



ProMOS SMART MANUFACTURING

Automation / Digitization /
Informatization / Visualization

ProMOS
Technologi
cal

茂德
科技

ProMOS Technologies INC.

SMART MANUFACTURING FOR SMART FAB

➤ VER. : V02

2022





PART ONE

ProMOS Smart Manufacturing Solution

- Power Fab



01

Production Process Problems



1

Unable to take timely actions when random abnormal events occur?



2

Production capacities idled due to inefficient logistics waiting time among personnel, machine, material and flow?



3

Having difficulties to find WIP and material?

Above issues are commonly seen in 8-inch fabs where the human-machine collaboration model of automations are taken in practice. It leads to **an average loss of 16.6% of productivity**, including losses of production capacities, manpower and other resources.

01

Smart Factory – 200mm Fab



ProMOS Smart Manufacturing

Industry 4.0 + Industrial IOT

The Revolution of Automated Manufacturing for 8" Fabs

By integrating the computer-integrated manufacturing (CIM) with IIOT wireless sensor technologies, ProMOS 's "Power Fab" solution is an industrial revolution onto automated manufacturing.

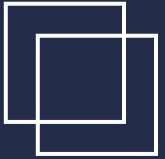
➤ Optimizing Manufacturing Procedures & Accelerating Clearance of Malfunctions

- Yield rate enhancement
- Productivity enhancement
- Cost reduction

➤ Low-Cost Smart Warehouse & Material Management Systems

- Improving production efficiency
- Maximizing the turnover ratio of materials

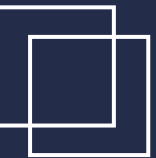
Automation ≠ Smart Manufacturing



Smart manufacturing refers to the process that employs automation, visualization, digitization, informatization and various other to improve manufacturing efficiencies.

- Integrating the distributed open systems of semiconductor fab operations
- Utilizing self-deployed IoT devices and technologies to strengthen automated applications thereby further building the connection between machines and personnel.
- Synchronizing all elements of production, i.e. Man/Woman, Machine, Material, Method and Environment (4M1E), to enhance the productivity, as well as to reduce the possible wastes of production capacities.

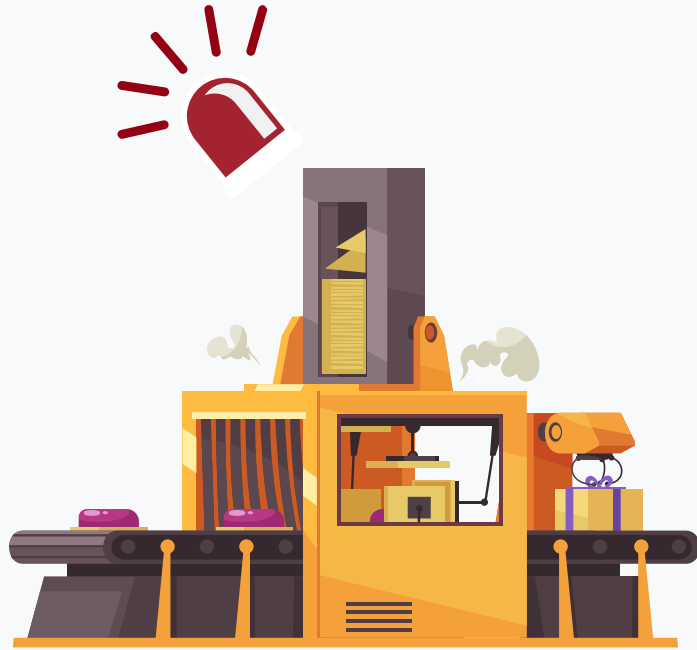
IoT IIoT IoP



01

Power Fab Solution-Case I (Machine Crashes)

