



Virtual Archive

October 26 – 29, 2021
Virtual Event

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KISS (Keep It Simple & Save) in Burn-In Operation

Joe Tan, Founder & MD

MSV Systems & Services Pte Ltd

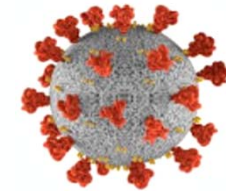


Virtual ▪ October 26-29, 2021



Introduction

1. Many Years of Hands-On Experience Maintaining
Burn-In Board / BLU / Chamber / FTC / Driver
2. The Root of All Evils in Burn-In Operations
Damaged & Poorly Maintained BIBs (Infected BIBs)
BIBs Should Be Regularly Maintained (Vaccinated)
老化板子是老化制程的万恶之源，需要经常维护
3. How to **KISS** in Burn-In Operations
如何运用 老化制程新技术，让你少走冤枉路



Contents

1. Typical Burn-In Operations 一般老化车间流程与问题

- 10 Long-Standing Problems & Current Automation Solution

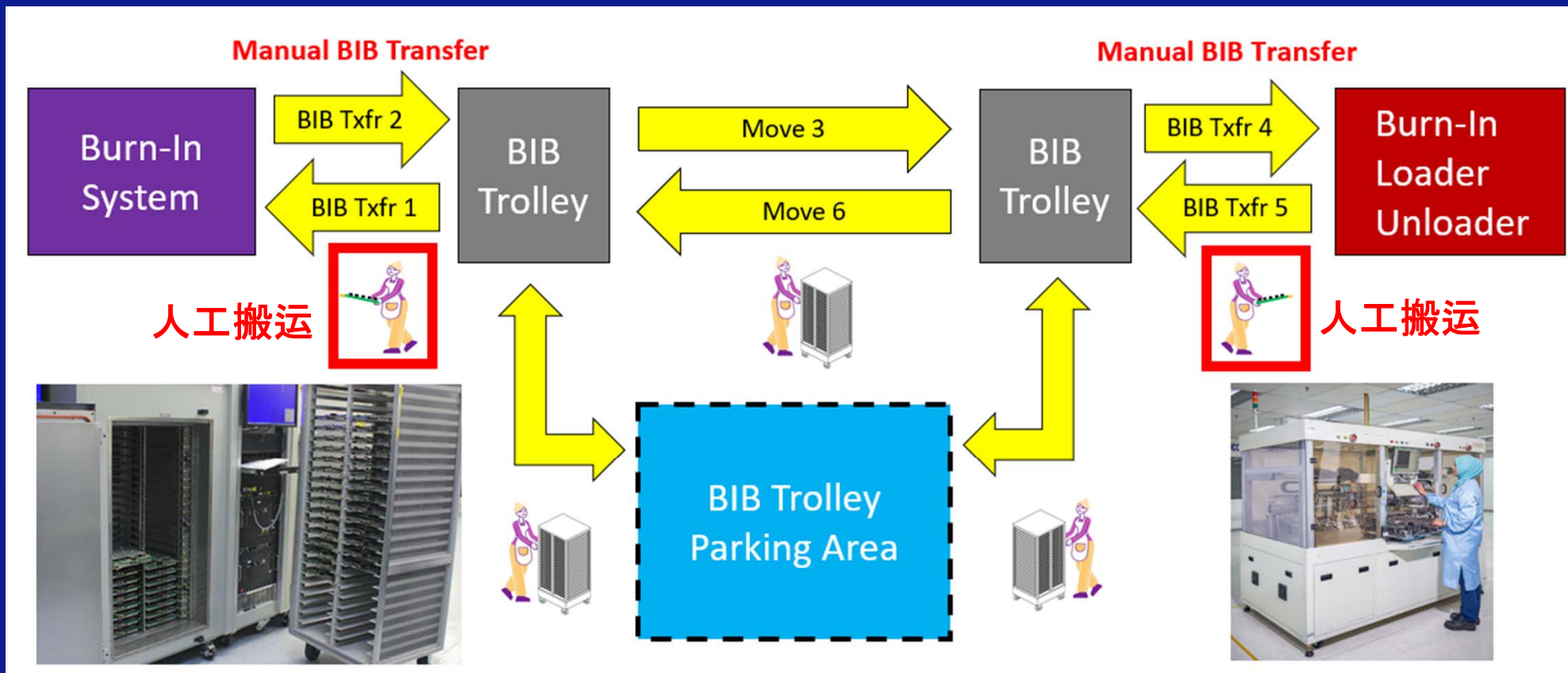
2. Our Journey To MudaX Solution 研发方案之旅

- Problems Solved!!!

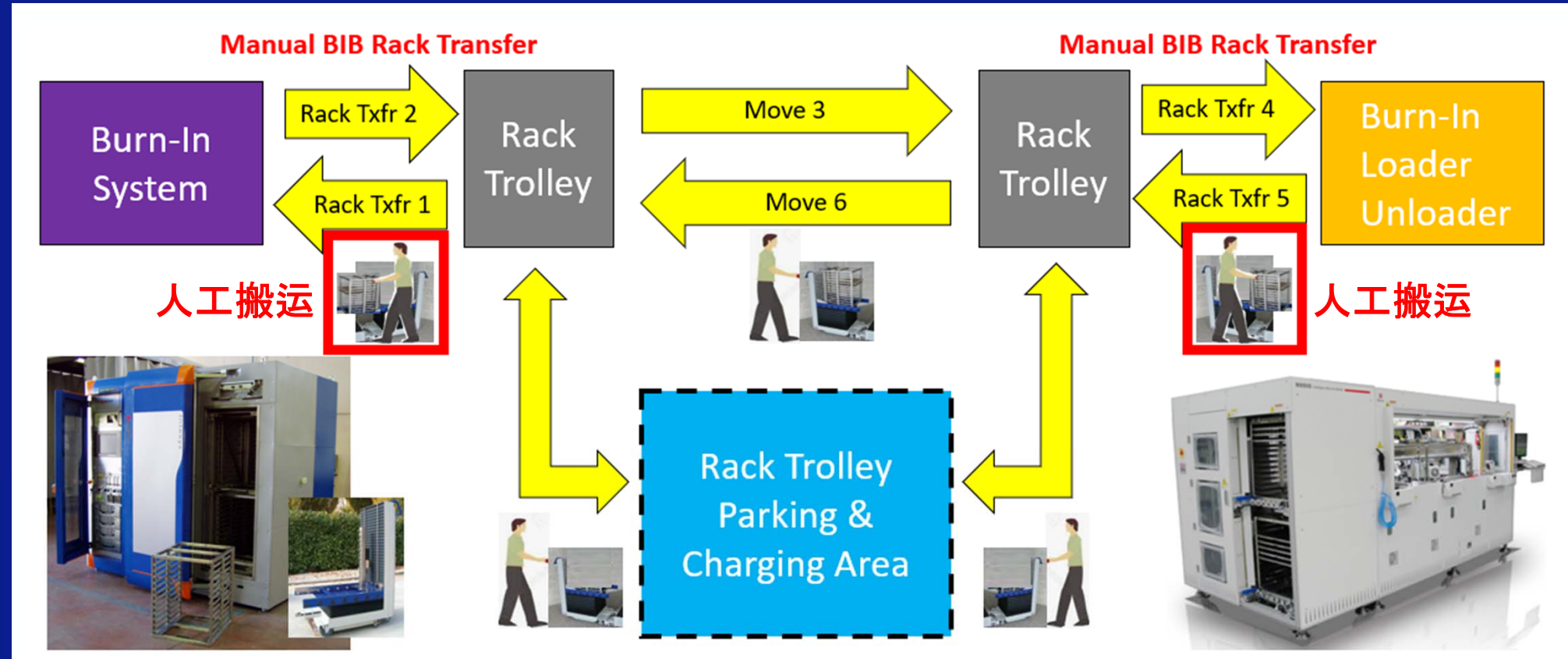
3. **Keep It Simple & Save** (A Lot of Trouble & Money)

