



德律科技股份有限公司

www.tri.com.tw

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報告人：陳冠元/財務長兼代理發言人

德律科技股份有限公司



- 成立時間：1989年4月10日
- 創立人：陳玠源董事長
- 資本額：新台幣23.62億



主力產品: 電路板組裝檢測設備

innovation

☆ 自動光學檢測設備(IT/Image Tester)

- ☆ 錫膏自動光學影像檢測機(SPI)
- ☆ 自動光學影像檢測機(AOI)
- ☆ X-ray自動檢測機(AXI)

☆ 電路板測試機(BT/In-Circuit Board Tester)

- ☆ 組裝電路板測試機(MDA)
- ☆ 全功能電路板自動測試機(ICT)

全球唯一“一條龍”電路板組裝檢測設備廠

TRI
innovation

德律產品在客戶的電路板組裝產線的應用

SPI
3D Solder Paste
Inspection

PRE-
REFLOW AOI
Automated Optical
Inspection

POST-
REFLOW AOI
Automated Optical
Inspection

DESKTOP
AOI
Desktop
Automated
Optical Inspection

Screen
Print

Pick &
Place

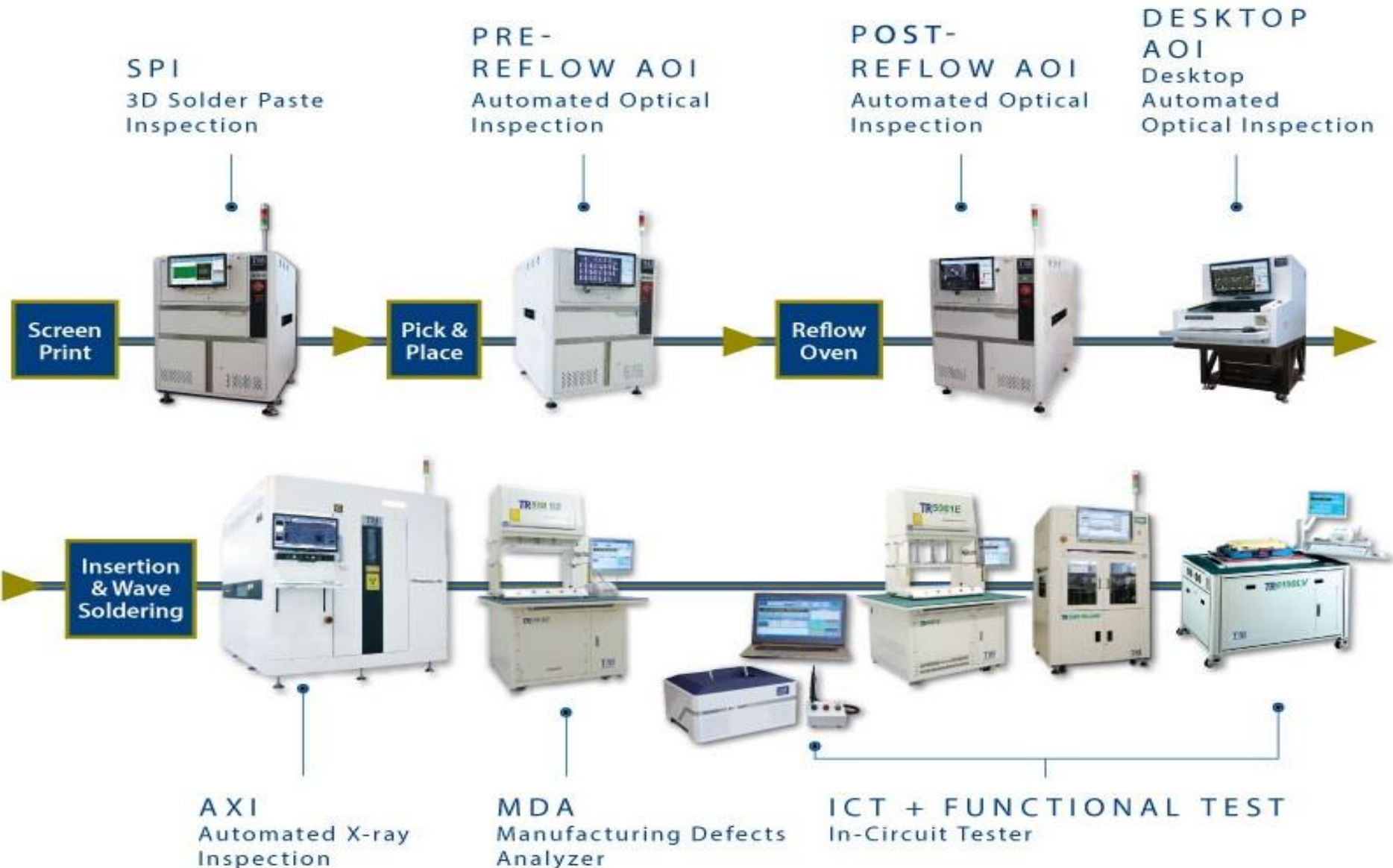
Reflow
Oven

Insertion
& Wave
Soldering

AXI
Automated X-ray
Inspection

MDA
Manufacturing Defects
Analyzer

ICT + FUNCTIONAL TEST
In-Circuit Tester



主要競爭對手

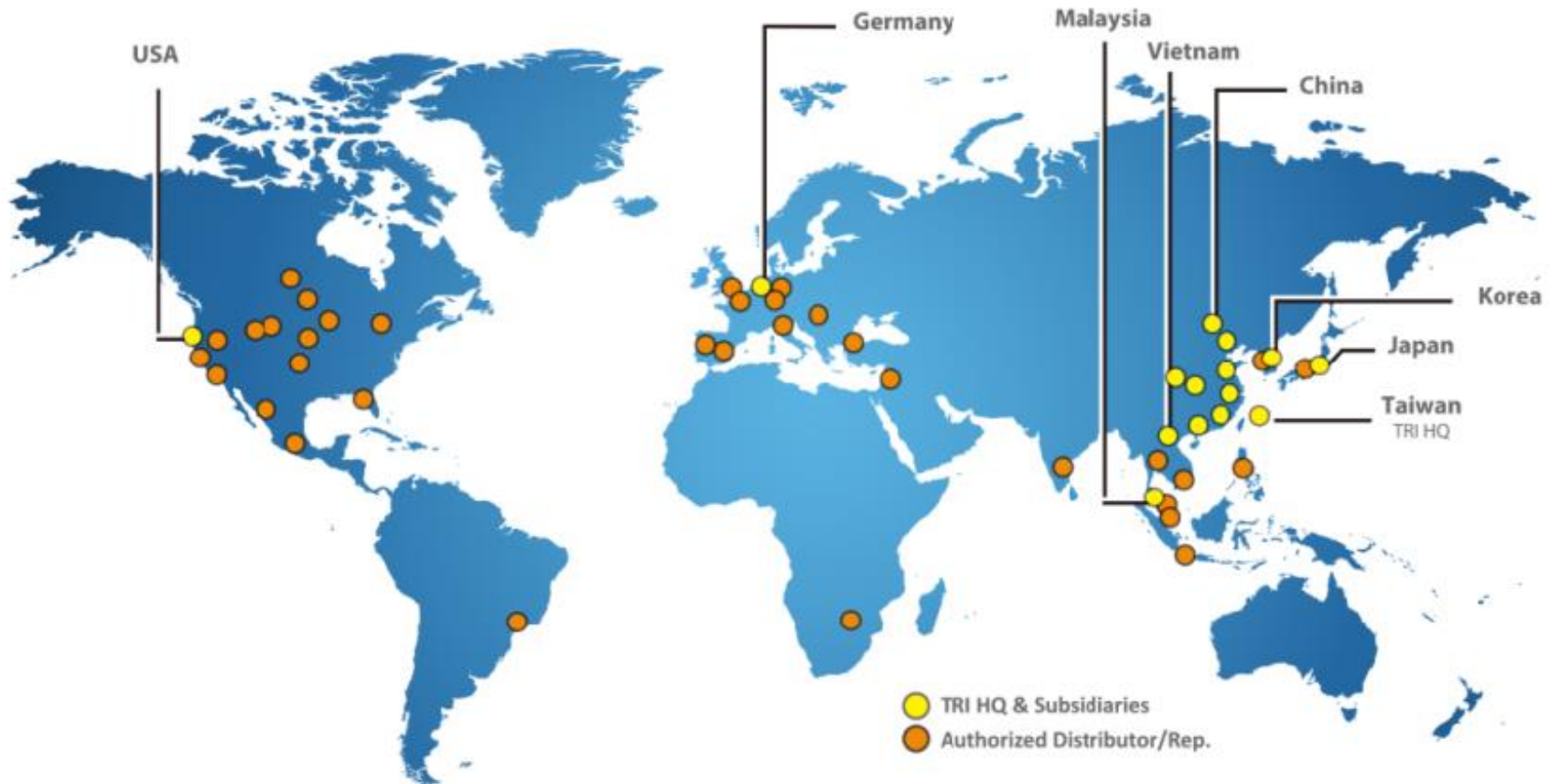
- 韓國: Koh Young
- 日本: Omron
- 中國大陸: Jutze/Sinic-Tek/Holly
- 馬來西亞: Vitrox
- 美國: Keysight/Teradyne
- 德國: Viscom/SPEA