Power Fab Solution



When machine or equipment crashed

Sending notification



Bridge

Sending notification message to the watch

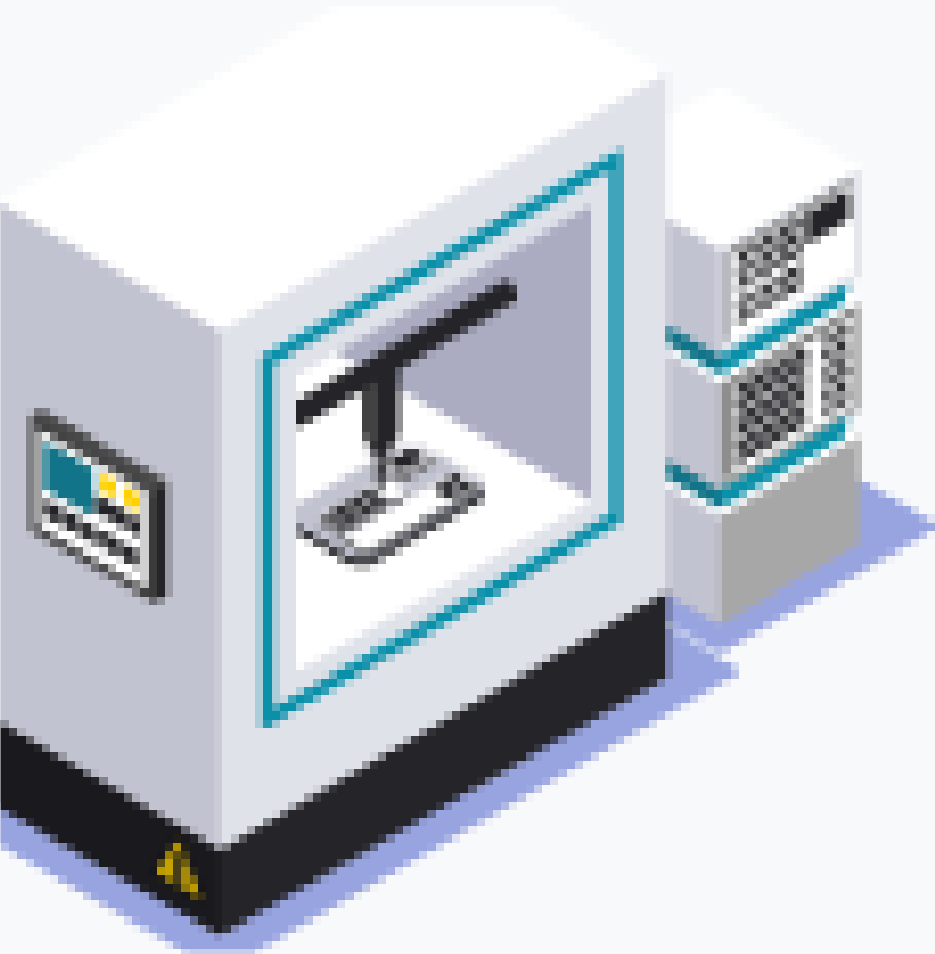


Press button (notification confirmed) Equipment engineer & operator in charge

01

Power Fab

Power Fab-Case II (Scene 1: Reticle Changing While Staff Are Not Available)



Please change
the reticle

!!

