半導體生產自動化與智慧工廠

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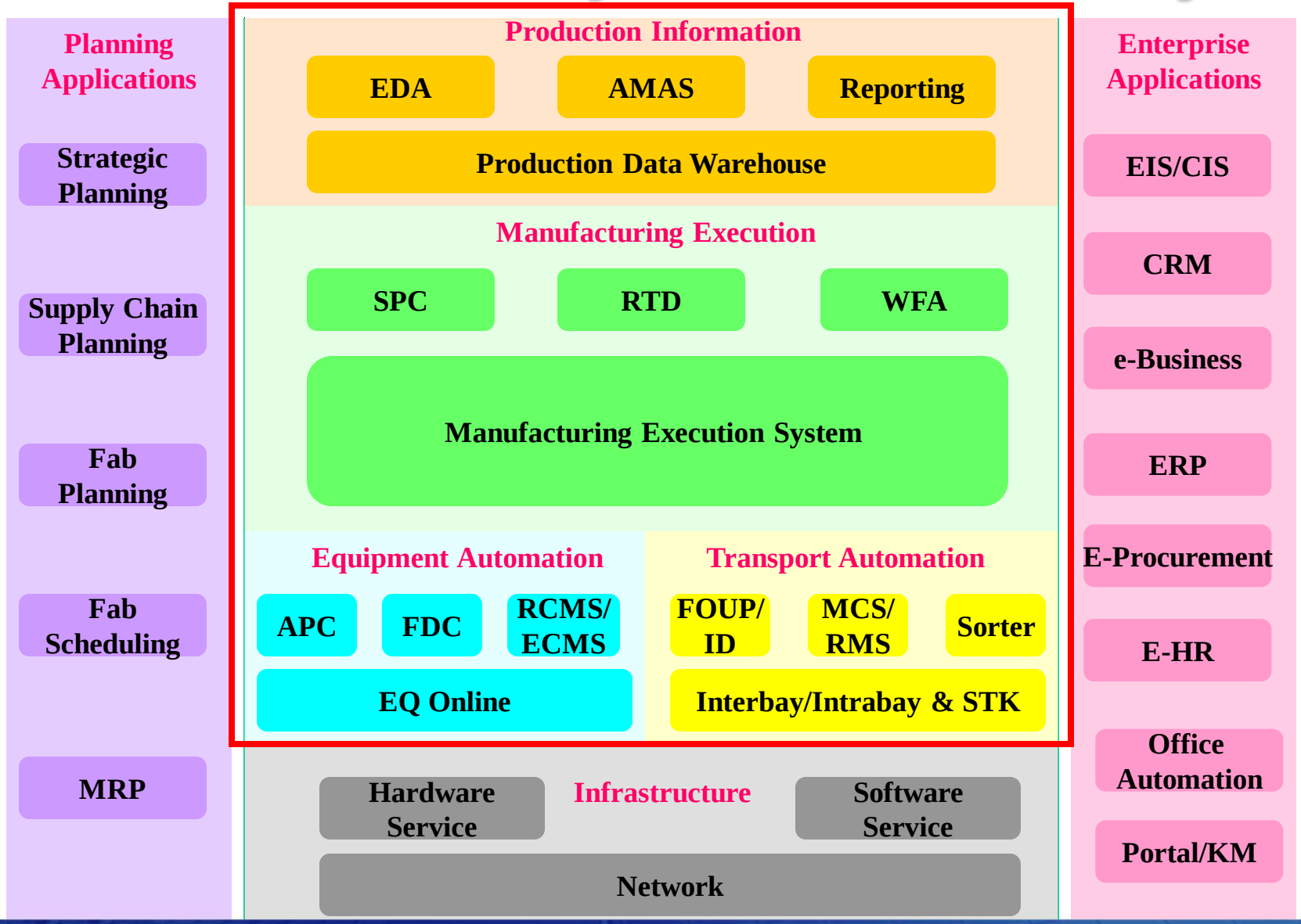
UMC

Customer-Driven Foundry Solutions

Contents

- 半導體產業資訊系統
- 半導體生產自動化系統
- 半導體智慧工廠的需求
- 半導體智慧工廠的新挑戰

Information System of Foundry



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Production Automation Introduction

- to replace all human operations and decisions by means of computer hardware and software.
- to develop intelligent systems which can simplify human works.