全球銷售服務網

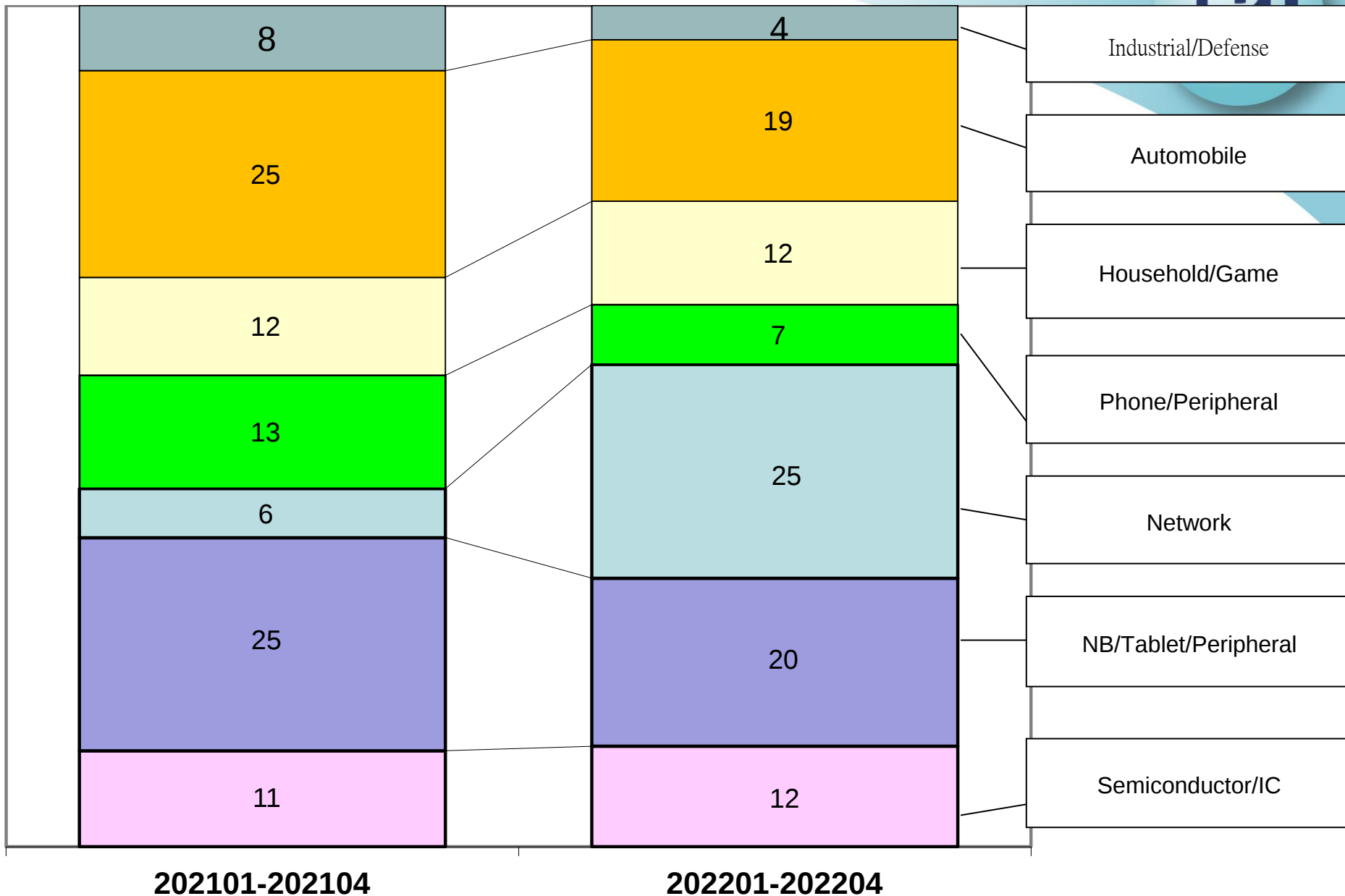


More than 3000 customers have been serviced
through worldwide partners
More than 50 distributors and Rep. worldwide.

主要客戶為全球各大電子產品組裝廠



Electronic Industry/Revenue Movement



年營收

台幣百萬

10000

9000

8000

7000

6000

5000

4000

3000

2000

1000

0

'01

'02

'03

'04

'05

'06

'07

'08

'09

'10

'11

'12

'13

'14

'15

'16

'17

'18

'19

'20

'21

-Uncertainty of global economy

-Delay of 3D AOI launch

-Low price competition in China

Decline of PC/NB application

Increase of smart mobile devices application

Improved product competitiveness

-Economic recovery

-Blue-ocean

Rush capacity buy triggered by economic recovery

New AOI 7500 is not launched until '06.

