



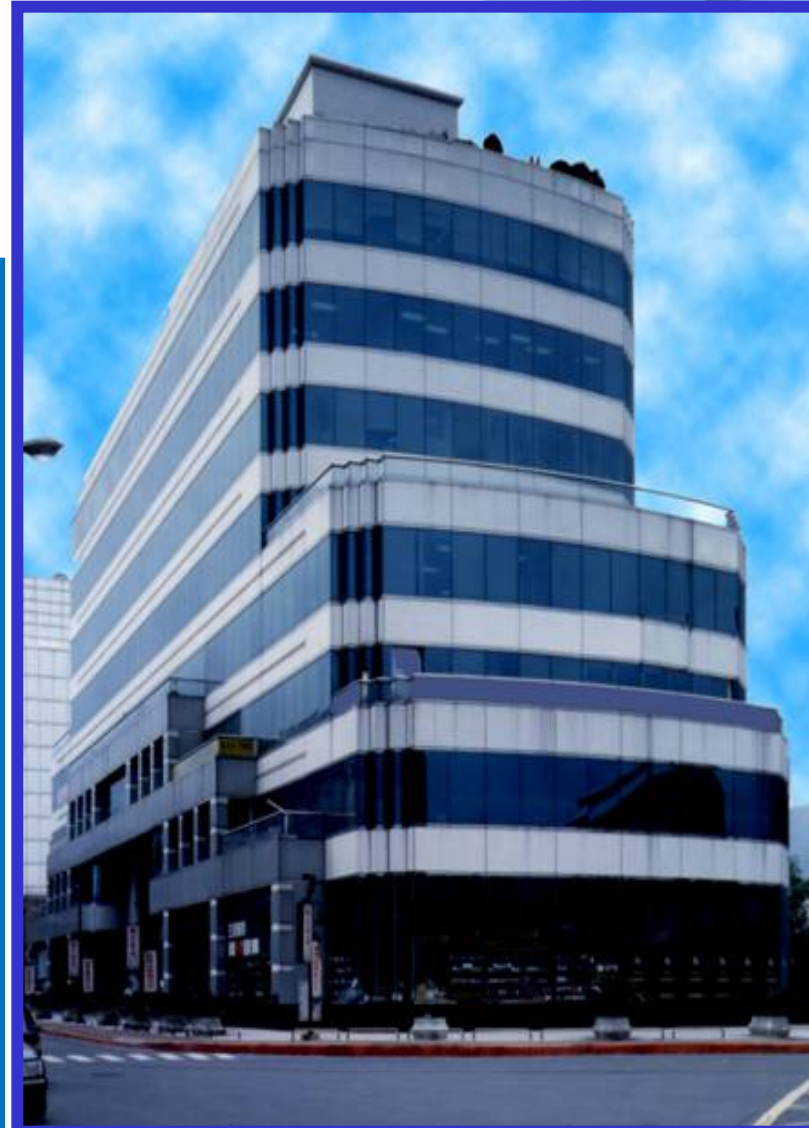
Test Research, Inc.
www.tri.com.tw

November 2024

Test Research, Inc.



- Establishment: April, 1989
- Founder & CEO: Jason Chen
- Capital: TWD 2362 million
(USD 78 million)



Expansion of Manufacturing



Location: TRI Linkou Manufacturing Facility - Second stage
(10 upper ground floors and 4 underground floors)

Floors Area: 35,000 m²

Completion and Launch: 2024 Q1



Increased Production Capacity

Smart Factory Showroom with All Product Lines

Conference Room for Hosting Seminars



ESG Report



🏠 / 投資人關係 / 永續報告書 / 永續報告書

投資人關係

致股東信

財務資訊

永續報告書

永續報告書

公司治理

股東專權

活動訊息

利害關係人

QA

永續報告書

日期	標題
2023/08/28	2022年永續報告書



Click to download the ESG Report



Main Product Line



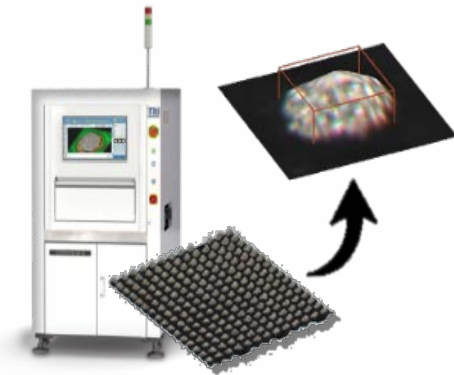
★ IT(Image Tester)