Major Benefits:

1. Eliminate the human operation cost in Fab
2. Increasing the throughput and reducing cycle-time
3. Help yield control and advanced process development
4. Support more flexible and complex manufacturing operations
5. Optimizing and standardizing business process to reducing waste and miss-operation

Production Automation Scope

Operation Automation

- Replace Human Efforts

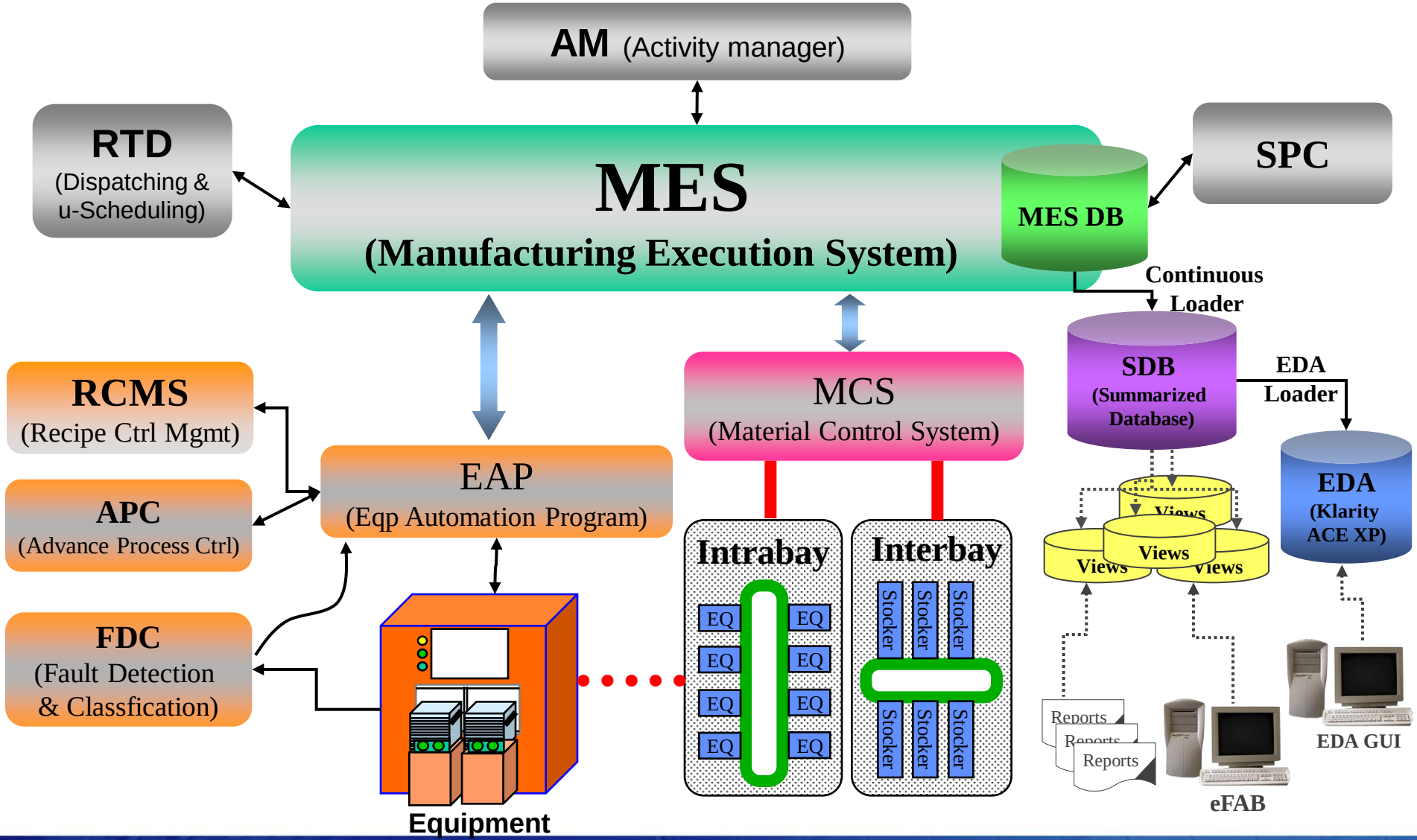
=>Reduce HR Cost, Reduce M/O, Improve CT, Improve Productivity, Increase MM ratio