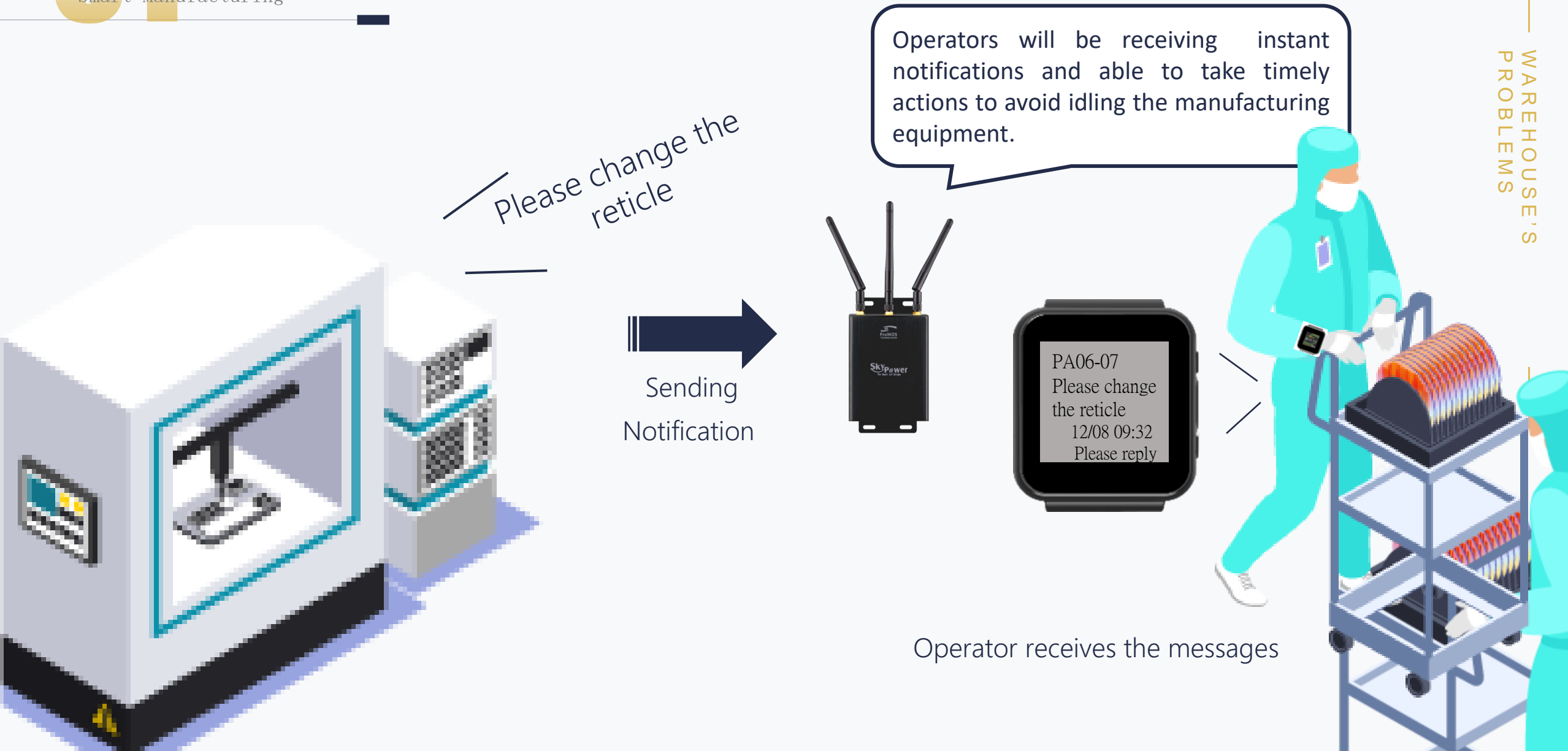


Operators may not be always on-site to timely take required actions thereby causing the production lines idled and leading to millions of dollars losses.

Common problems that factories are facing nowadays.

Power Fab-Case II (Scene 2 :Reticle Changing with Notification Sent From ProGuard F1)

Smart Manufacturing

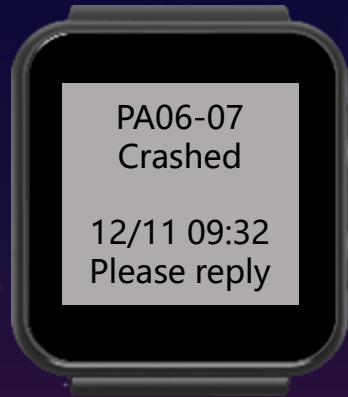


01

ProGuard F1 Watch Function Page

「ProGuard F1」

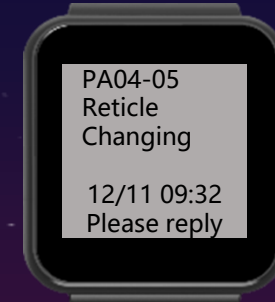
The system will deliver instant messages to the ProGuard F1 watch via Skypower Bridge. The following are the sample images of the screen displayed under different scenario.