- ★ SPI(Solder Paste Inspection)
- ★ Pre-reflow AOI / Post-reflow AOI/SEMI AOI/Wafer AOI
- ★ AXI(Automatic X-ray Inspection)

★ BT(In-Circuit Board Tester)

- ★ MDA
- ★ ICT

Products of Advanced/Back-End Packaging Inspection



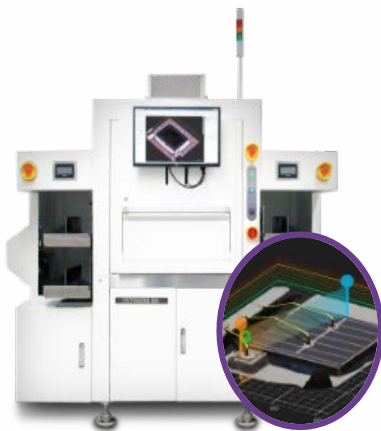
TR7007Q SII-S
3D SEMI
Bump Inspection



TR7720S
2D SEMI
AOI



TR7700Q SII-S
3D SEMI
AOI



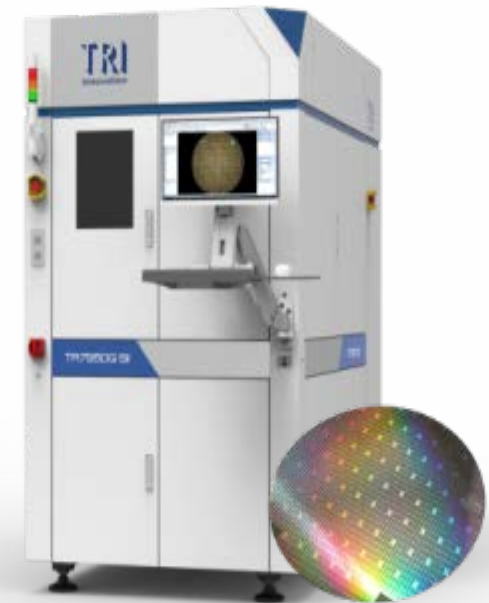
TR7900Q SII
Magazine & Strip
3D Semi AOI



TR7900Q SII-R
Magazine & Strip + Reject Station
3D Semi AOI



TR7600 SIII Plus
3D Semi X-Ray
Cu-Pillar, C4 Bumps

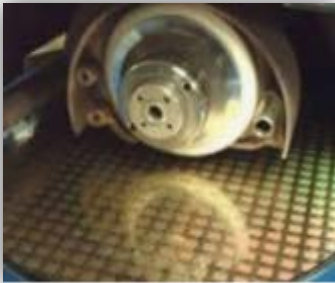


TR7950Q SII
Wafer Inspection and Metrology
Frame, Bumping, Surface TSV

Semiconductor Back-End Inspection Applications



Wafer Saw / Dicing



Fillet Inspection
Epoxy / Underfill



Die Bonding



Wire Bonding



TR7950Q SII
8"/12" Wafer
3D Saw Measuring
2D Surface AVI
Back Side & Top
Side Chipping
SWIR Support

TR7700Q SII-S
TR7720S
Bond Pad
Epoxy
Underfill
Surface
Inspection

TR7700Q SII-S
TR7700QE-S
Die Inner & Outer
Crack / Chipping
Surface Particle
Scratch / Residue
Foreign Material
Inspection