Engineering Automation

- Support Engineer do job better and smarter

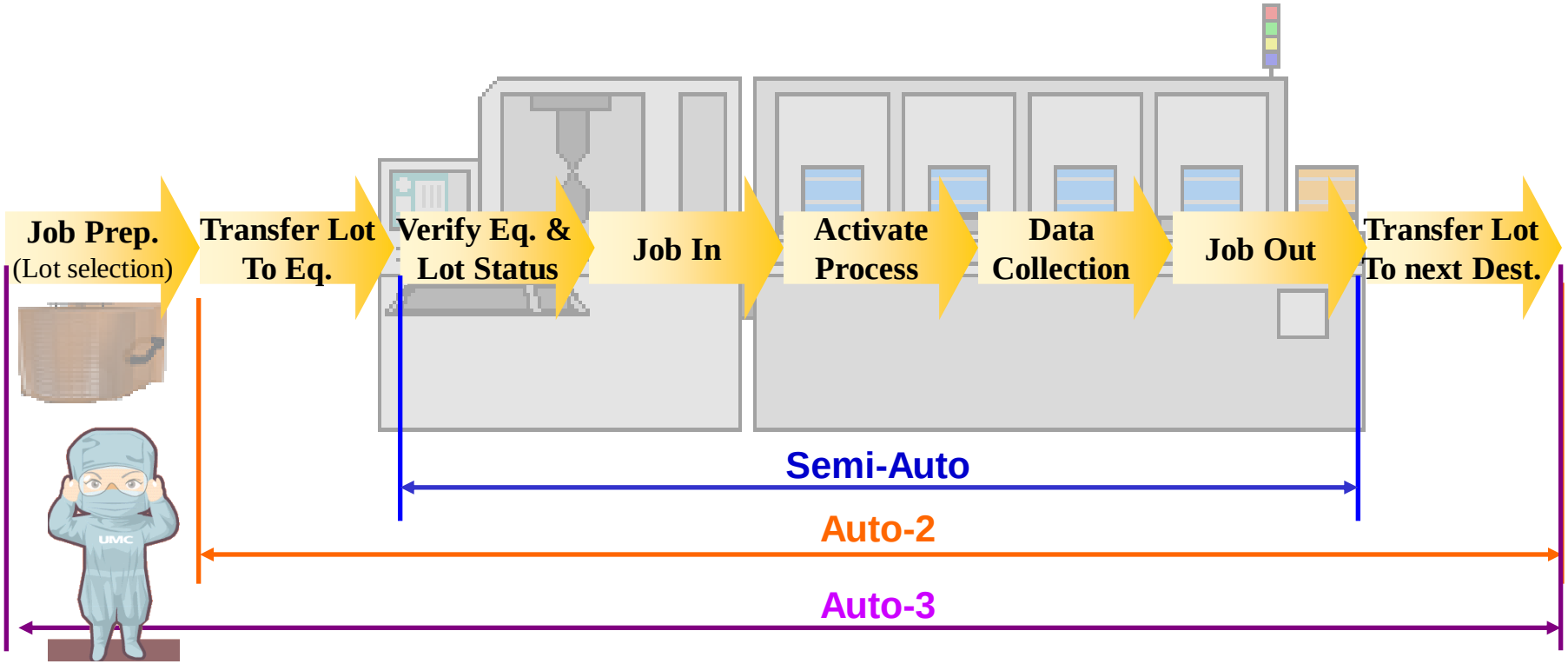
=>Sustain EQ variance, Improve quality, Yield, Support RD, Reduce Engineering Cost, Improve Time-to-Market

