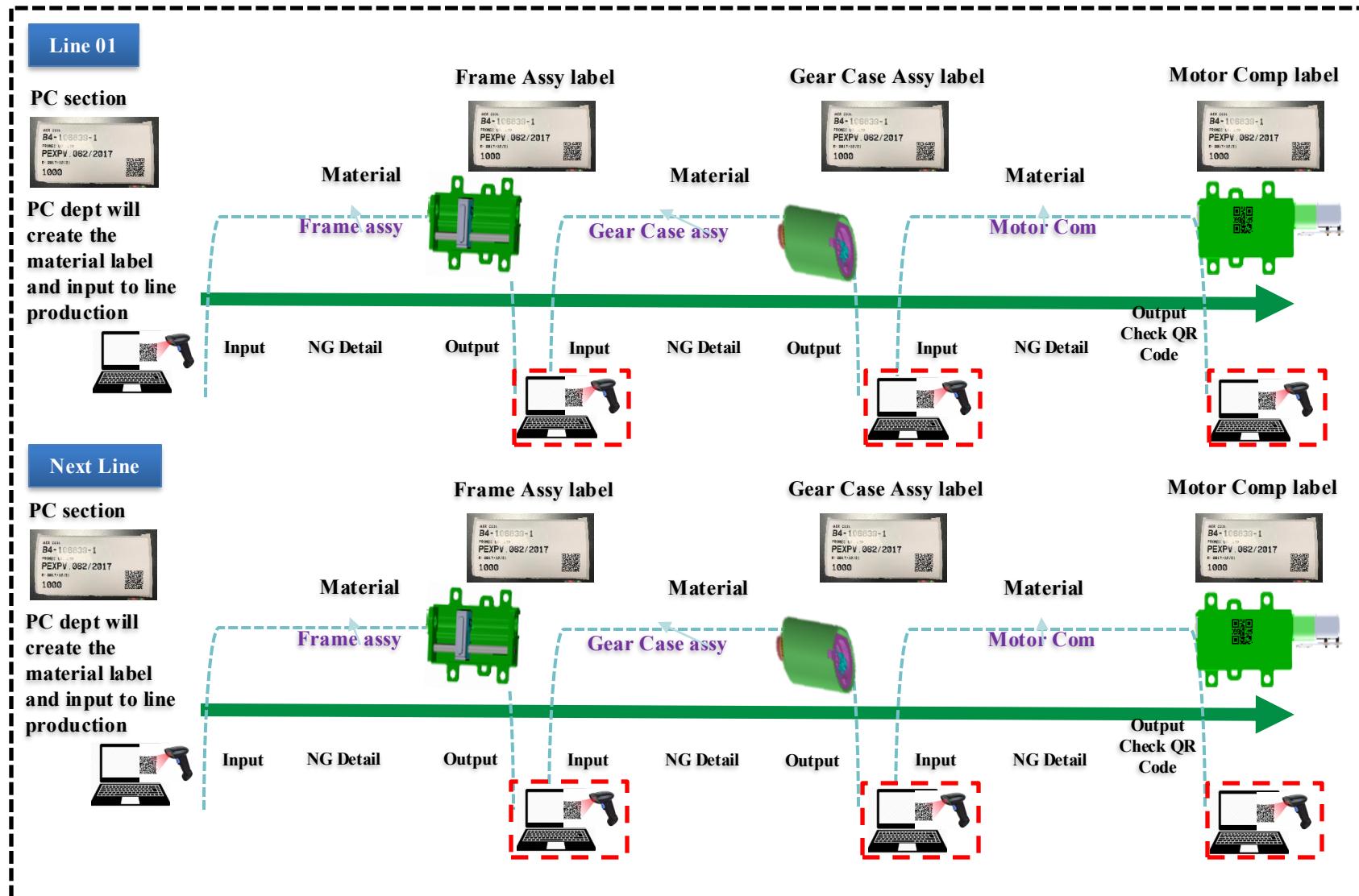
Data | Chart | Process | Export Excel

Export

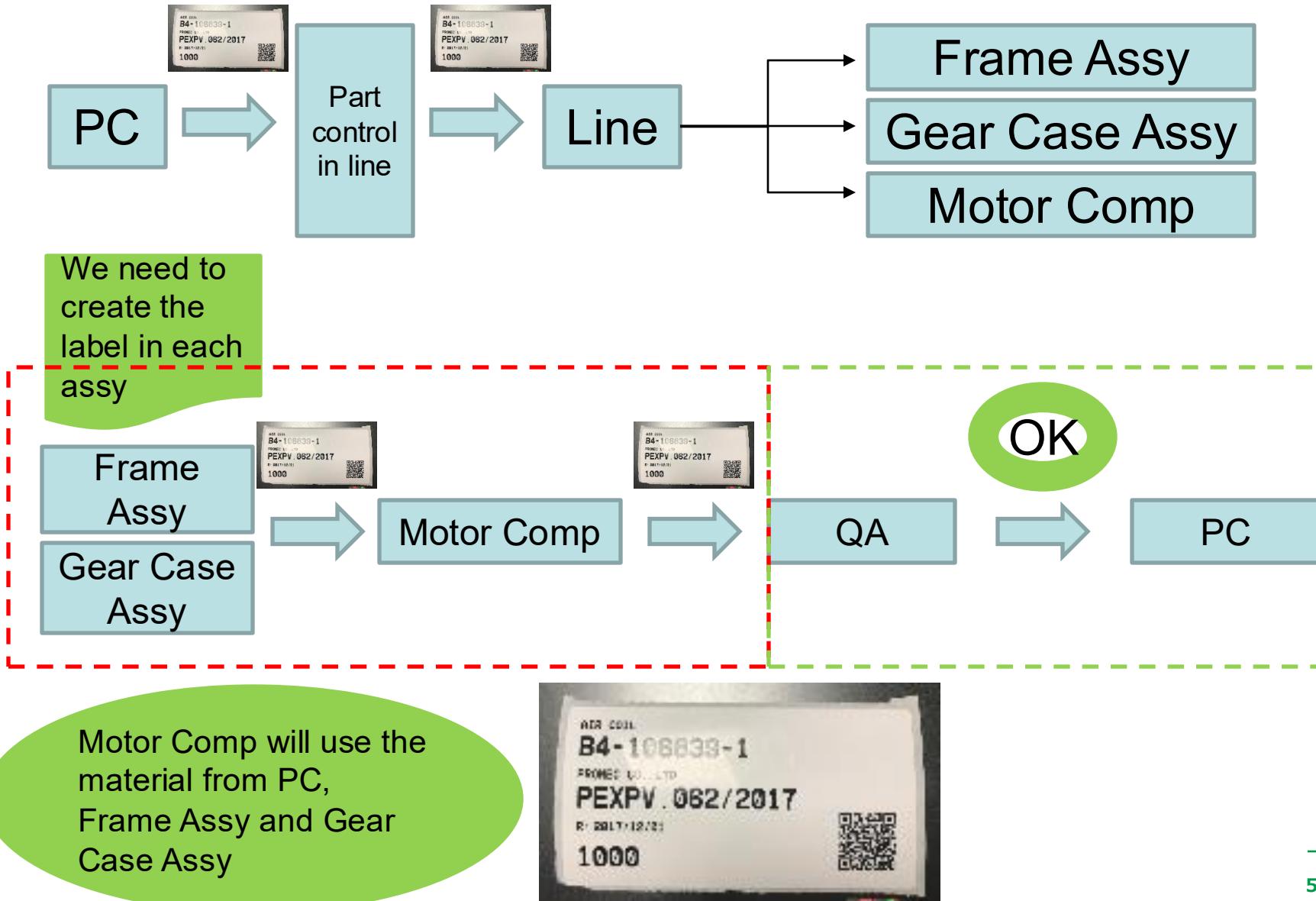
From Date Time: 2019-03-04 00:35:25   To Date Time: 2019-03-04 13:35:25   View   Browser:   Export Excel

process	inspect	inspectdata
FA_IP	Input Frame	406
FA_OP	OP1	44
TOTAL_F	Toal NG Frame	10
FA_BallB	BB_NG	1
FA_BallB	LS_BENT	0
FA_BallB	LS_HARD	9
FA_BallB	LS_NG	0
FA_Caulk	FR_BENT	0
FA_Caulk	FR_BENT1	0
FA_Caulk	GUI_NG	0
FA_Caulk	NUT_NG	0
FA_Caulk	SHA_HIGH	0
FA_APP	PA_NG	0
FA_APP	PA_OPEN	0
FA_APP	PA_OPP	0
FA_APP	SOLDER	0

## 8. Material label and create in line (future plan)



## 8. Material label and create in line (future plan)



*Nidec*  
—All for dreams