- Conclusion & What's Next

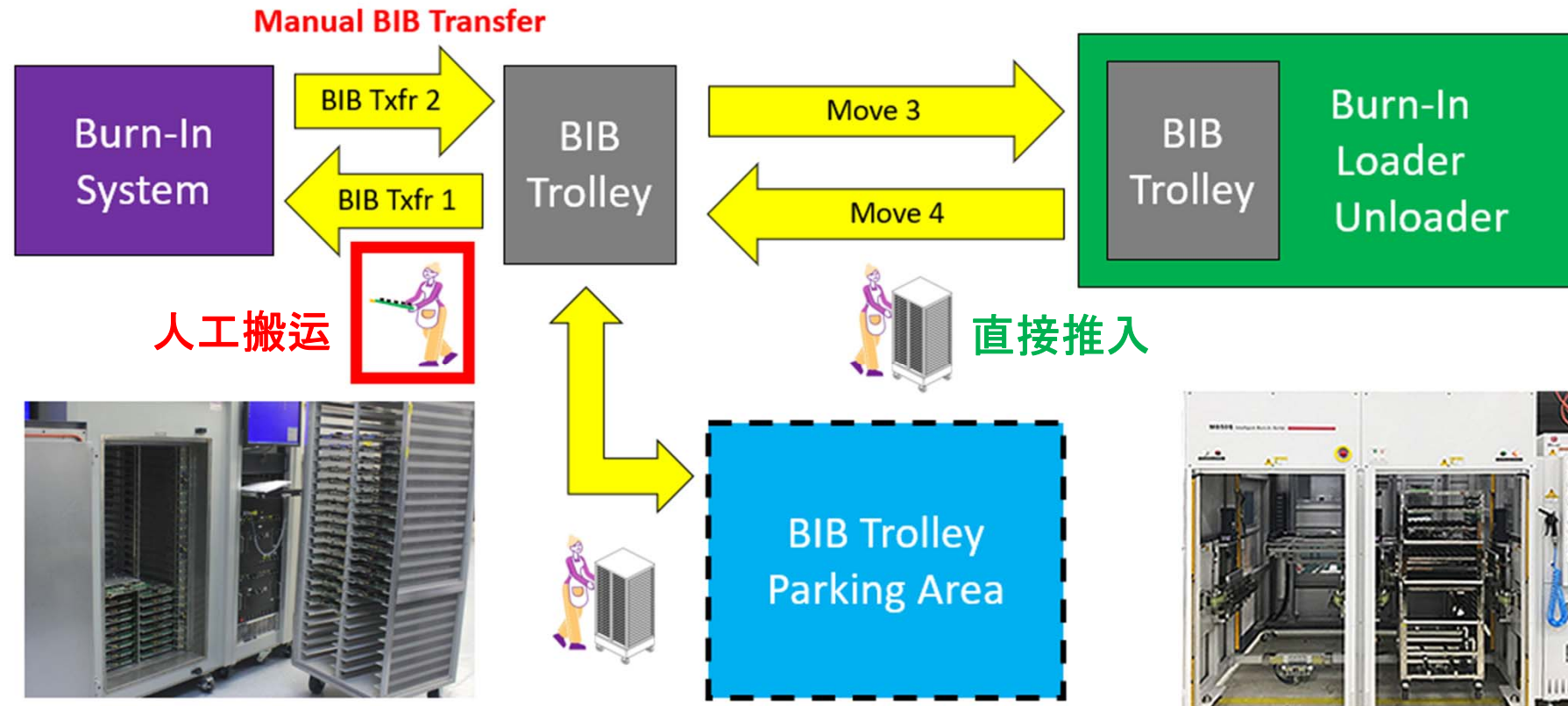
Burn-In Operations – Manual BIB Transfer



Burn-In Operations – Manual BIB Rack Transfer



Burn-In Operations – Partial Manual BIB Transfer



10 Long-Standing Problems

Manual Transfer

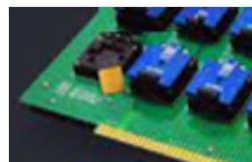


1. Operator Fatigue/Injury



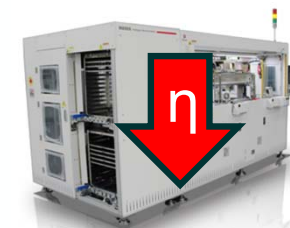
过劳

2. BIB, Socket Damage, FTC, Driver Damage



损坏

$\eta \downarrow$ **OEE** \downarrow
Cycle Time \uparrow



Expensive Recursive Algorithm

 **TestConX** 中国
China

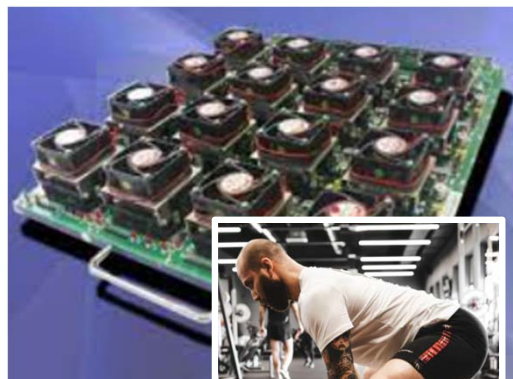
KISS (Keep It Simple & Save) in Burn-In Operation

2021

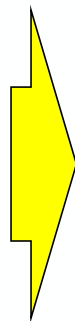
7

10 Long-Standing Problems

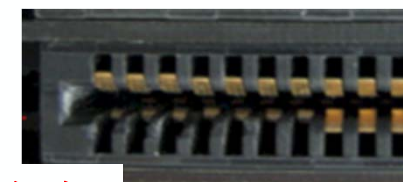
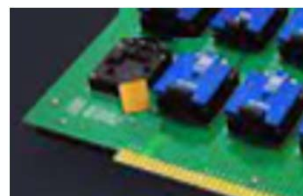
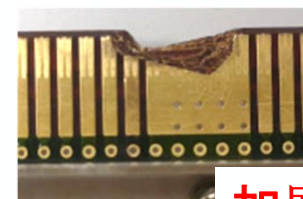
3. Increasingly Larger & Heavier BIB