CIM System Overview



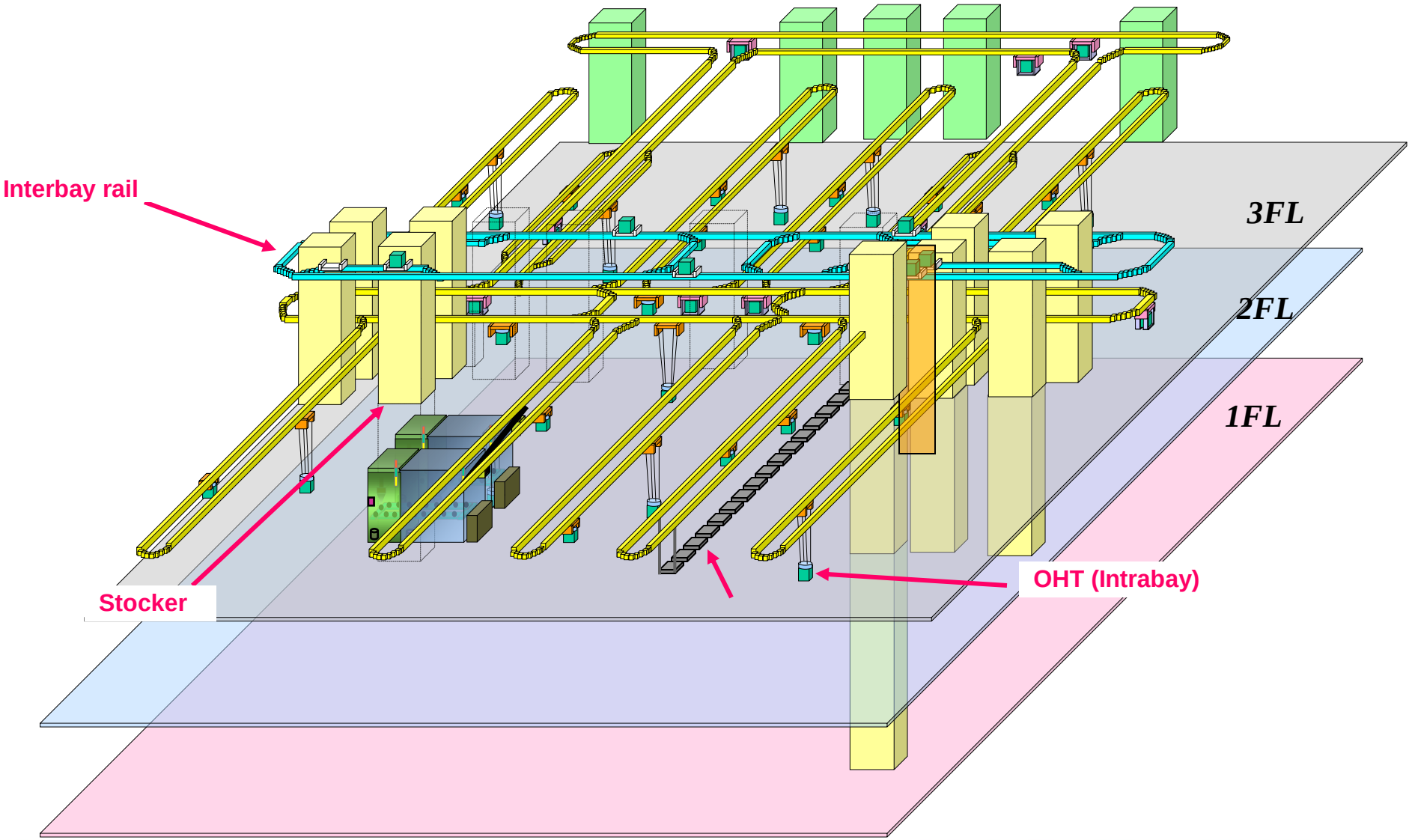
Operation Automation

Definition of Automation Modes



	Job Prep.	Transfer Lot to Eq.	Verify Eq&Lot Status	Job In	Start Process	Data Collection	Job Out	Transfer Lot to next Dest.
Manual Mode	Human	Human	Human	Human	Human	Human	Human	Human
Semi-Auto Mode	Human	Human	System	System	System	System	System	Human
Full Auto-2 Mode	Human	System	System	System	System	System	System	System
Full Auto-3 Mode	System	System	System	System	System	System	System	System