For Equipment Engineer



For Process Engineer



Changing Notification

For Operator



Arrival Notification

ProGuard Watch' s function page offers other different display formats, e.g., equipments binding, equipments checklist, personnel tracing and tracking, reserved pages, tracking in OK, etc.

01

Instant Messaging Notifications

Common Hold Lot Reminders

The hold lot messages will be sent to the watches of the engineers of the defined steps when the Lots are held in MES awaiting further confirmation due to various reasons, such as O.O.S. of the measurement steps or machines crashes.

Future Hold Lot Arrival Notifications

If a future hold lot is set in MES, the system will instantly send the lot arrival messages to the watches of the engineers on duty when the lot arrives the future steps.

Urgent Materials & Parts Arrival Notifications

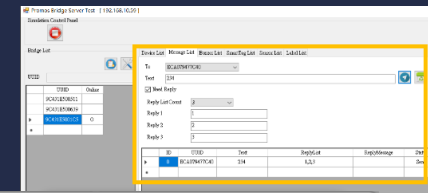
If the request of an arrival notification has been set, the system will simultaneously send Materials/Parts arrival notification to the watches of the engineers on duty when the logistics administrators have confirmed the receipt of the Materials/Parts.

Super Hot Lot Arrival Notification

Users will be able to set arrival reminders for various of the defined Super hot lots in accordance with operating rules and habits within the factories.

Message List 指定手環進行執行發送

- 可使用特定訊息傳送, 也可使用預先設定好的 Reply1、Reply2、Reply3進行發送



01

Alarm Instant Messaging Notifications

Equipment Crashes Warning Notification

The system will send warning messages to the watches of the engineers on duty whenever the equipments crashes. The system will not stop sending warning messages until receiving a confirming reply to said warning message.

Warning Notification for Abnormal Events

Abnormal notification defined by various sources, such as:

- EAP string function & alarm log
- APC abnormal event check BLE-Sensor fault detection
- Each Fab CIM systems (EDA/SPC/MES, etc.)

Message Confirming Reply by Engineers in charge

The Power Fab system offers bi-directional communication functions. Users may define which types of warnings and notifications requiring the message recipients' confirming replies. The Skypower will notify the source systems of said warnings and notifications once receiving the requested confirming replies from the message recipients.