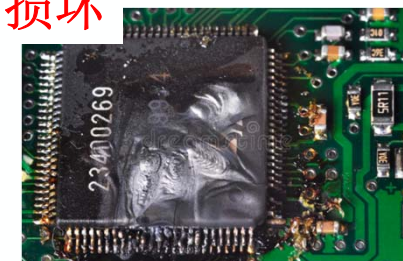
日益沉重
的板子



More Fatigue, More Damage, More Losses



加剧损坏



10 Long-Standing Problems

4. Non Value Added Movement

- Multiple BIB / Rack Transfer
- Parking Empty Trolley



无谓搬运



5. Time Wastage

- Parking Empty Trolley
- Locating BIB, Empty Trolley



浪费时间

6. Non Value Added Space

- Wide Walkway
- Trolley Parking Area



浪费空间



10 Long-Standing Problems

7. Limited BIS / BLU Integration



设备间断层



8. Complex Automation



\$\$\$

Safety
Flexibility



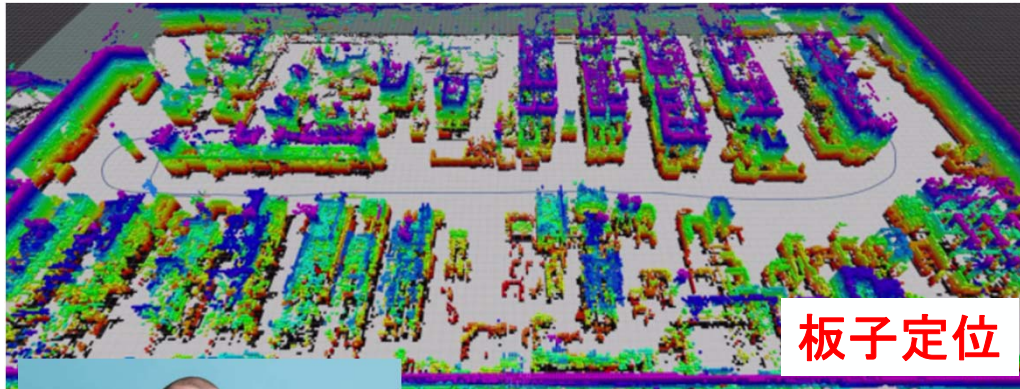
自动化考量



Further Aggravated by Production Floor Unevenness & Machine Relocations

10 Long-Standing Problems

9. Difficulty in BIB Tracking



BIB Inside Burn-In System

- Extreme Temperature
- Full Metallic Enclosure

GPS, RFID, BLE, WIFI, UWB



10. Managing BIB Inventory



板子管理



Current Automation Solution



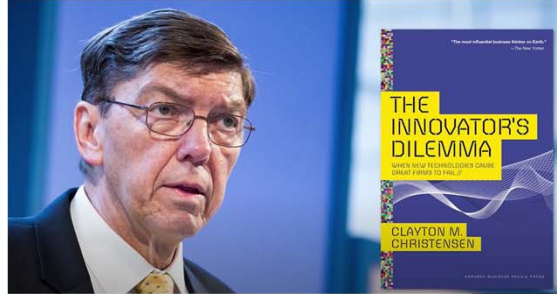
Advantage: 唯一优点

1. Implement on Existing Machine

Disadvantages: 许多缺点

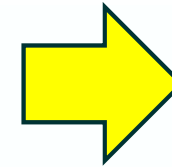
1. Mimic Operator (Operator Replacement)
2. Difficult to Automate (If It is Possible)
3. High Precision Requirement, Slow & Big Size
4. High Cost to Implement & Maintain
5. Safety Concern (Fenced Operation)
6. Low Flexibility (Floor Unevenness, Relocation)
7. Wide Walkway & Trolley Parking Space Remains
8. BIB Tracking & Management Problem Remains

Our Journey To MudaX Solution



**Disruptive/
Sustaining
Innovation**

Muda (Waste)
Lean Concept



MudaX

"involve no new technologies; rather they consist of components built around proven technologies that are put together in novel architectures, offering the consumer a set of attributes never before available."

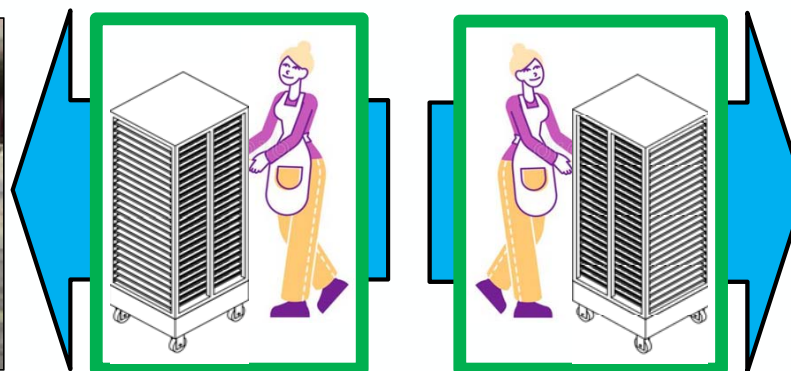
Our Journey To MudaX Solution

We Already Have
Direct Trolley BLU



推入式装卸机

Why Not Have Also
Direct Trolley Chamber?



推入式老化箱?

Challenges

Wheel Material
Trolley Design
Alignment Issue
Auto Door Open/Close
Auto BIB Insert/Extract
Chamber Sealing
The List Goes On...

Our Journey To MudaX Solution

MudaX Solution Development Focus

- Fully Aligned, Integrated, High Performance, Novel Architecture

研发目标：完全校直，整合，高性能的体系结构

Not In Focus – Proven Technologies

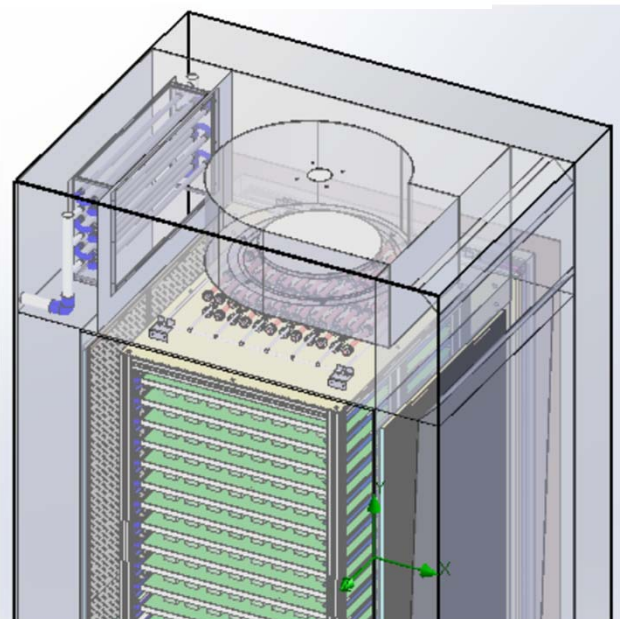
- Auto Door Opening & Closing
- Auto BIB Insertion & Extraction
- Chamber Sealing



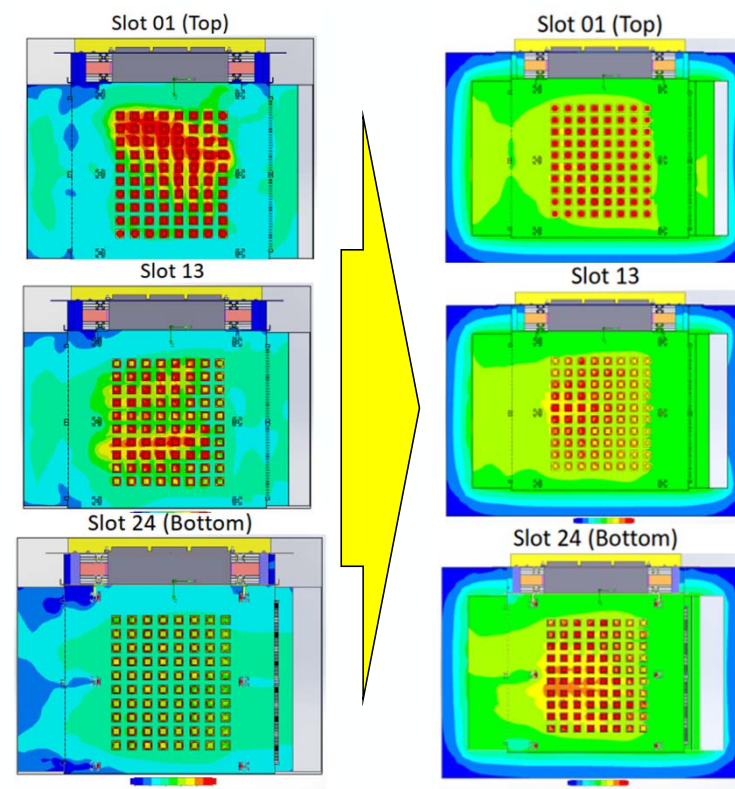
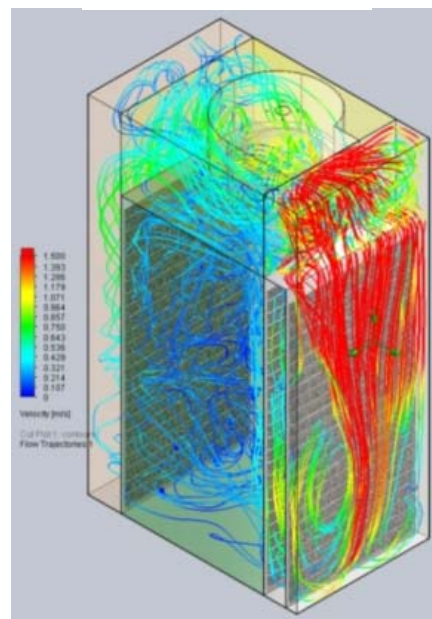
Our Journey To MudaX Solution