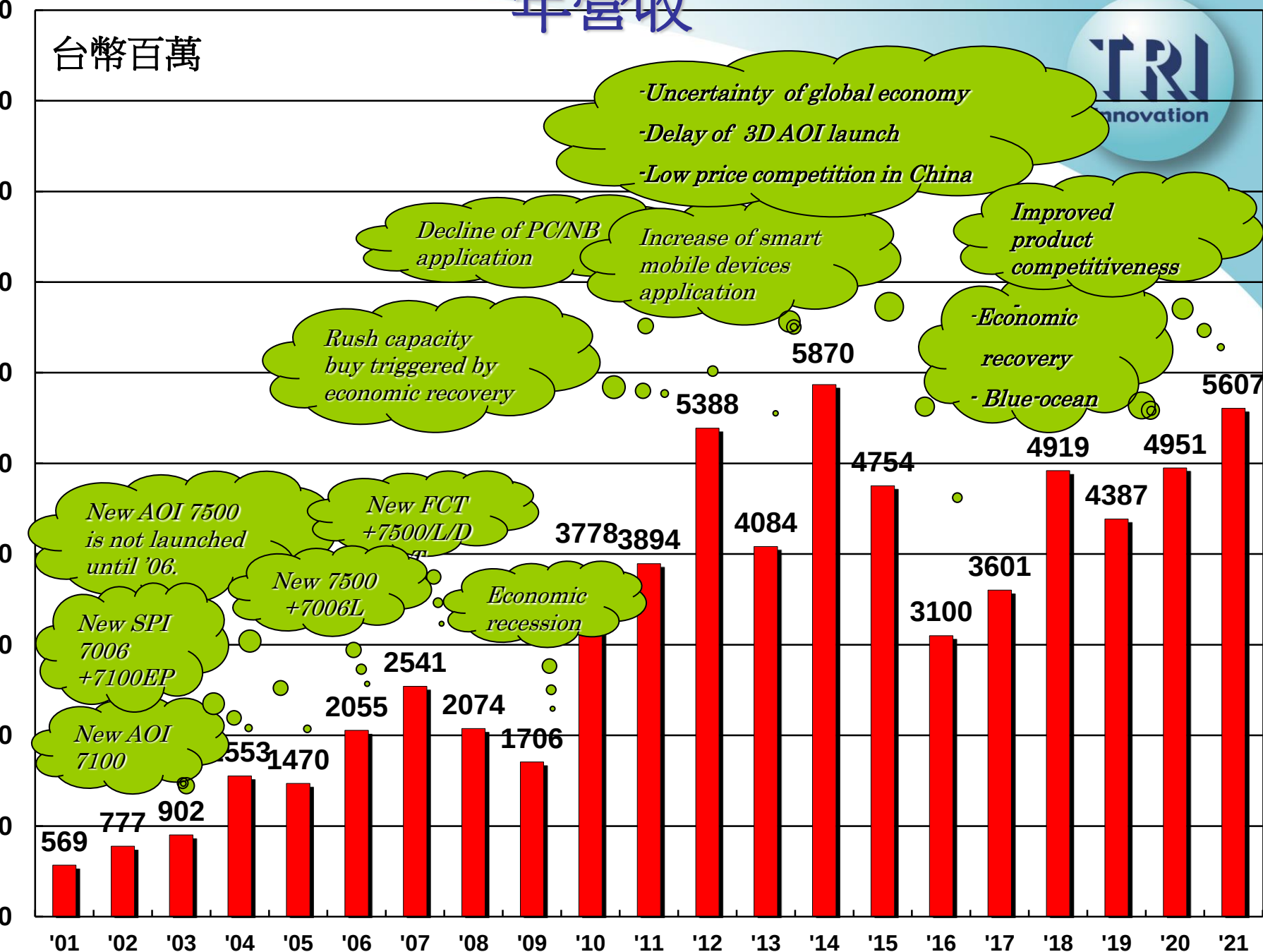
New SPI 7006 +7100EP

New AOI 7100

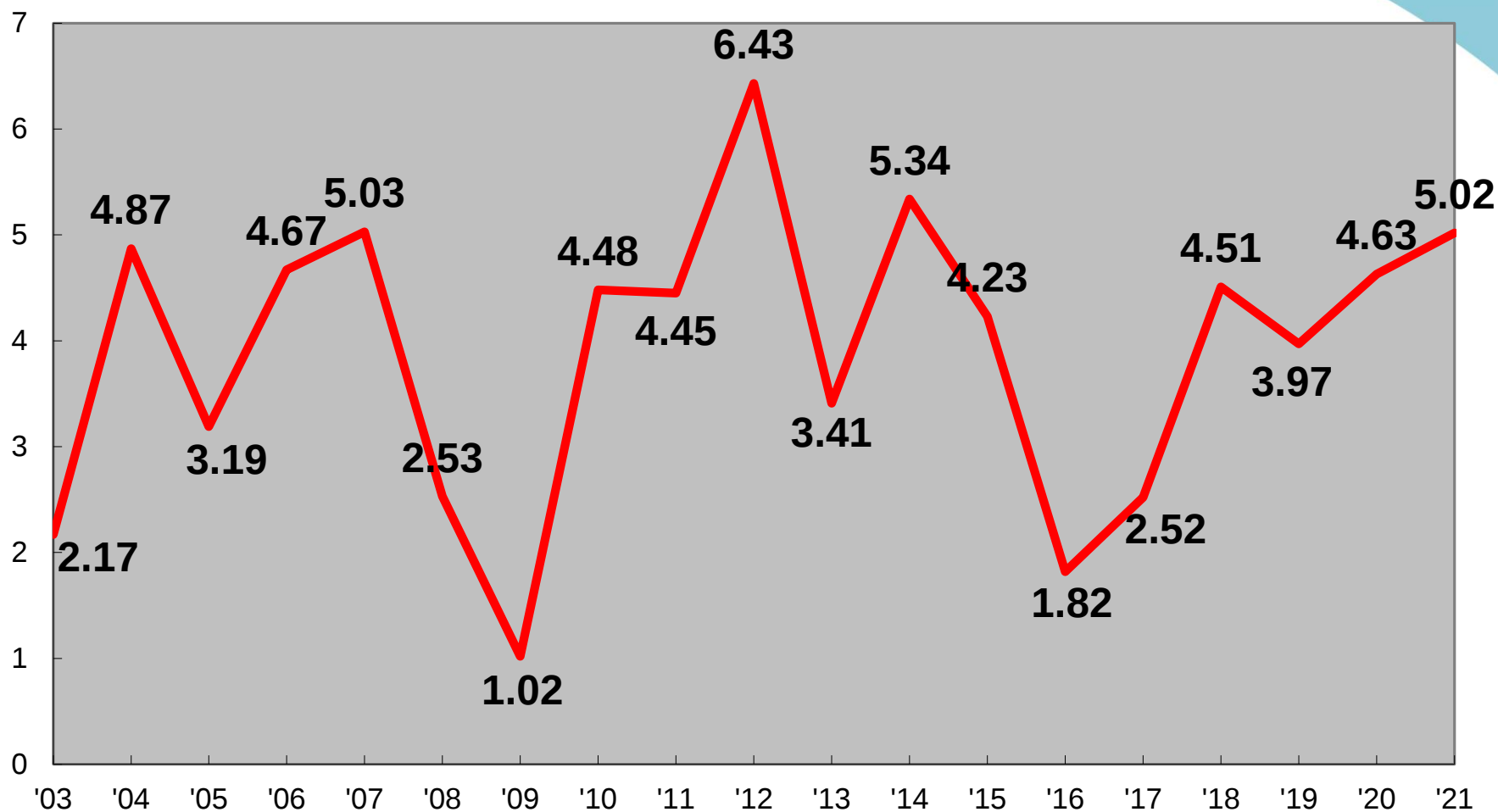
New 7500 +7006L

New FCT +7500/L/D

Economic recession



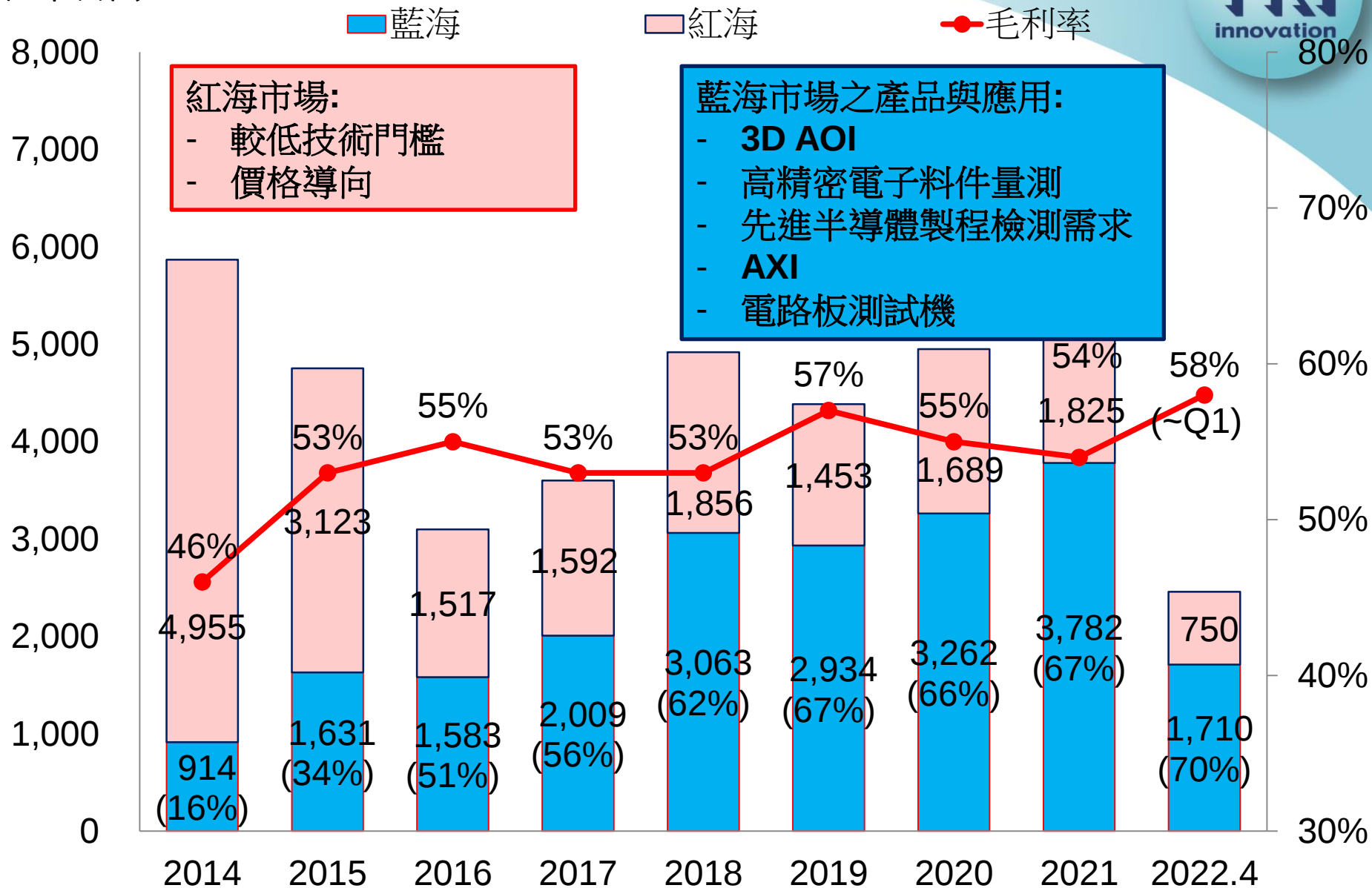
每股盈餘



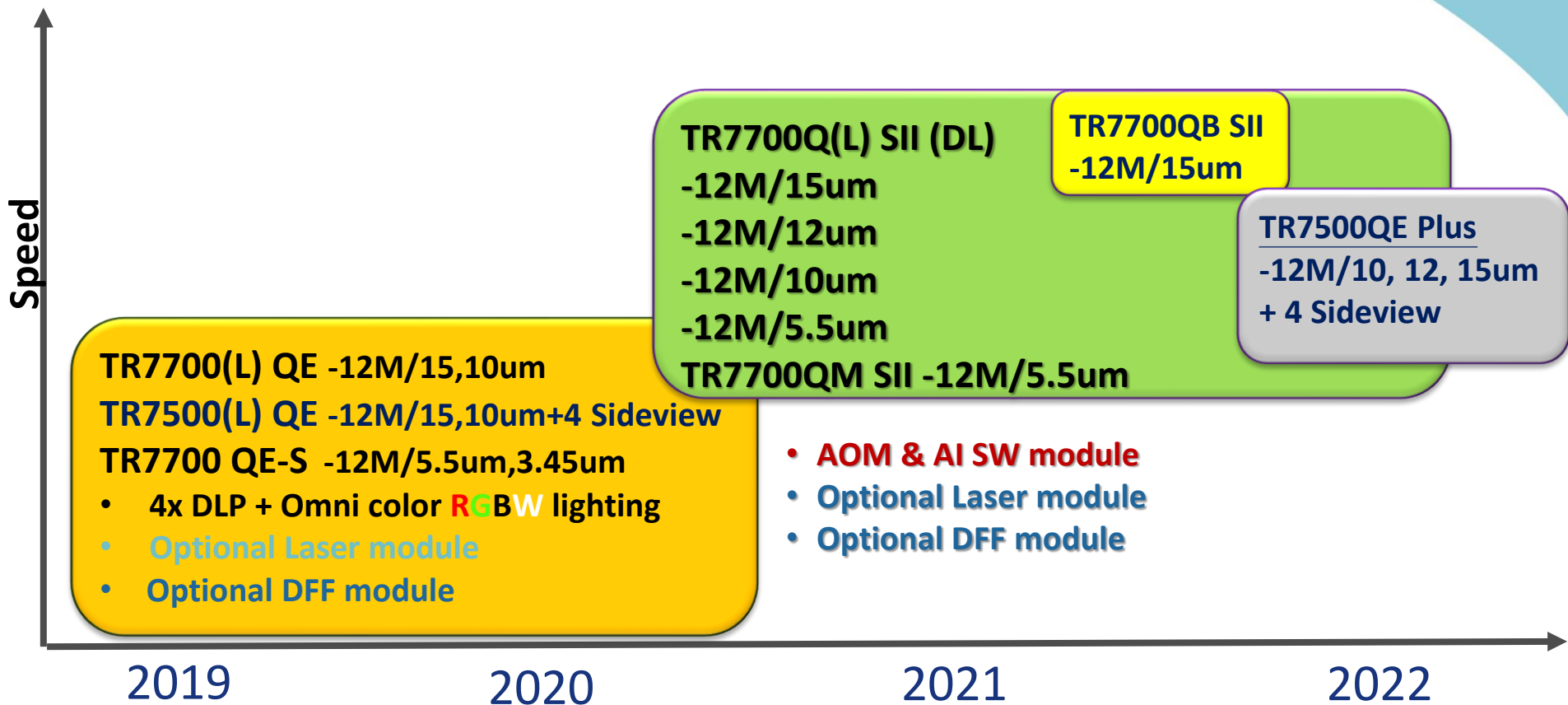
紅海與藍海市場營收變化



台幣百萬



TRI 3D AOI Product Roadmap



NEW

TR7500QE Plus 3D AOI 特點

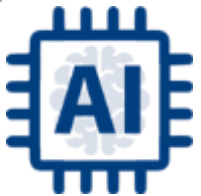
TRI
innovation



**Multi-Angle 3D Side View
Metrology-Grade Inspection**



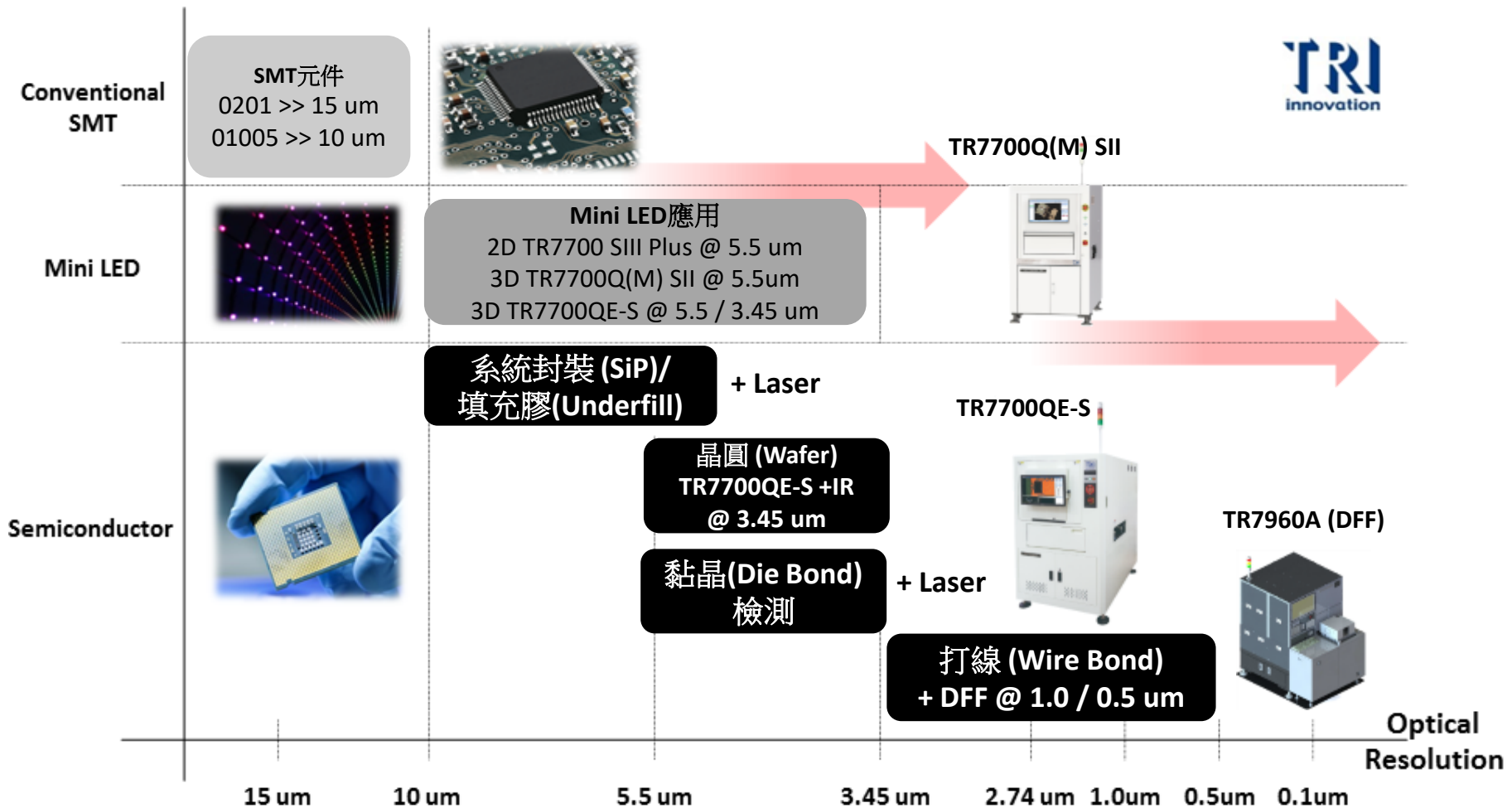
**Industry-Leading Speed with
High Accuracy Resolution**