01

Power Fab Yield Enhancement Solution

Vibration Sensor

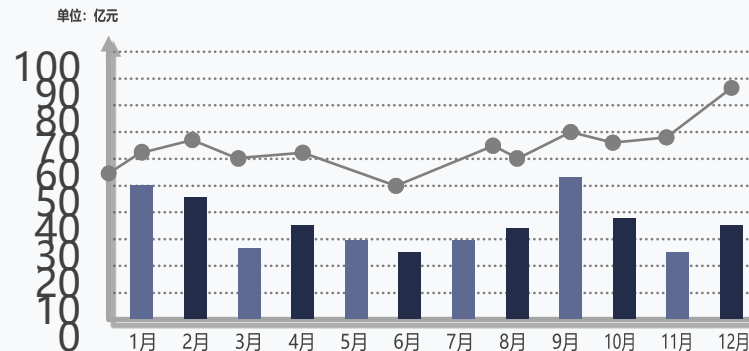
Hygro-thermos Sensor

Pressure Sensor

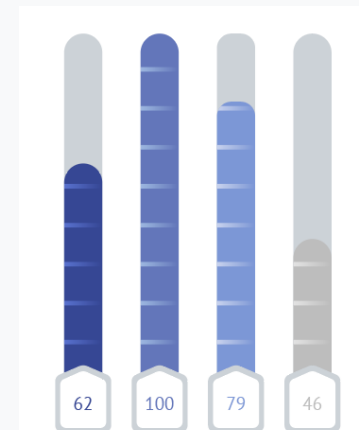
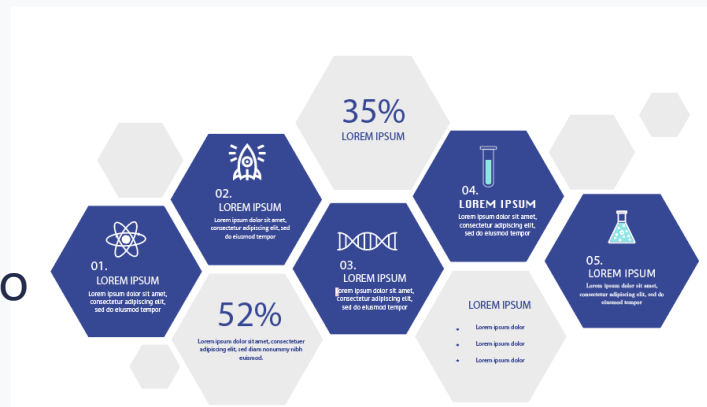
Flow Sensor

Customized Sensor

Bluetooth protocols transmitted through Bluetooth base station



Can be converted to professional charts & tables



*Customized

*Extremely low signal interferences, No interference to manufacturing processes



Alternative Solutions for Automated Warehousing

PART

E-Rack Solution

TWO



Wafer Carrier

Two different types of Wafer carriers in worldwide 8" Fabs

- I. Open cassette (+ Box)
- II. SMIF POD



ProMOS Offers Products Solutions for Two Types of Wafer Carriers.

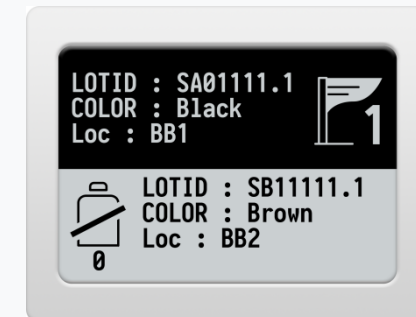
Smart Tag (For SMIF POD)

1. ProMOS' s self-designed and developed technologies.
2. Supporting full Asyst smart tag protocols, the one and only worldwide that offers customized and adjustable specifications.
3. The Products have been sold to many big named fabs across Taiwan/Europe/USA/Singapore.



Low Power Consumption Smart Level Tag (For open cassette solutions)

1. ProMOS self-designed and developed technologies.
2. Compatible with Barcode and Bluetooth transmission.
3. Offering functions for a wide-area and accurate positioning.
4. Being able to connect with the manufacturing systems and offering customized screen displays.



Smart Tag

The product is specifically designed for the uses of SMIF POD

- Providing electronic identifications for each of the designated Wafer Lot and is capable of communicating with machines and warehouses to enhance the automatic production productivity.
- Well suited for most of globally SMIF PODs widely used 8-inch wafer fabs.
- Supporting Tag Protocol & SECS Protocol.

Compatible
Stable
Extensible



SMART TAG (SKY-T7)



SMART TAG (SKY-T5)

Short of shelving spaces for wafers or reticles, but costs of space expansion are too high and might occupy too much clean room space

ProMOS provides the following low-cost product solutions to effectively optimize the utilization of limited storage spaces and to accurate positioning for all target objects.