1) Mechanical Design & Simulation

概念机设计



概念机模拟



Our Journey To MudaX Solution

2) Prototype for POC 概念机

a) MudaX Frame ☒

b) MudaX Chamber ☒

3) Proof of Concept 概念验证

a) Alignment ☐

b) Integration ☐

c) Performance ☐



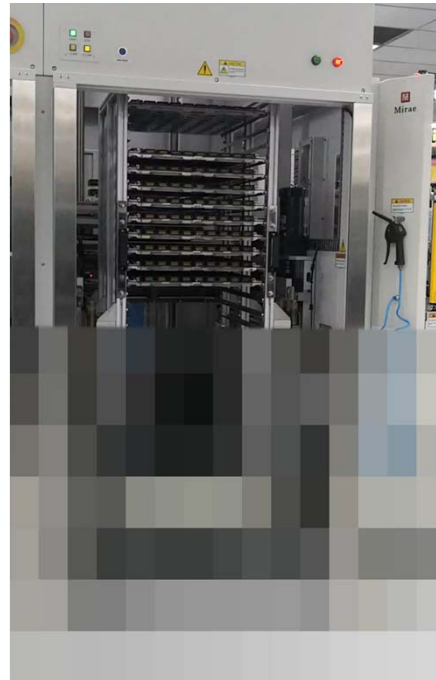
Our Journey To MudaX Solution

3a) Proof of Concept – Alignment

**MudaX Frame
BIB Alignment
Check in BLU**



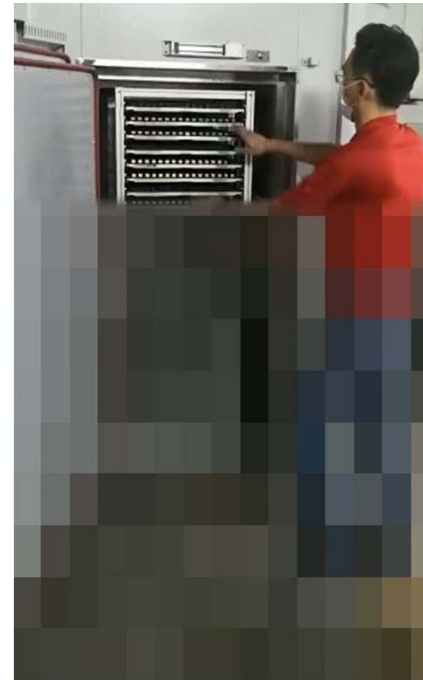
校直验证-装卸机



**MudaX Frame in
MudaX Chamber
BIB Alignment
Check in Oven**

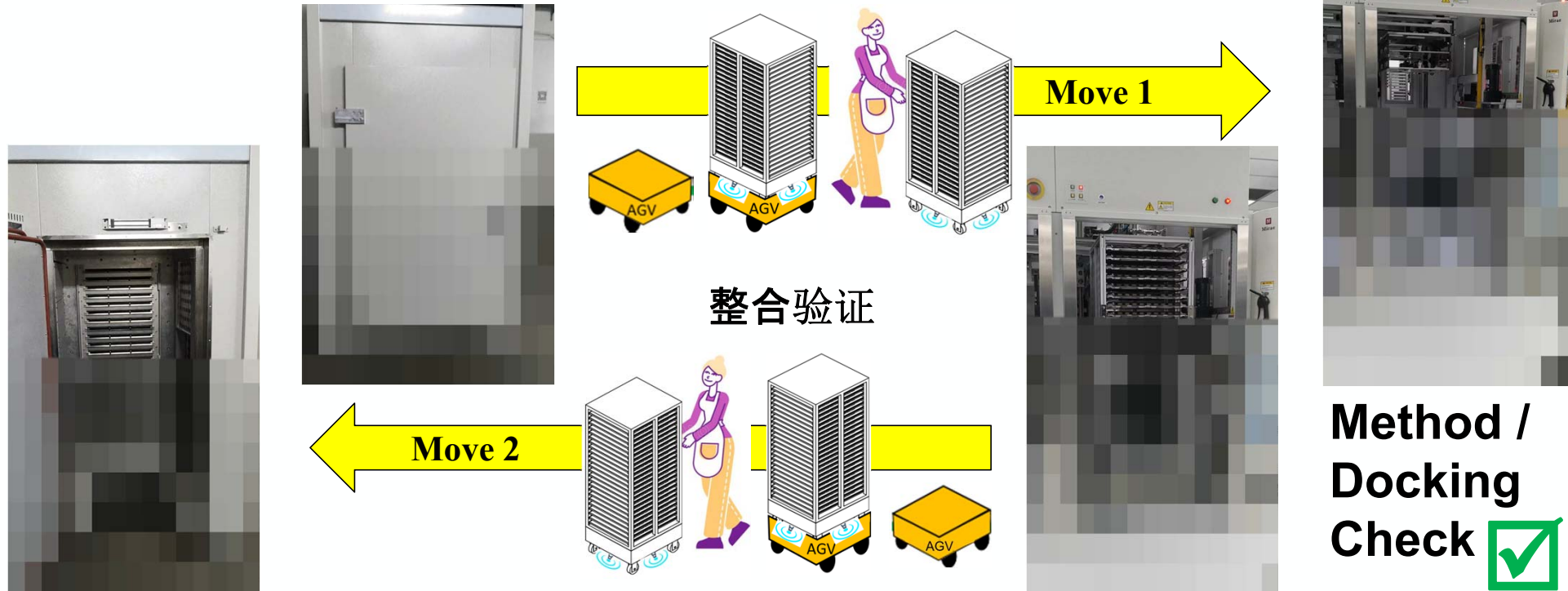


校直验证-装置插板



Our Journey To MudaX Solution

3b) Proof of Concept – Integration



Our Journey To MudaX Solution

3c) Proof of Concept – Performance

Temperature measurements – Perpendicular to Flow

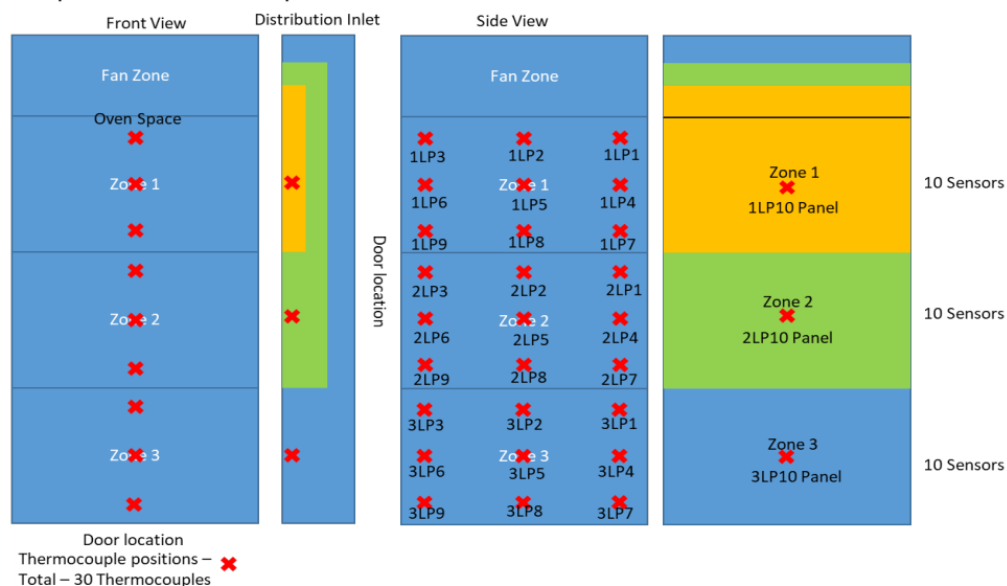


Figure 2 Measurements points located on the perpendicular flow plane

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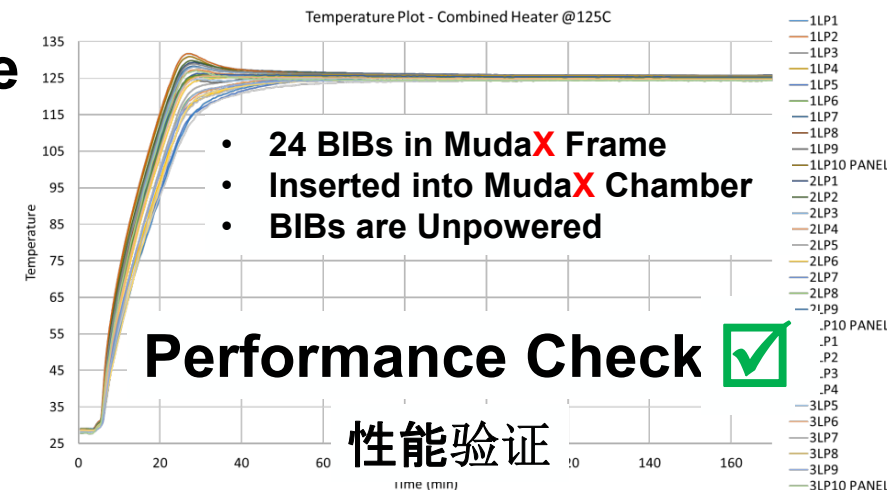
