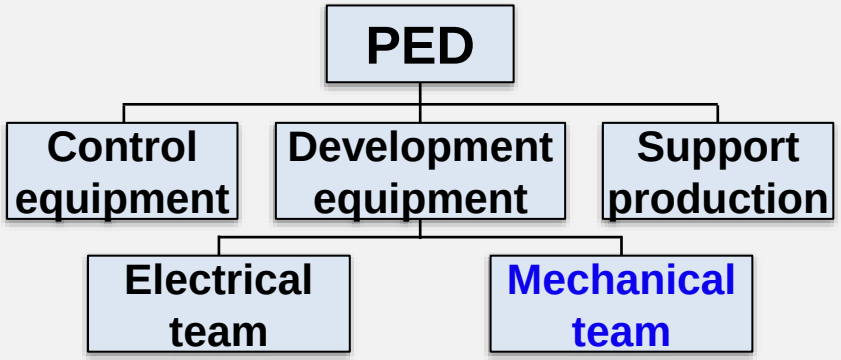
Develop Door phone Automation Line with improvement to increase pass rate and reduce running cost

CONTENTS:

- Present by: Nguyen Van Quyen
- Join Date: 25th Mar 2019
- Current Position: Officer
- New Position : Engineer
- Section: Development section – PE Department

1. Organization Chart and Job Description

❑ Organization chart



- SUP. Thien
- Engineer: Quyen
- 03 members

❑ My assignment

❖ **Current jobs:**

- Design jig, equipment of new models
- Improve equipment and process to enhance efficiency, ensure quality.
- Control tools, spare parts and material.

❖ **New tasks:**

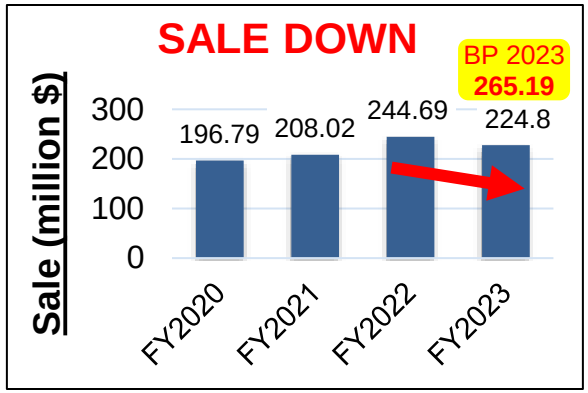
- Develop equipment standard to save design time and cost, ensure quality.
- Cooperate with other sections to increase in-house making jig, equipment.

❑ Job history and achievement

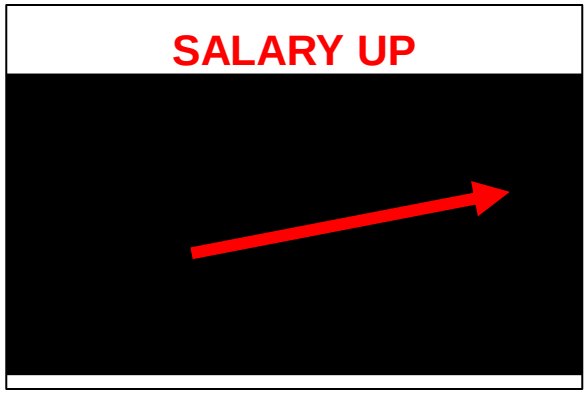
Mar/2019	❖ Start working in PSNV ▪ Officer of mechanical team
Jun/2019	❖ Assemble DP automation ▪ Line No1~3.
Oct/2019~ Dec/2022	❖ Microwave Oven Transfer ▪ Localize 100% electrode model 18L & SCV (67 sets) ▪ Design all checker (27 pcs) ▪ Design 224/247 support jigs for MW FA, FCT line and QC
Sep/2020	❖ Sound Business Transfer ▪ In-charge model ST600/SZ600-ST700
Feb/2023	❖ In-house PAPVN checker ▪ 04 FA checker, 06 FCT checker
Jun/2023	❖ DP FA automation (line No.4) Project Leader