**Powered by TRI's Flexible Algorithms,
Smart Programming and AI Technology**



TRI AOI 產品應用



TR7700QE-S 3D AOI 特點



NEW



**Supports 3.45 / 5.5um
Ultra High Resolution**

可支援半導體封裝等級檢測應用:

貼片元件 (SMD)

表面凸塊 (Bump)

黏晶/打線接合 (Die / Wire Bonding)

填充膠 (Underfill)



升級 DFF 3D 科技

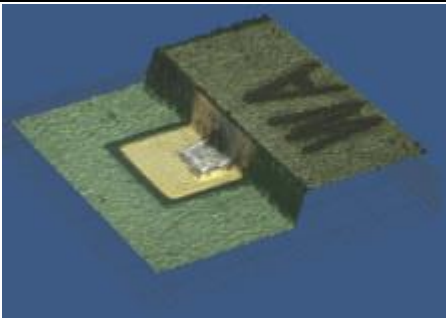


0.5 μ m

1 μ m

超高解析度

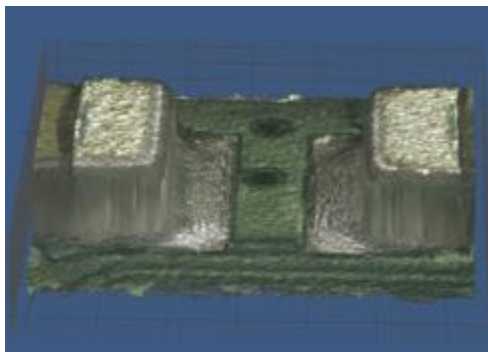
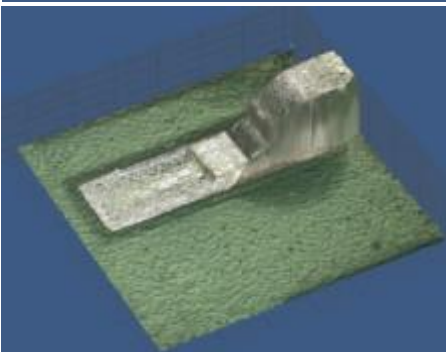
- Optimal **focus** position
- **Clearer** 2D Images
- **Sharper** images
- **Shadow-free** 3D Image