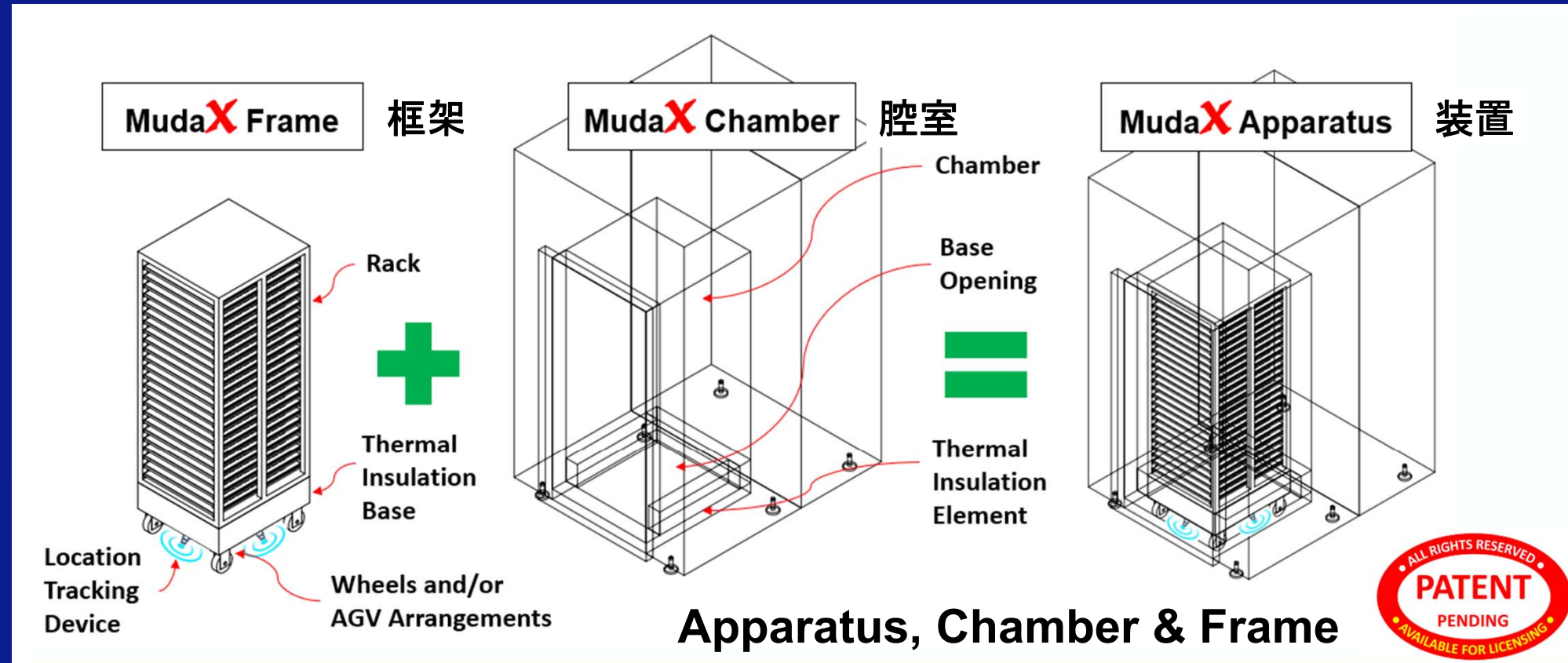


Figure 21 B) Temperature measurement in the perpendicular plane with a heater set point of 125°C

4.4.2 Case 2: Heater Set-point at 125°C

This section presents the temperature results of the oven when with a set-point of 125°C. Figure 21A presents the temperature results where flow is in parallel plane and Figure 21B is in perpendicular plane. From the results, the temperature profile of both planes are similar, in terms of the rise profile and towards the desired set point temperature of 125°C. Once reaching steady state, the observable error for the temperature measurements in the parallel flow, is between +0.5°C and - 1.0°C, which is within the desired tolerance level.

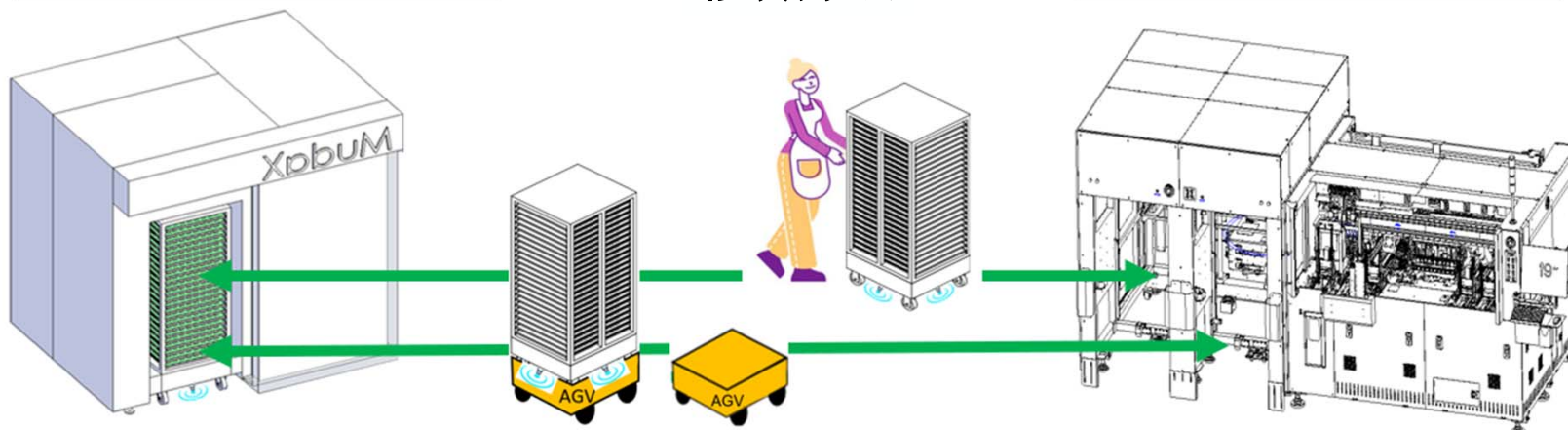
Our Journey To MudaX Solution



Apparatus, Chamber & Frame



Our Journey To MudaX Solution



Transfer Method

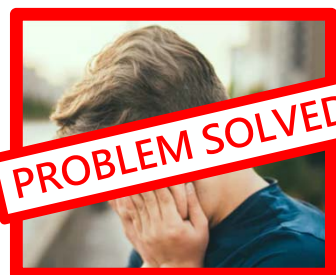


Problems Solved!!!