2. Improvement Background

❑ PSNV business situation and PE mission



- PSNV sale reduce and don't achieve BP (84.8%)



- Salary increase annually

⇨ Labor cost increase

➡ **Fix cost increase**

PE MISSION:

Reduce labor cost by applying automation

❑ Consider automation projects situation and production plan in FY2023

❑ 2019~2020

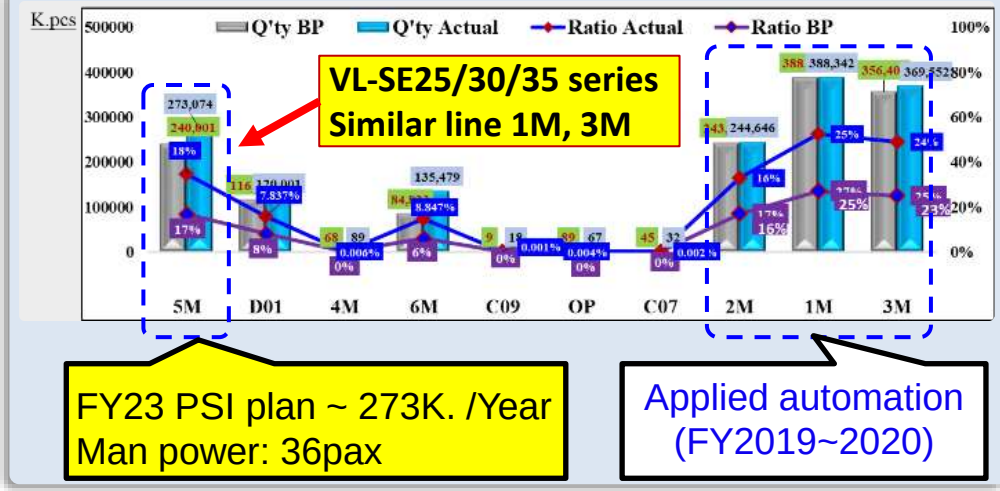
FA automation

- Cut 18 pax (3 line)

❑ 2022

FCT automation

- Cut 6 pax (1 line)



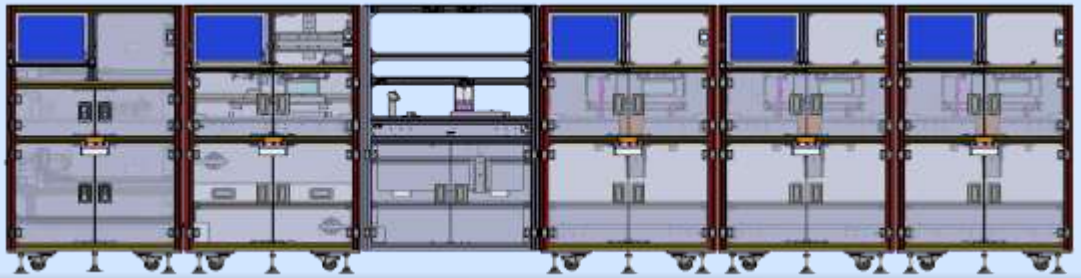
➡ **Apply automation for line 5M (VL-SE25/30/35) to reduce labor cost**

2. Improvement Background

❑ Cooperate with other sections to overview current design of automation lines

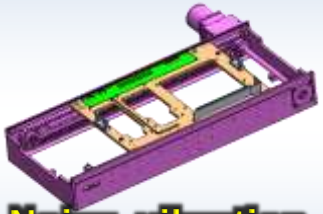
PE FA

Current Issue Analysis



❑ **Movement Structure**

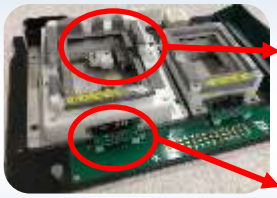
Inaccurate



Noisy, vibration

⇨ Affect to pass rate

❑ **Pallet and support jigs**



Cover, pin broken

Connector broken

⇨ Need to replace broken parts

❑ **Frame and out-side cover**

Door, cover broken

⇨ Need to replace broken parts

❑ISSUE 01:

Pass rate is low **(83~91%)**

❑ISSUE 02:

High running cost due to replacing parts **(9.7kUSD/year)**

My Mission: Resolve these issues by improving design matter

3. Detail action plan and Target

❑ Action plan and target

ISSUE	DETAIL ACTION	TARGET
❑ **ISSUE 01:** Pass rate is low **(83~91%)**	➢ **ACTION 01:** Change design of movement structure	❑ **Pass rate achieve 95%**
❑ **ISSUE 02:** High running cost due to replacing parts **(9.7kUSD/years)**	➢ **ACTION 2.1:** Change material door and cover. ➢ **ACTION 2.2:** Change connector on signal PCB. ➢ **ACTION 2.3:** Change structure of support jigs.	❑ **ACTION 2.1:** Reduce △600 USD ❑ **ACTION 2.2:** Reduce △3.0k USD ❑ **ACTION 2.3:** Reduce △1.2k USD **Total save cost: △4.8kUSD/Year**

❑ Project implementing schedule and progress

Plan - - - → Actual ——→

MAIN CONTENT	Jun/23	Jul/23	Aug/23	Sep/23	Oct/23	Nov/23	Dec/23	Jan/24
Current automation line analysis	- - - →							
Developing design concept		- - -	- - - →					
Assembly and evaluation				- - -	- - - →			
Follow actual production						- - -	- - -	- - - →

4. Detail improvement actions

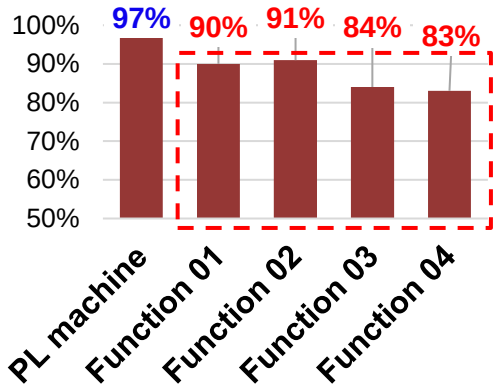
❑ISSUE 01:
Pass rate is low (83~91%)

❑ACTION 01: Change design of movement structure

❑TARGET:
Pass rate achieve 95%

❖ Current situation:

PASS RATE OF MACHINES

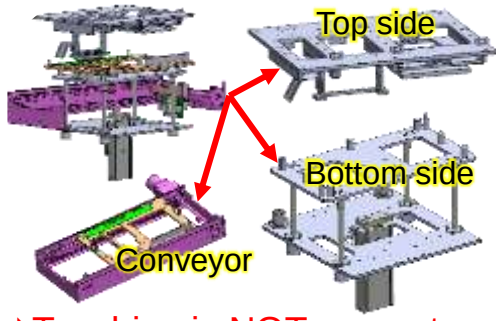


❑ Problems:
Pass rate of function checkers are low

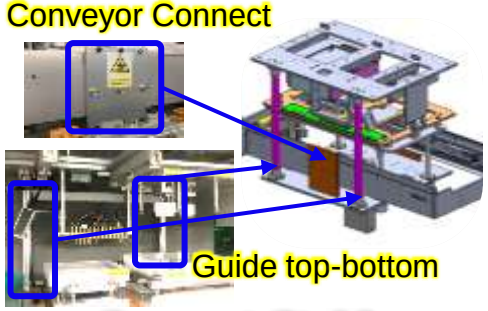
❑ Reason:
1. Connection is unstable
2. Signal is disturbed

❖ Problem analysis and Solution.