SMT
- 錫點
(Solder joint)

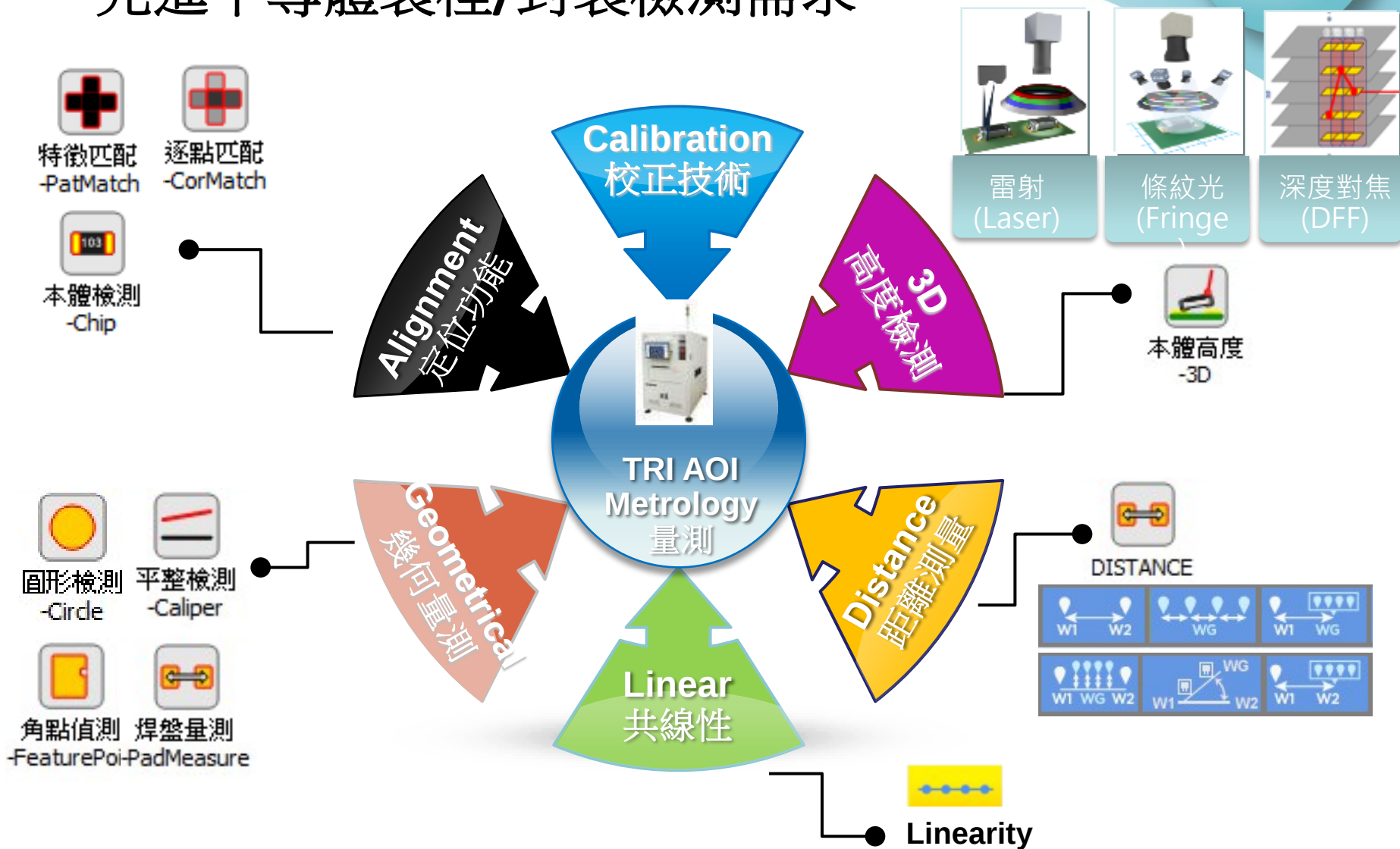


Semiconductor
- 打線接合
(Wire bond)

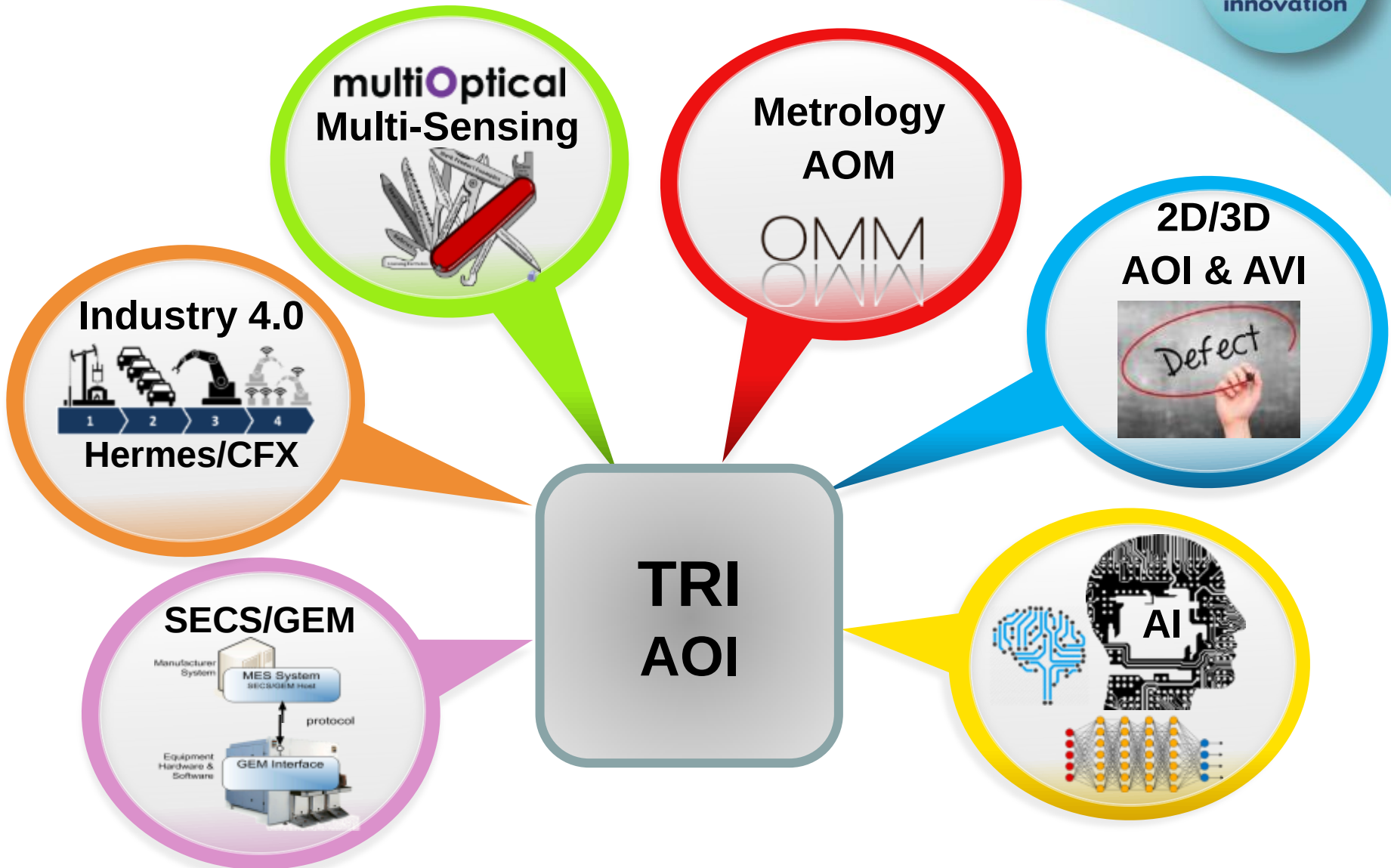


整合多項視覺核心新技術 因應:

- 高精密電子料件量測需求
- 先進半導體製程/封裝檢測需求



TRI 整合完整的解決方案



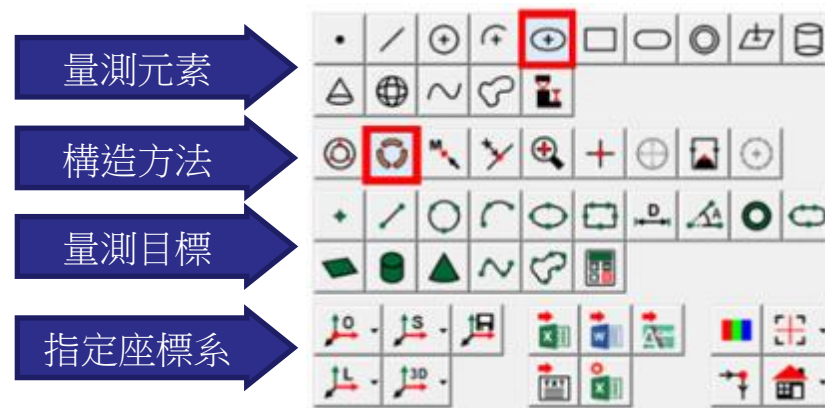
全新TRI量測功能(AOM)



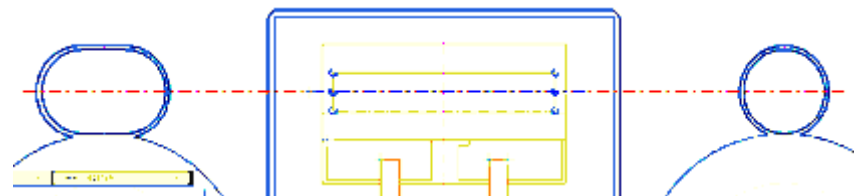
- ❖ UI: New designed and friendly user interface



- ❖ Features: More complete measurement functions will be available



- ❖ High Flexibility: Multi-Layer measurements



TRI's SPI 最新應用項目



Fast Inspection Speed



Large FOV

CoaXpress Technology

Dynamic Imaging

Stop & Go Imaging

Precision Inspection

5.5 μm

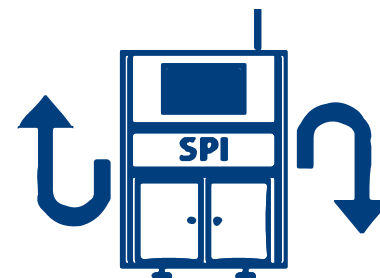
High Resolution

Shadow Free

Smart Warpage Technology

High Inspection Range

Smart Factory



Closed Loop

IPC-CFX

Smart Library

YMS 4.0

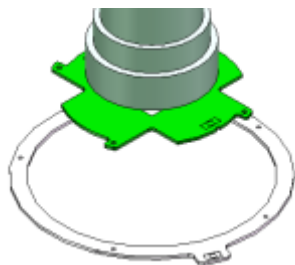
NEW

TR7007D/Q Plus Series SPI

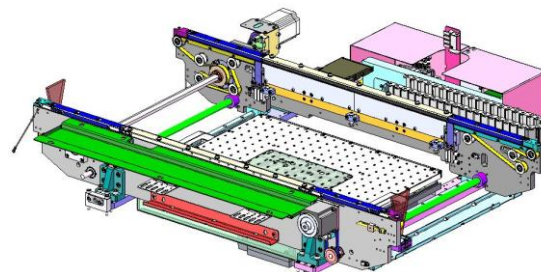
新應用特點



Improved Inspection Stability and Capability



Enhanced 2D Light
Improved Imaging

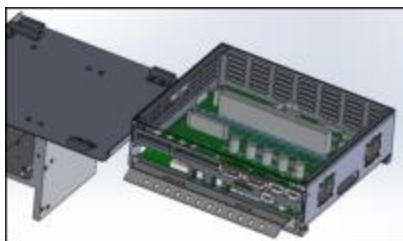


Full Size Support Pin
(Optional)

Easy Maintenance



New Log Interface



Easy hardware
Upgrading design



NEW Motion Controller

NEW

TR7007 SII Ultra Series SPI 特點



Next Generation of the Award Winning TR7007 SII Plus



New Mechanical Structure
Minimal Vibration, More Rigid Frame*

13%+
Improved GR&R*

New Motion Controller
Flexible Communication Protocol

Ether**CAT**.

Higher Top Clearance
50mm

* Compared to TR7007 SII Plus



完備的3D在線型 AXI

TRI
innovation

NEW



TR7600(LL/TL) SIII

TRI新一代具指標性的在線型PCBA檢測解決方案。結合了業界最快速的高解析取像速度，並在先進的自動X光檢測中大大提升了影像品質。

*** Linear Motion**
(運作機制:線性掃描)

NEW



TR7600F3D(LL) SII

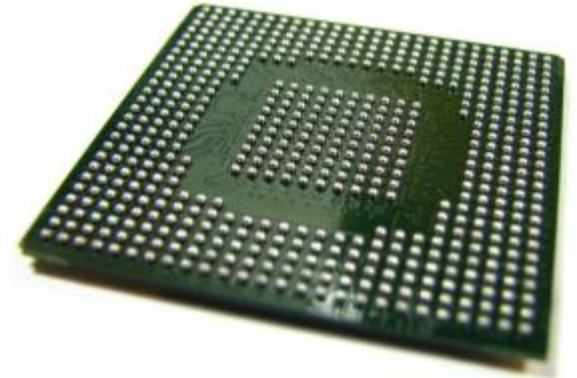
大幅提升檢測速度的高解析度在線型3D AXI，並可應用CT電腦斷層掃描科技，專門用於檢測需要高影像品質的組裝電路板和軟板組件。

*** Circular Motion**
(運作機制:區域環形掃描)

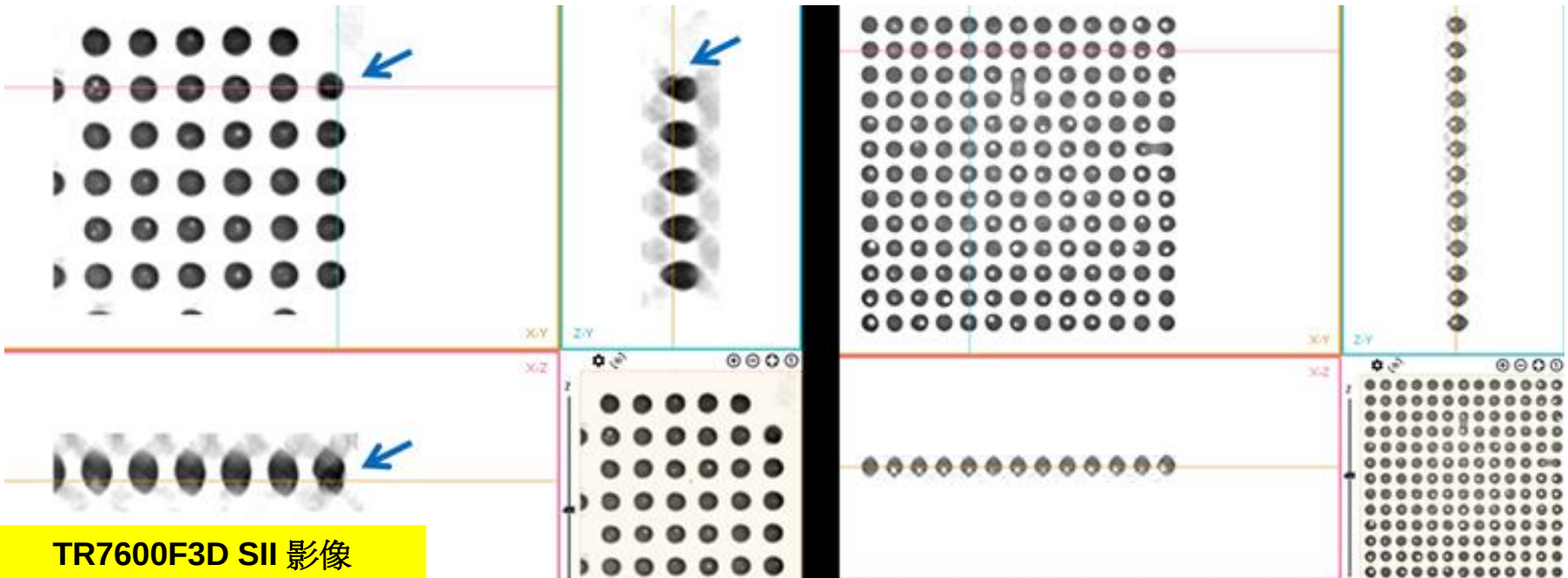
TRI AXI - BGA 檢測應用



Product Type Examples	ADAS, Radar Module, Communication Module
Inspection Criteria	<u>BGA Void, Open</u>
TRI AXI Application	3D CT Inspection



3D CT (電腦斷層掃描)