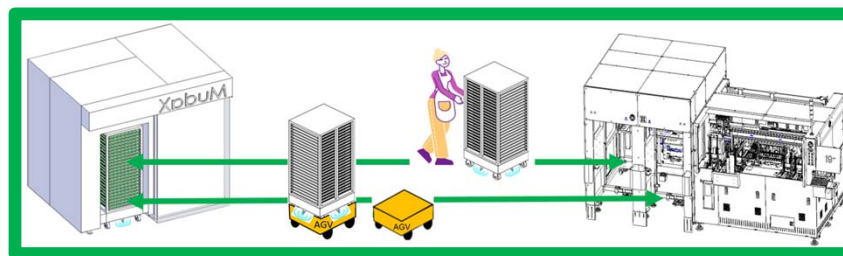
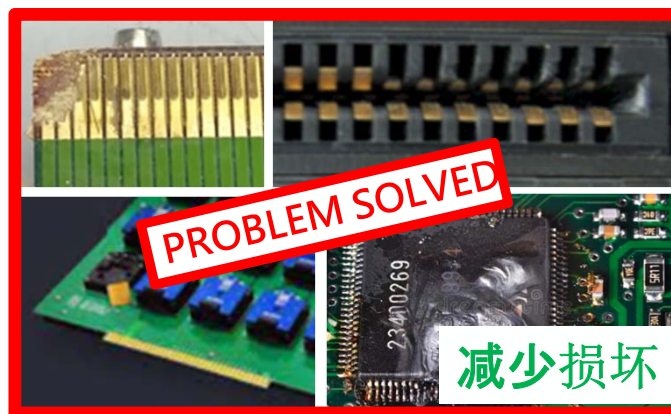
Manual Transfer



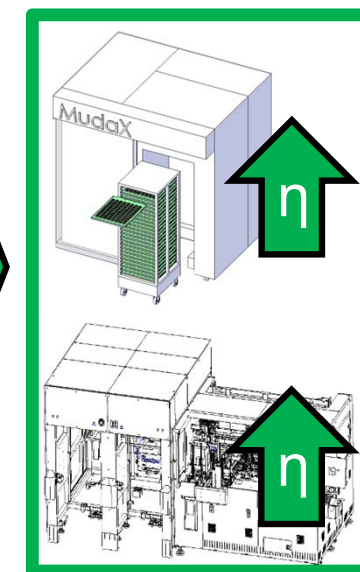
1. Operator Fatigue/Injury



2. BIB, Socket, FTC Driver Board Damage

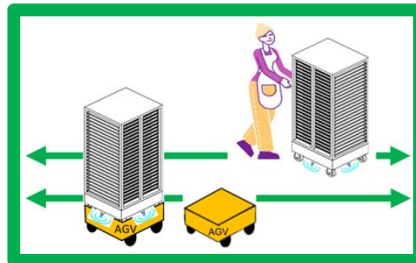
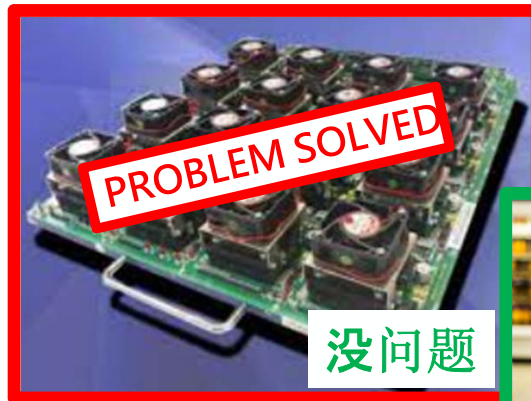


$\eta \uparrow$ $OEE \uparrow$
Cycle Time \downarrow



Problems Solved!!!

3. Increasingly Larger & Heavier BIB



New Possibilities!

新机遇！



Problems Solved!!!

4. Non Value Added Movement

- ~~Multiple BIB / Rack Transfer~~
- ~~Parking Empty Trolley~~



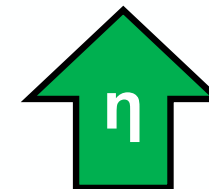
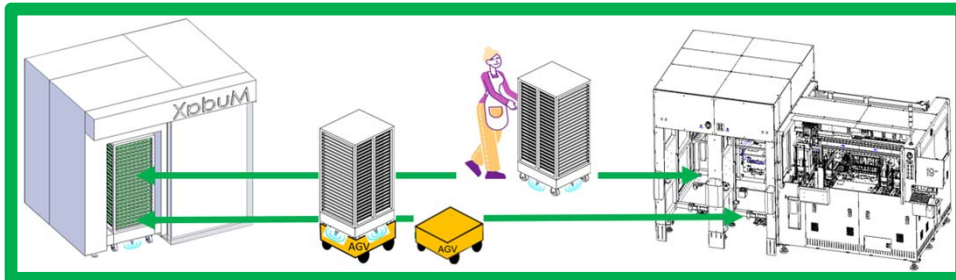
5. Time Wastage

- ~~Parking Empty Trolley~~
- ~~Locating BIB, Trolley~~



6. Non Value Added Space

- ~~Wide Walkway~~
- ~~Trolley Parking Area~~



Problems Solved!!!

7. Limited BIS / BLU Integration



PROBLEM SOLVED



无缝衔接

8. Complex Automation

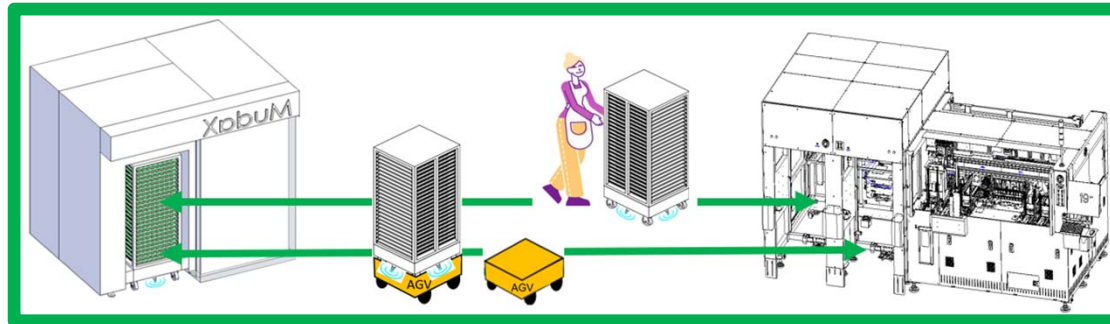


PROBLEM SOLVED



- ☑ \$\$\$
- ☑ Safety
- ☑ Flexibility

价廉物美

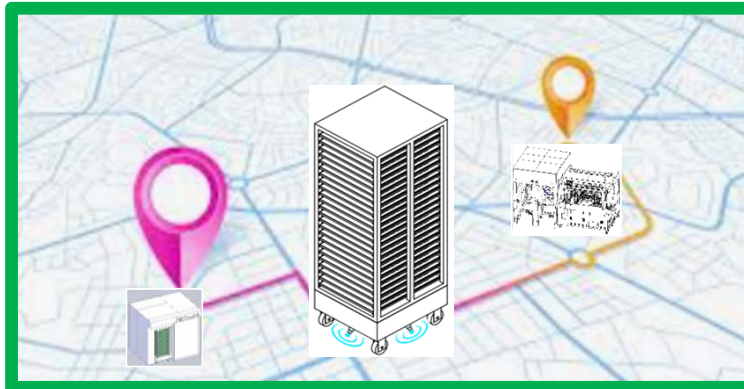


Not Affected By
Production Floor Unevenness
& Machine Relocations



Problems Solved!!!