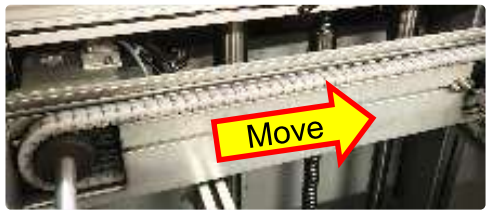
Reason	Analyze machine	Solution
1. Connection is unstable ⇨Pallet position is not accurate	Structure is not connected	Add connecting parts
2. Signal is disturbed ⇨ Affected by noise, vibration	Chain rub aluminum frame	Use plastic part and bearing



⇨Touching is NOT accurate

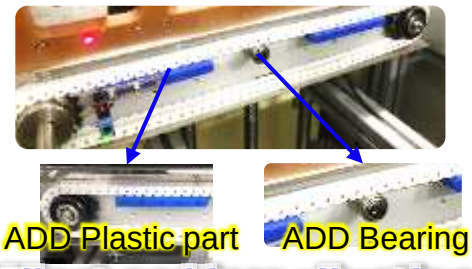


Connect Stably



Aluminum frame ⇨ High friction

⇨ Cause noise, vibration



Silent and less vibration

■ With new design, we improved accuracy and reduce noise and vibration

RESULT

Minimum pass rate achieve 94% (Function checker 02)

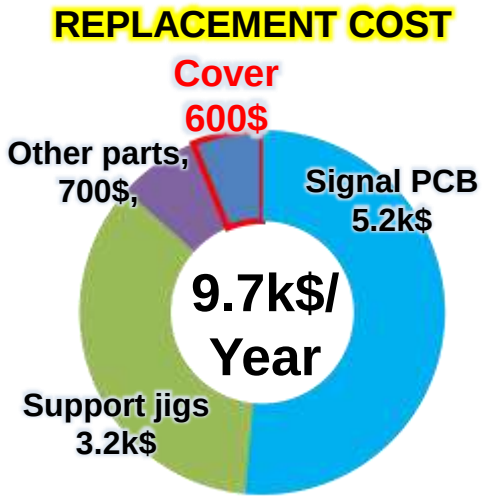
4. Detail improvement actions

❑**ISSUE 02:** High running cost due to replacing parts (9.7kUSD)

❑**ACTION 2.1:** Change material of door and cover

❑**TARGET:** Save cost (600USD/Year)

❖ Current situation:



❑ **Problems:**

Lost cost to replace cover

❑ **Reason:**

Acrylic cover are broken, need to replace.

❖ Analyze problem:

Most of transparent covers at PSNV are made by acrylic plastic

Advantages:

- Hard, nice appearance
- Easy to clean, process

Disadvantage:

- Broken by impact
- Poor anti-vibration

Door, cover are broken by impact and vibration

■ Effect to replacement cost (600USD/Year)

❖ Solution: Change material to ensure durability

Study feature

- Durability
- Nice, transparent
- Process easily

Options

- PEI plastic
- PVC plastic
- PET plastic

Choose PVC

- Easy order, process
- Softer, resist vibration
- Already used in SMT

■ Result: Prevent broken door and cover. Remove replacing cost.

RESULT

Replacement Part (Dec~Feb.2024): Zero

Saving Cost FC: △600USD/Year

4. Detail improvement actions

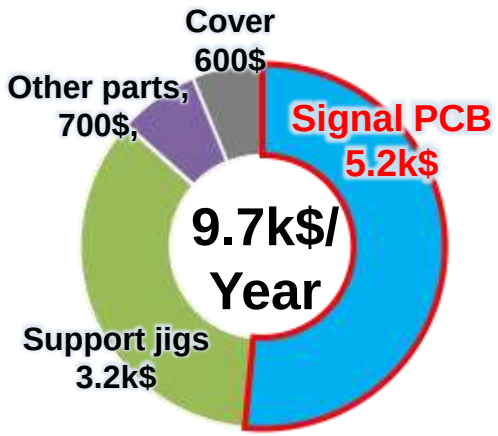
❑ISSUE 02: High running cost due to replacing parts (9.7kUSD)