TR7600F3D SII 影像

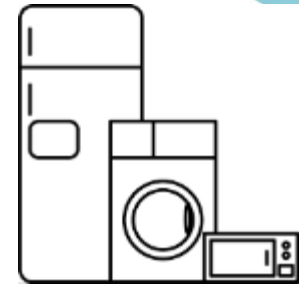
TRI ICT/BT 應用



Automation



Laptops



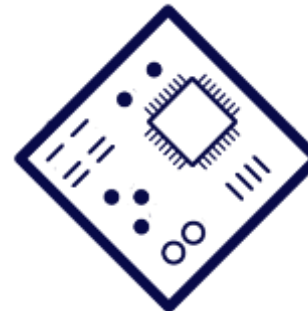
White Goods



Flex Boards



Smart Factory



Customized FCT



Automobile



TR5001 SII Series ICT/BT 特點



- Multi/Merge Core Parallel Testing
- Improved Test Accuracy and Capability
- New and Improved Test Modules
- Intelligent Software Interface
- QDI Fixture Interface
- Inline and Manual Handler
- In System LED Analyzer



高密度測試點數ICT

TR8100H SII / TR8100HL SII



NEW

Original Model	Test Points.	New SII Model
TR8100LV	3584 pins	7056 pins
TR8100LLV	5632 pins	11088 pins



TR8100H SII ICT - 產業應用



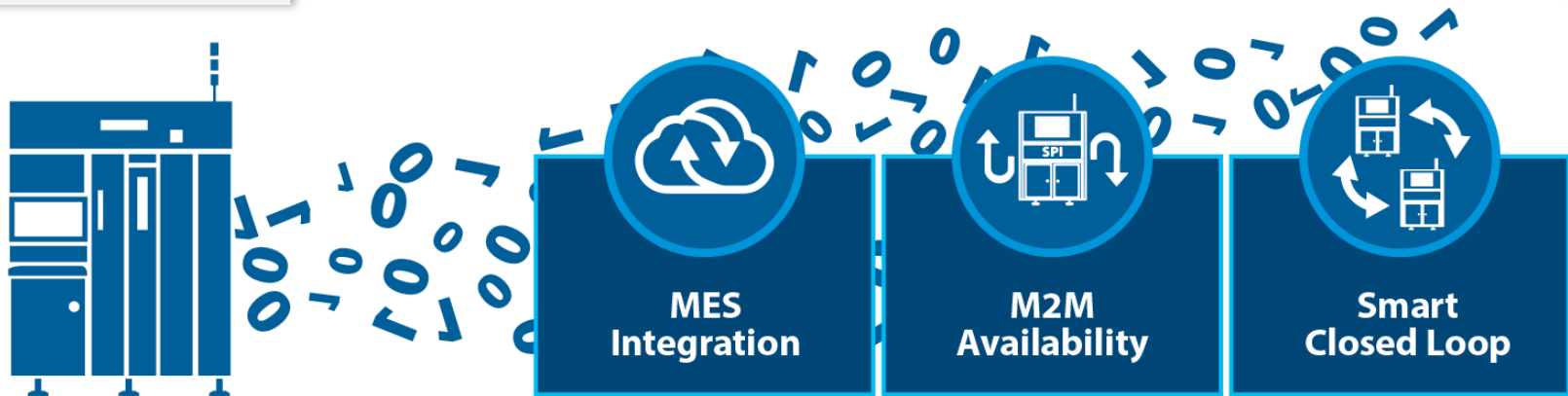
- Server/Data Center/Networking main boards
 - Test pins range 3000~5000
- 5G Base Stations
- Charging facility



智慧工廠解決方案



Big Data Ready



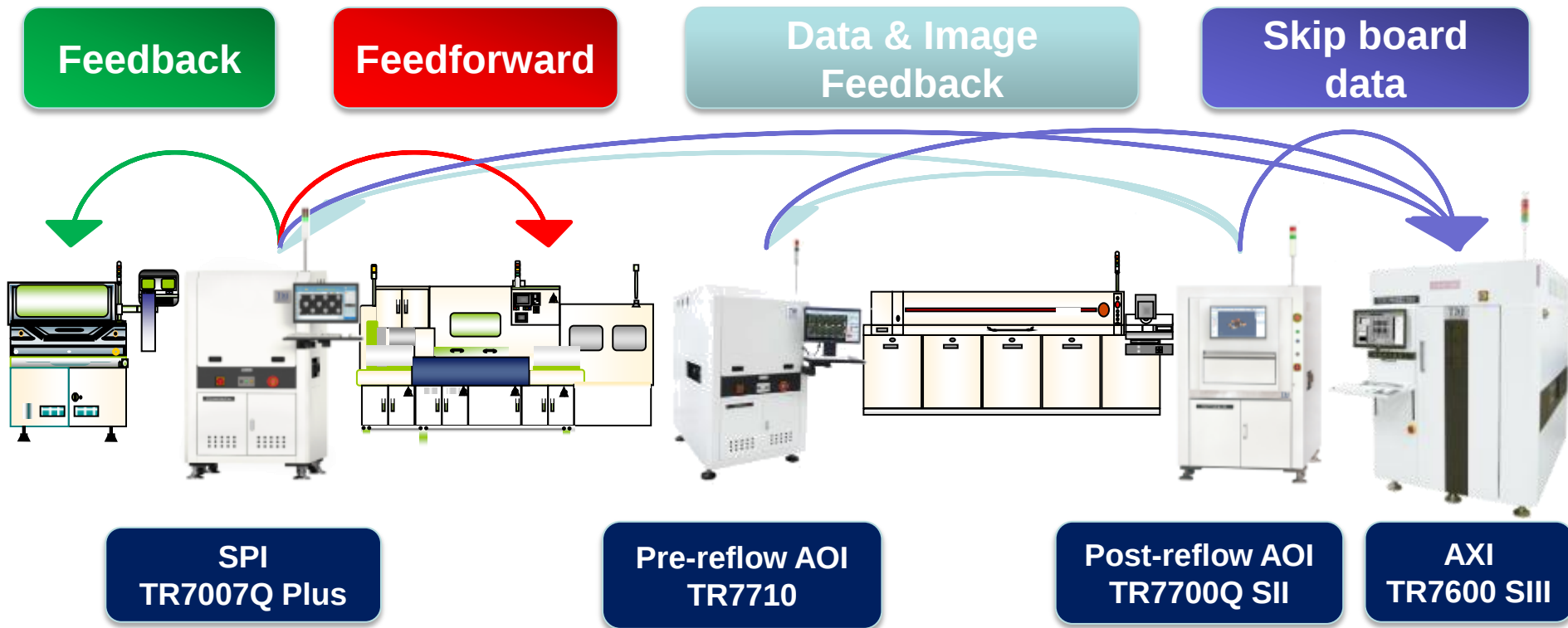
Smart Monitoring



TRI支援封閉迴路控制系統

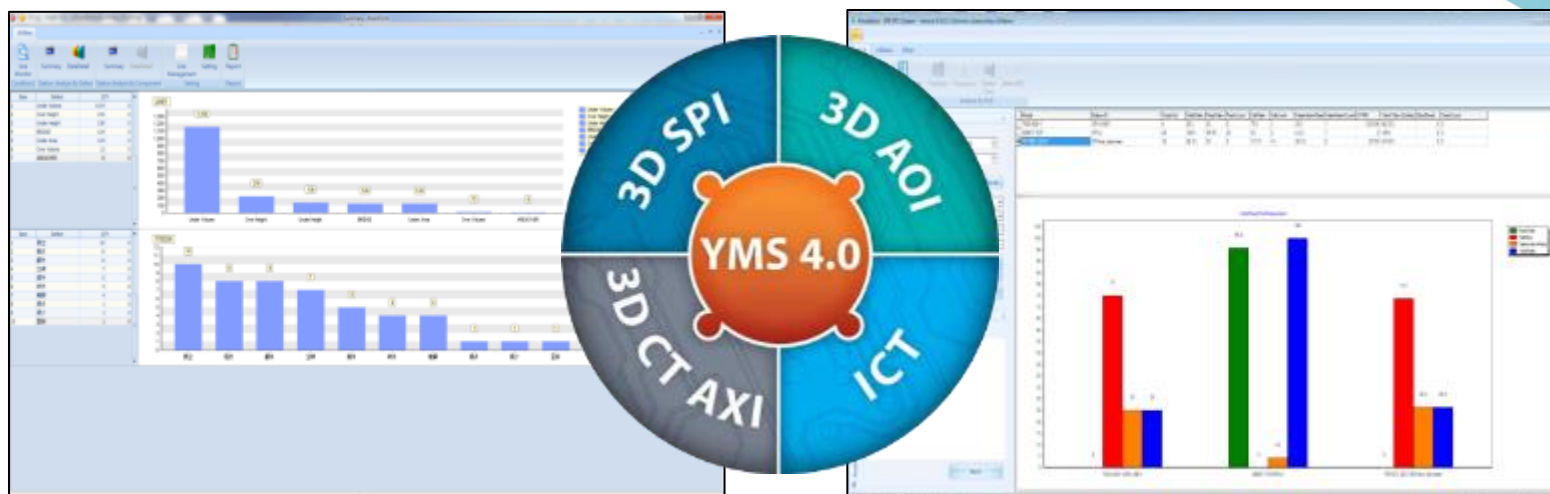


TRI SPI, AOI, AXI 檢測資訊的串流 IPC CFX(data)/HERMES(M2M)