1. Electronic Shelving Systems(E-Rack) for SMIF POD & Cassette Box
2. Electronic Shelving Systems for Reticles(Mask-Rack)
3. Electronic Nitrogen Cabinets
4. Smart Cabinets
5. Various Kinds of Customized Electronic Shelves and Bridging Systems that can connect with Automatic Robot Systems, such as AMR/AGV
6. Components for Electronic Scanning. ProMOS' s NFC/BLE readers will be able to broaden the expandability for value-added applications.



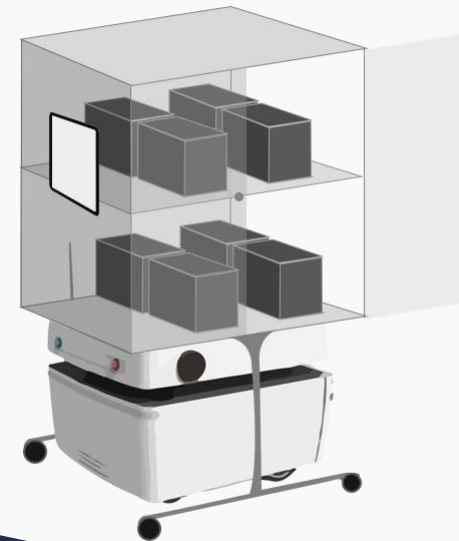


Customizable Electronic Rack

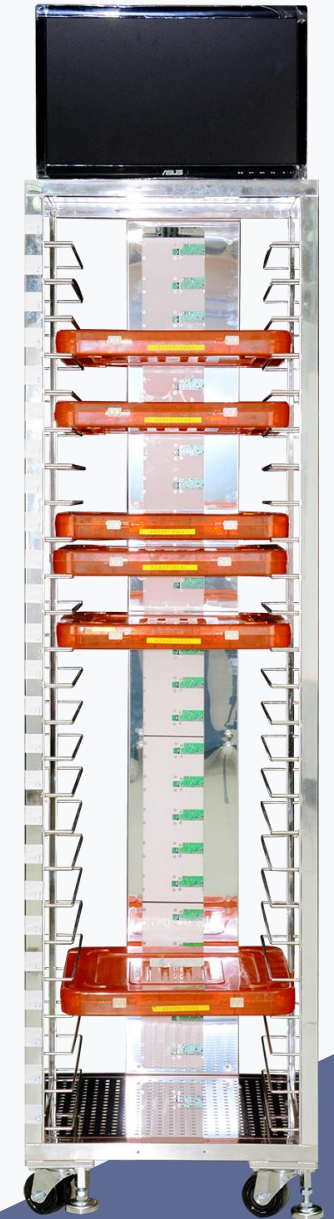
E-Rack Solution



6-inch/8-inch/12-inch Wafer Management



AMR Cascading Management



Mask Boxes Management

WAREHOUSE'S
PROBLEMS

ProMOS Introduction

PART THREE





“

- The first mass production 12-inch semiconductor wafer manufacturing factory in Taiwan.
- In addition to being well known for its DRAM technology, ProMOS has further expanded its business spectrum to the IoT and industry 4.0 related fields and has continued growing in these areas.
- ProMOS has also dedicated itself in researching and developing technologies in the AIoT fields, including but not limited to software, hardware and firmware that could be highly compatible and configurable with various kinds of applications in sport science, smart factory, smart surveillance,...etc.
- ProMOS was founded in December 1996, and had since managed 5 FABs (two 8" and three 12" FABs). ProMOS owns highly-advanced automatic operation experiences in fab management and knowledge.

Low-cost

Smart
Warehouse





Summary

- Fabs manufacturing technologies in a FAB are ever-changing; however it still remains in the stage of realization of automated operations.
- Imaging the picture of future FABs, the priority tasks will be integrating technologies of IoT, AI, visual AR/VR and Fab manufacturing , cascading personnel, equipments, materials, process flows, environments and automation altogether, and realizing various kinds of applications for AI computing and visual technologies.
- ProMOS is the first company who starts cultivating in these integration applications.





THANKS