❑ACTION 2.2: Change connector on signal PCB

❑TARGET: Save cost 3.0kUSD/year

❖ Current situation:

REPLACEMENT COST



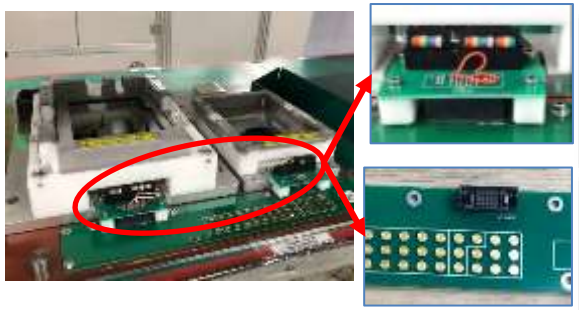
❑ Problems:

High cost to replace signal PCB on pallet

❑ Reason:

Connector on signal PCB is broken, need to replace

❖ Analyze problem: Pallet is connected jigs by hard connector



Advantages:
- Compact, save space
- Easy to make, order

Disadvantage:
- Loosen by vibration
- Difficult to plug/pull out

⇨ Connector is loosen and broken

■ Effect to cost for replacing connecting PCB (5.2k$/year)

❖ Solution: Cooperate with other teams to change connector type

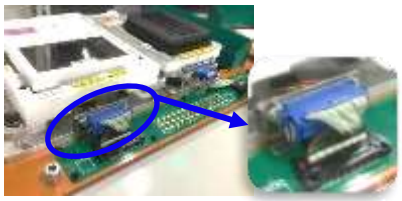
Study design
- Durable, good price
- Make, service easily

⇨

Other teams test
- Actual assembly.
- Stability of signal

⇨

Choose and follow
- Stability in vibration
- Durability in operation



Wire connector
- Durable, make easily
- Easy to operate
- Can repair connector

■ Reduce PCB replacement frequency (**4 times/year ⇨ 1time/Year**)

RESULT

Replacement Part (Dec~Feb.2024): Zero

Saving Cost FC: △3.0 k USD/Year

4. Detail improvement actions

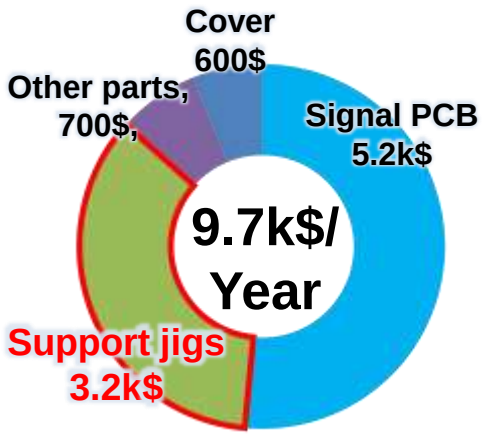
❑ISSUE 02: High running cost due to replacing parts (9.7kUSD)

❑ACTION 2.3: Change structure of support jig

❑TARGET: Save cost 1.2kUSD/Year

❖ Current situation:

REPLACEMENT COST



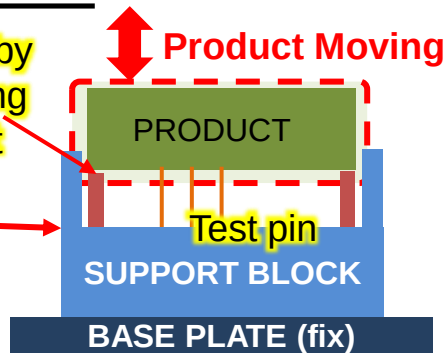
❑ Problems:

High cost to replace pin, cover on support jigs

❑ Reason:

Support jig structure is not good.