9. Difficulty in BIB Tracking



BIB Inside Burn-In System

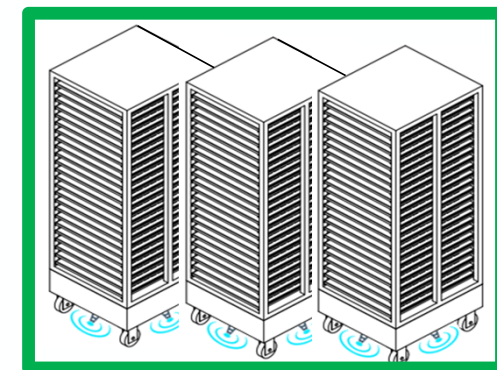
- Extreme Temperature
- Full Metallic Enclosure

Frame/BIB Tracker Outside

GPS, RFID, BLE, WIFI, UWB



10. Managing BIB Inventory



Problems Solved!!!

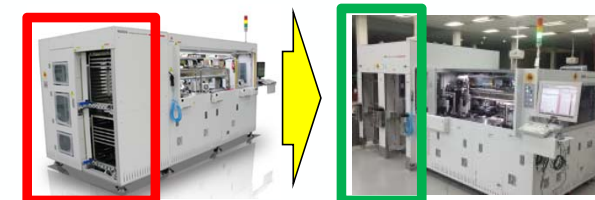
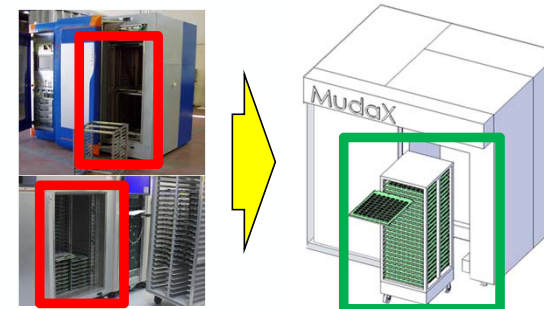
	Problems	Conventional System & Method	MudaX System & Method	MudaX Gain
1	Operator Fatigue/Injury	Yes	Reduced	$\eta \uparrow$ Flexibility \uparrow OEE \uparrow Safety \uparrow Cycle Time \downarrow Cost \downarrow Space \downarrow <input checked="" type="checkbox"/> Simplified Burn-In Area Management
2	Time Wastage	Significant	Little	
3	BIB/Skt/FTC Damage	Yes	Reduced	
4	Size & Weight of BIB	Significant Effect on A, B, C	Little Effect	
5	Non Value Add Movement	Significant	Insignificant	
6	Non Value Add Space	Significant	Insignificant	
7	Limited BIC / BLU Integration	No, or Limited	Full Integration	
8	Complex Automation	Difficult & Extremely Costly	Easy & Less Costly	
9	Difficulty in BIB Tracking	Very Difficult	Easy	
10	Managing BIB Inventory	Very Difficult	Easy	

Keep It Simple & Save (A Lot of Trouble & Money)

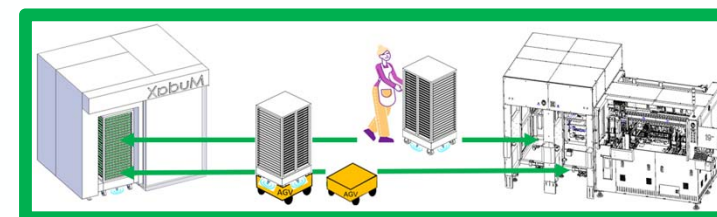
1. Maintain Existing Burn-In Operations
2. Plan for Next Capacity Expansion / NPI
 - a. Marginal Budget Increase
 - BIS: Upgrade with MudaX Chamber
Driver Remains the Same
 - BLU: Upgrade with Frame Handling Unit
BLU Main Body Remains the Same
 - b. Minimal Requalification Needed

如常营运

增产/新线
稍加投资



Simple, Cost Saving & High Performance
Burn-In Operation Realized!
实现 简单，省钱，高效 老化制程



Keep It Simple & Save (A Lot of Trouble & Money)

3. Plan for Next Modernization / Upgrade

a. Minor Budget Allocation

- BIS: Upgrade to MudaX Chamber

Driver Remains the Same

- BLU: Upgrade to Frame Handling Unit

BLU Main Body Remains the Same

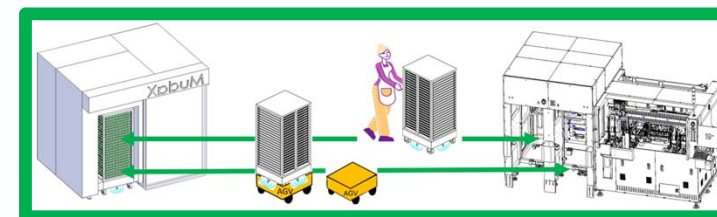
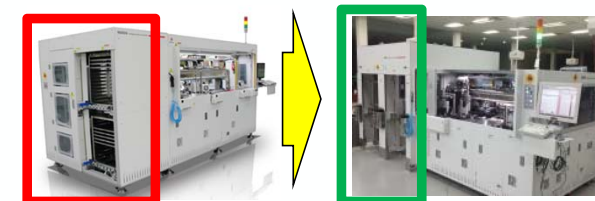
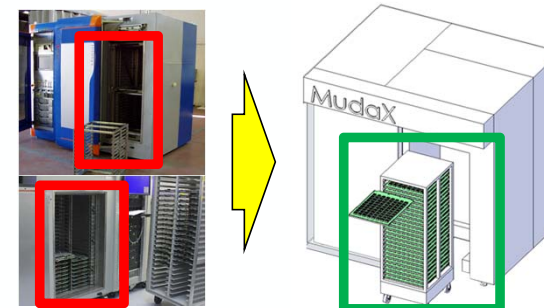
b. Minimal Requalification Needed

Important:

- Especially for Existing Line, Also for New Lines
- Isolate/Remove Infectious BIB in B/I Operations
- Ensure BIBs are Well Maintained (Vaccinated)

孤立坏板，阻断传染

现代化/升级
稍微投资

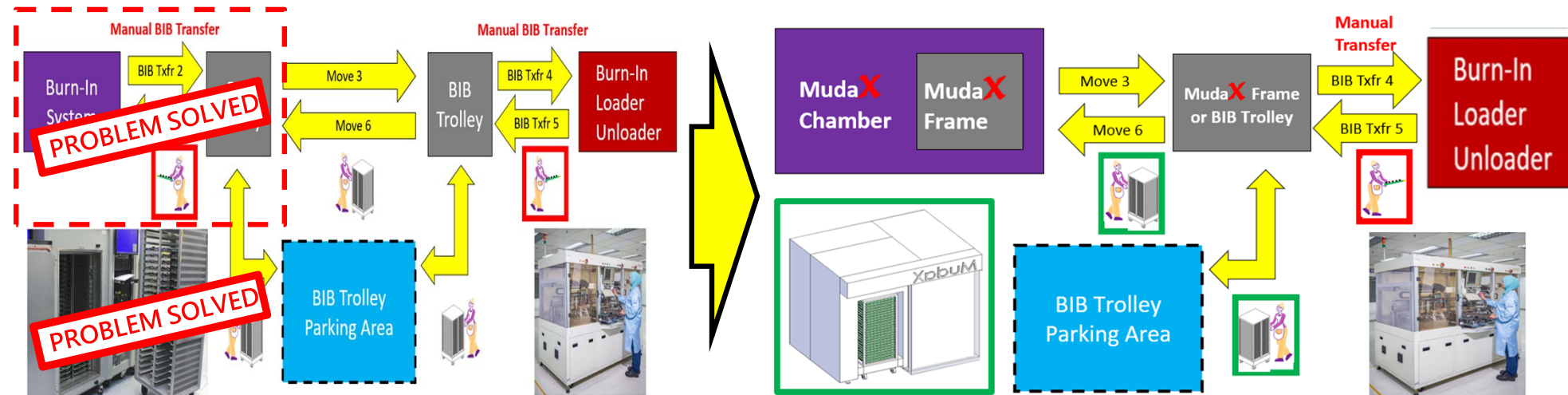


Keep It Simple & Save (A Lot of Trouble & Money)