TRI YMS 4.0 良率管理系統

協助客戶提升生產力及品質管理



- 實時狀態檢查
- SPC和生產力監控
- 列出排名前10的不良項目和對應圖像
- 依各站別, 線別, 流程找出問題點
- 監控生產問題改善狀況
- PDCA改善循環
- 支持品質優化
- 輸出報告到MES / SFCS

工業4.0解決方案

TRI的AI應用

檢測階段

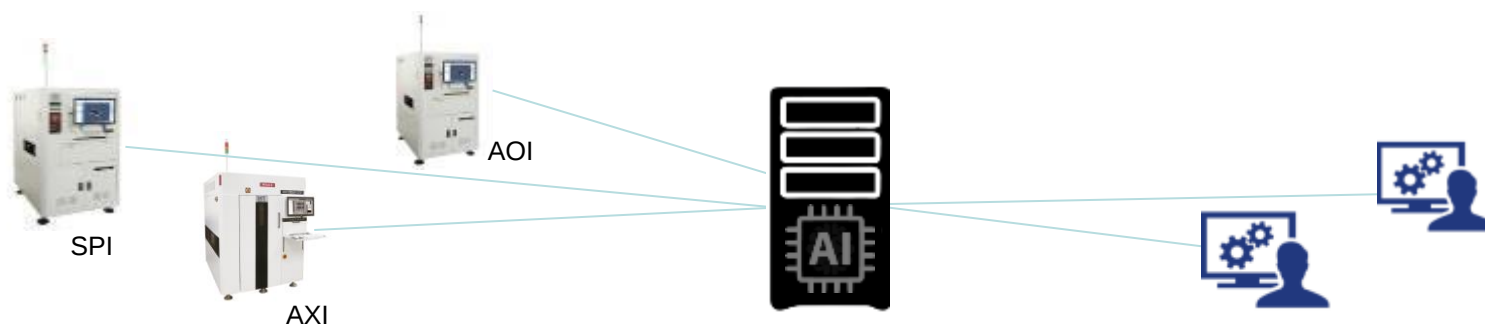
缺陷檢測/ 字元識別/ 視覺檢測/ 量測輔助

優點：提高檢測品質，減少誤判

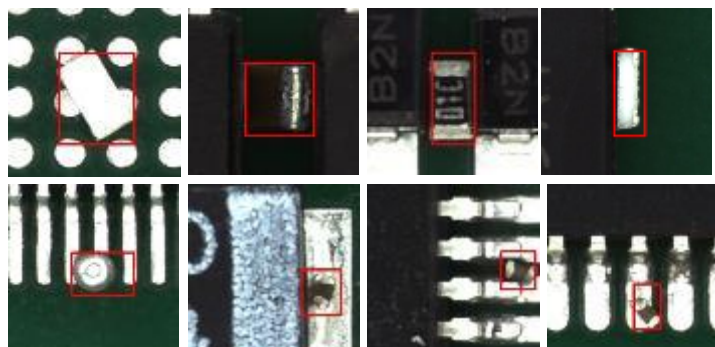
複判階段

維修站缺陷分類和複檢

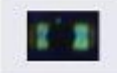
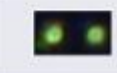
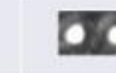
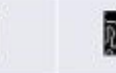
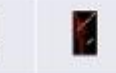
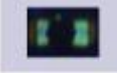
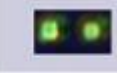
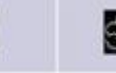
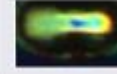
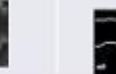
優點：減少人工複檢的工作量



TRI 檢測解決方案



TRI AI 工作站

Std-Img	Insp-Img	Gray-Img	Edge	Line	Original Type	Result Type
					Missing Parts	Tombstone
					Billboard	Missing Parts
					Billboard	Missing Parts
					Billboard	Billboard

維修/複判站

TRI的AI應用



1. AI 智慧編程 (Smart Programing)
2. AI 工作站:伺服器-終端架構的 AI 檢測及調試
3. AI 智能複判主機 (Verify Host):
AI 維修/複判站(Repair Station) 管理
4. AI 檢測:
 - 字元辨識 (OCV/OCR)
 - 瑕疵檢測
 - 待測物外觀檢測
 - 異物檢測

TRI AI 發展藍圖



➤ Future Plans



❖ 技術深耕

- ❖ AI Station/Training Tool
- ❖ Big Data: 更多內建AI網路
- ❖ 提升檢測能力

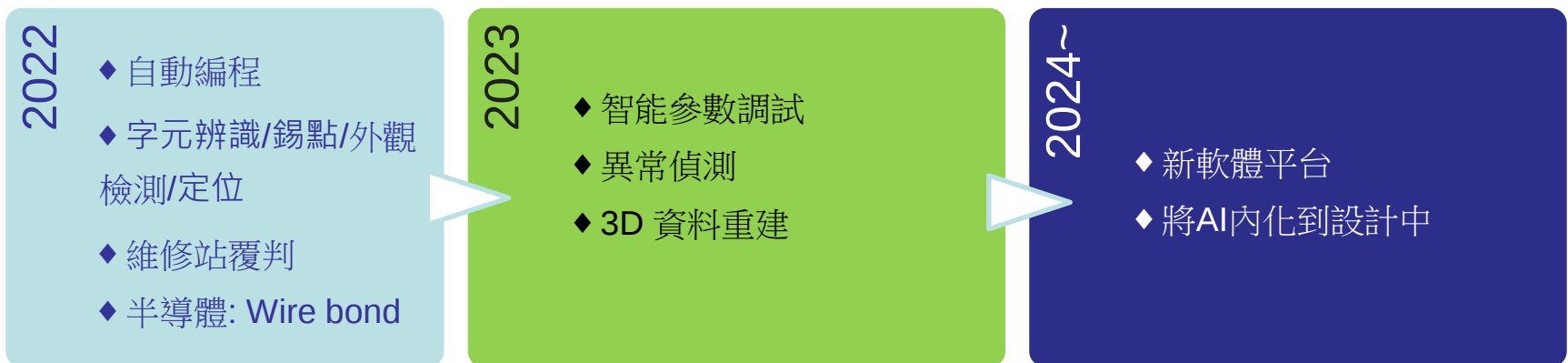
❖ 擴大發展

- ❖ 更快速及更精確
- ❖ 更簡易及更快速的訓練
- ❖ 應用面擴展

❖ 願景

- ❖ 零漏測、零誤判
- ❖ 無人化 AOI

➤ AI 應用:



內部研發團隊



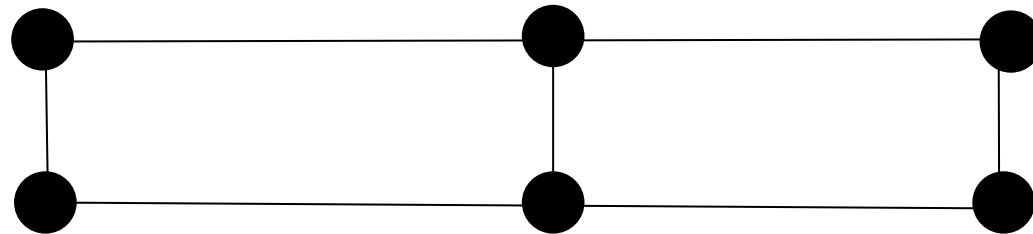
- Optical Dept.
- Mechanical Dept.

- system S/W
YMS, R/S

- PLC control
- Lighting control

光學檢測

電路板測試



200+ RD

外部機構技術支援

Department of Computer science, 台灣大學

- 影像處理 / Understanding

Department of Power Mechanical, 清華大學

- X-ray 3D Reconstruction/Digital Tomosynthesis Algorithm/電腦切層演算法

Center of Measurement Standards, 工研院

- Length/ Camera / 色彩校正

近年獲獎



- 2016 Global Technology Award
- 2017 Circuits Assembly NPI Award
- 2017 EM Asia 創新獎
- 2018 Circuits Assembly NPI Award
- 2018 EM Asia 最佳供應商獎
- 2019 Global Technology Award
- 2019 EM Asia 傑出產品獎
- 2020 Global Technology Award
- 2021 EM Asia 創新獎
- 2021 Global Technology Award

* TRI's Company Milestones:

<https://www.tri.com.tw/tw/about/about-21-1-2.html>

免責聲明



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Better Testing Better Quality



THANK YOU!

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Test Research, Inc.***



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