❖ Analyze problems: Product is move on jig to touch test pin.

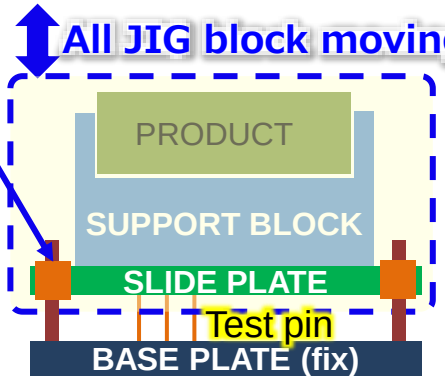


Have big gap on jigs
- ⇨ Touching is not exact
- ⇨ Pin is stuck, broken

Cover is rubbed
- ⇨ Friction is much
- ⇨ Cover sheet worn out

■ Effect: High cost to replace pin, cover, press head (3.2kUSD/year)

❖ Solution: Slide all block by shaft and bushing to touch test pin



Guide by shaft
- ⇨ Position is accurate
- ⇨ Prevent breaking pin

Fix product on block
- ⇨ Reduce gap, friction
- ⇨ Cover is more durable

■ Result: Increase durability of test pin and fabric cover

RESULT

Replacement Part (Dec~Feb.2024): 240USD (Test pin)

Saving Cost FC: △1.76kUSD/Year

5. Summarize action result

❑ ISSUE 01: Pass rate is low (83~91%)	TARGET	RESULT	JUDGE	NOTE
➢ ACTION 1: Change design of checking structure and conveyor.	Pass rate 95%	Minimum pass rate 94%	△	Continue improve VC check

❑ ISSUE 02: High running cost due to replacing parts (9.7k USD/Year)	TARGET	RESULT (Update until Feb.2024)	JUDGE	NOTE
➢ ACTION 2.1: Change material door and cover.	Save cost: △ 600$	Save cost: △ 600$	○	
➢ ACTION 2.2: Change connector on signal PCB.	Save cost: △ 3.0k$	Save cost: △ 3.0k$	○	Follow result in actual
➢ ACTION 2.3: Change structure of support jig.	Save cost: △ 1.2k$	Save cost: △ 1.76k$	○	
	Total: △ 4.8k$	Total △ 5.36k$		

⇨ These action result will be followed in actual production

Future plan

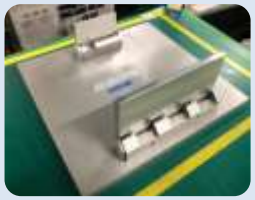
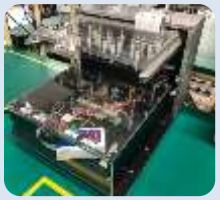
❑ Apply improvement point to reduce running cost of current automation line

MAIN ITEM	ACTION	Jan/24	Feb/24	Mar/24	Apr/24	May/24	Jun/24	TARGET
Change material of door and cover	Design							❑**Save cost:** 600$/line/year
	Order, Process							
	Assembly							
Change connector on signal PCB	Design							❑**Save cost:** 3.0k$/line/year
	Order, Process							
	Assembly							

❑ Develop standard forms for common equipment to save design time

❖ **Consider common equipment standards**

Problem: Common equipment don't fix size


☑ **Fix structure**
☒ **No fix size**

⇨ **Lost 15~30% time to re-draw similar parts**

Actions: Develop standard form to save design time

▪ Classify data (Mar~Apr/2024)	▪ Standardize form (Apr~Jun/2024)	▪ Apply, follow (May/2024)
• Analyze PCB size • Arrange size	• Soldering jig • Dividing jig • Checker	• Recognize problems • Finalize

⇨ **Target: Remove wasting time in design process**

THANK YOU FOR YOUR ATTENTION