Progressive Transition for Existing Burn-In Operations to **KISS**

- Empty MudaX Frame in MudaX Chamber = Existing Chamber
- Same Operations as Existing Process & Ready to **KISS**

过渡过程, 立马节省

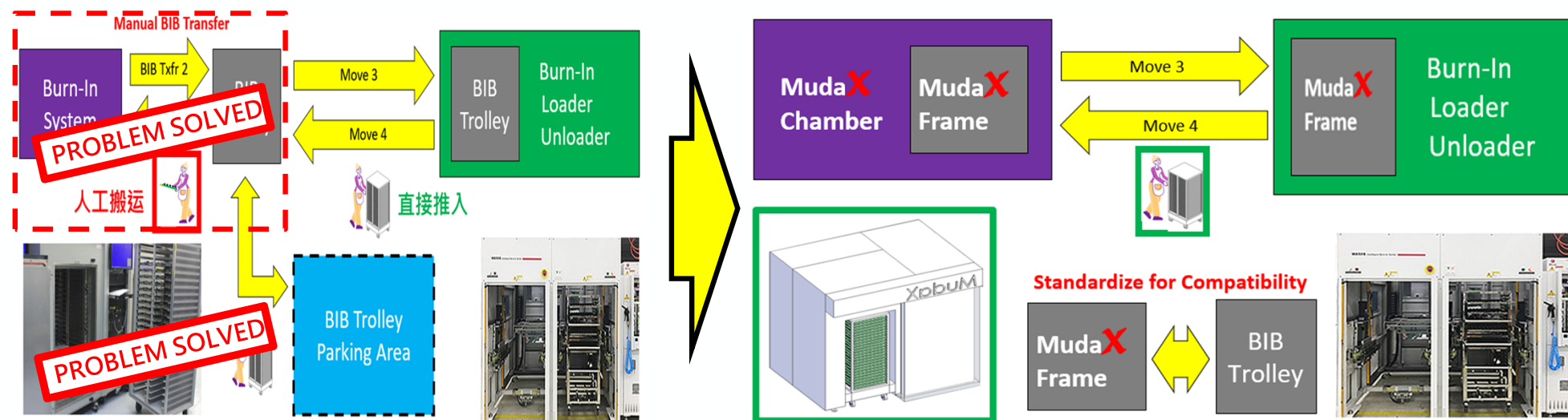


Keep It Simple & Save (A Lot of Trouble & Money)

Progressive Transition for Existing Burn-In Operations to **KISS**

- Standardize Existing BIB Trolley with MudaX Frame/Chamber, or vice versa
- Ready to **KISS**

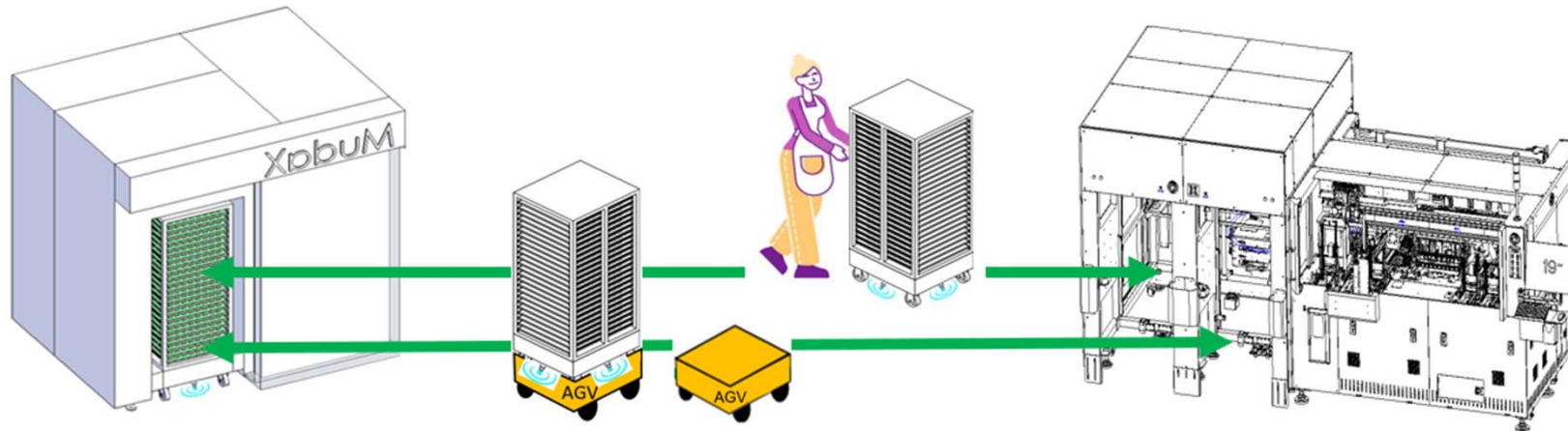
过渡过程, 立马节省



Conclusion: Let's KISS!

Let's **Kee**P** **It** **Simple & **Save** A Lot of Trouble & Money in Burn-In Operation****

老化制程新技术，让你少走冤枉路



Remarks:

- MSV Do Not Build Chamber, BLU or AGV, Please Contact Your Suppliers to Contact Us
- We Only License Our Patent / Know-How & Use Our Skills to Solve Customer's Problems ☺

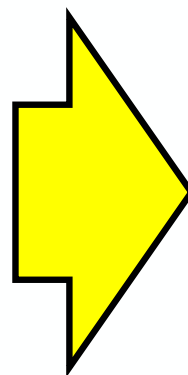
What's Next for Us?

MISSION 1 COMPLETE!

**Simple, Cost Saving
& High Performance
Burn-In Operation**

奠定基础，持续维护

- MudaX chamber/method will lay the groundwork
- Focus on BIB condition to sustained high performance



MISSION 2 START!

**Minimize / Eliminate
BIB Pre-Test / Pre-Check
in Burn-In Operation**

下一步，无需预测

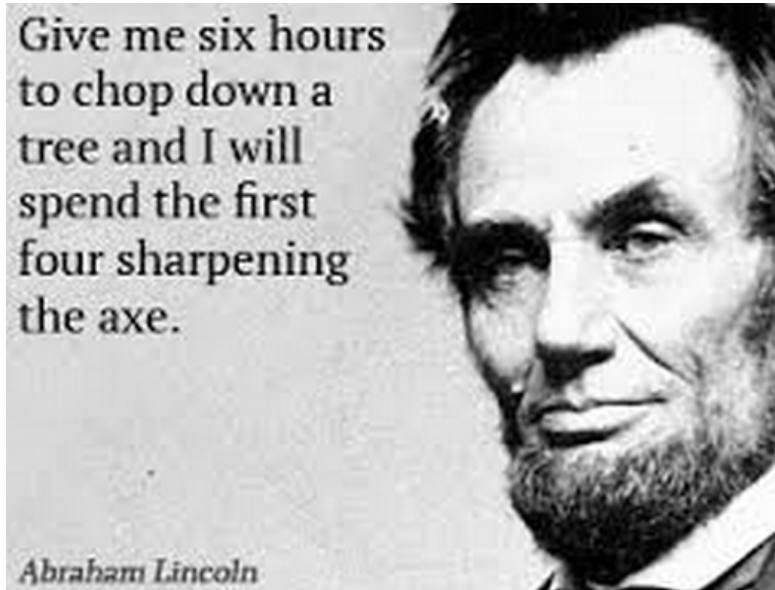
- Current BLU placement accuracy: 99.95% through analytics & continuous improvement
- Building on MudaX, to minimize / eliminate BIB pre-test through data analytics & correlation

What's Next for You?

Start Discussing & Plan How You Can Also

千里之行，始于足下

Kee**P** **I**t **S**imple & **S**ave A Lot of Trouble & Money in Burn-In Operation ☺



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