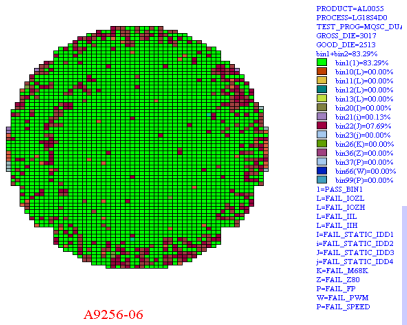
Automatic Material Handing System



Engineering Automation

Automatic Engineering System

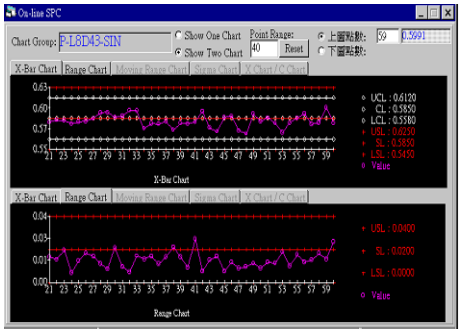
Micro-view
Historical Analysis



Offline

EDA

Historical
Engineering Data
Analysis



FDC

Real time
In site Control

APC

CMP
APC
PH APC
ETCH
APC

Process Control
via previous
processed results

SPC

Product
SPC
Monitor SPC
WAT SPC
EQ SPC
FE SPC

Process Control
via past data

Online

Equipment Automation

Avoid Human MO

Intelligent Factory

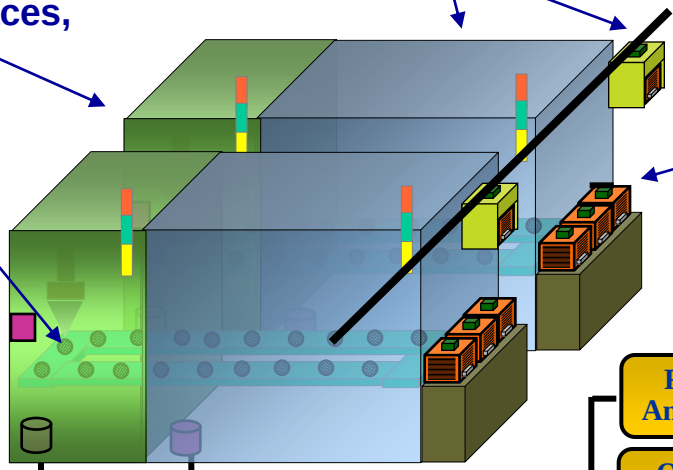
Achievement of FAB automation Today

High product mix operations enabled using automation

Aggressive focus on lot cycle time reduction

100% AMHS Storage and Intrabay Transport Systems in place

Pervasive use of Standards for carriers, equipment interfaces, and software systems



FOUP carrier tracking using ID tags at load ports

Some Wafer Level Tracking & Recipe/Parameter Changes

Very high use of APC and Yield systems

APC, Yield, and E-Manufacturing Capabilities (EEC)

Data

R2R | FDC | SPC | Recipes

Yield | PCS | E-Diag | EPT

Factory Scheduler And Material Control

On-line Equipment Control Systems

Manufacturing Execution Systems

Systems Scaled for > 100k

Most equipment data feed through SECS/GEM & IF/A communications

All lots and wafers tracked and processed using the MES

Partner, Customer Or Supplier

Some use of E-Diagnostics

Equipment Performance Tracking (EPT) Data

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半導體智慧工廠的新挑戰

- Predicable PM
- Virtual metrology
- Waste Time reduction
- Material consumption
- Intelligent Data mining

Q&A