Magazine AOI
TR7900Q SII
TR7900Q SII-R
Die Bonding
2D / 3D
Inspection

Magazine AOI
TR7900Q SII
TR7900Q SII-R
Wire Bonding
2D / 3D
Inspection

TR7950Q SII



TR7700QE-S



TR7700Q SII-S



TR7720S



750 mm

TR7900Q SII



TR7900Q SII-R

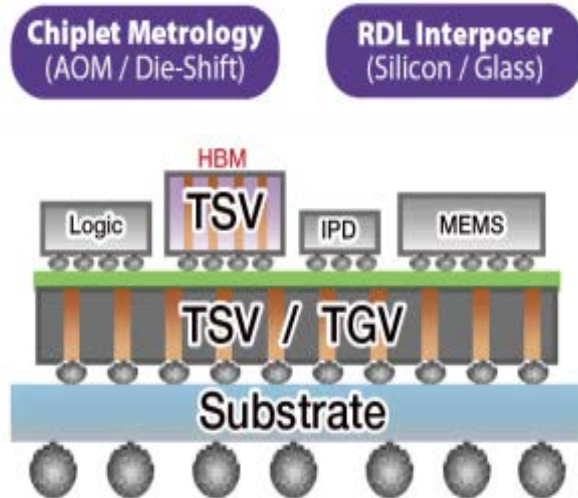


SEMI Advanced/Back-End Processing

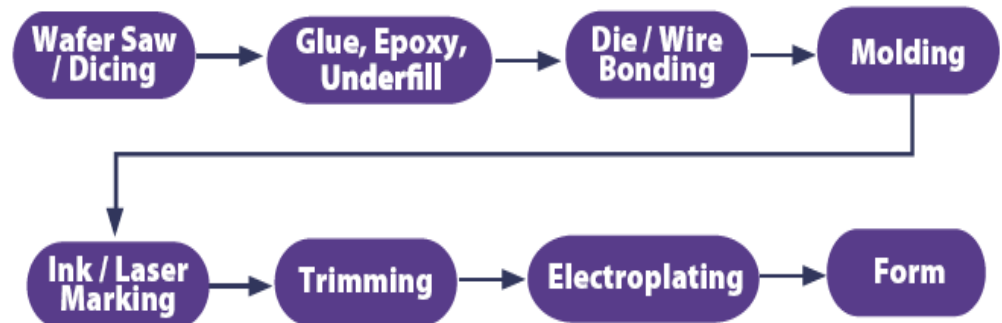
– Inspection and Metrology



▶ ADVANCED WLP/PLP



▶ BACK-END PROCESSING



SEMI Advanced/Back-End Packaging Inspection

INSPECTION & METROLOGY SOLUTIONS FOR:

Advanced WLP

Wafer Frame

Patterned Wafer

Wafer Bumping

WLCSP

TSV

Cu Pad/Pillar

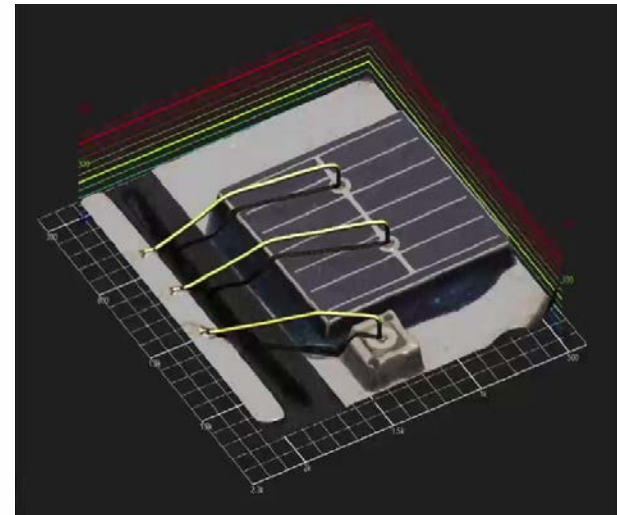
Die / Wire Bonding

IGBT / SiC / GaN

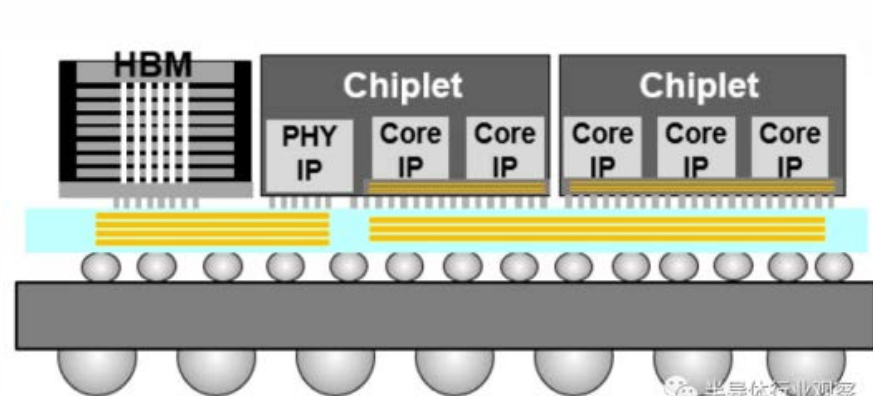
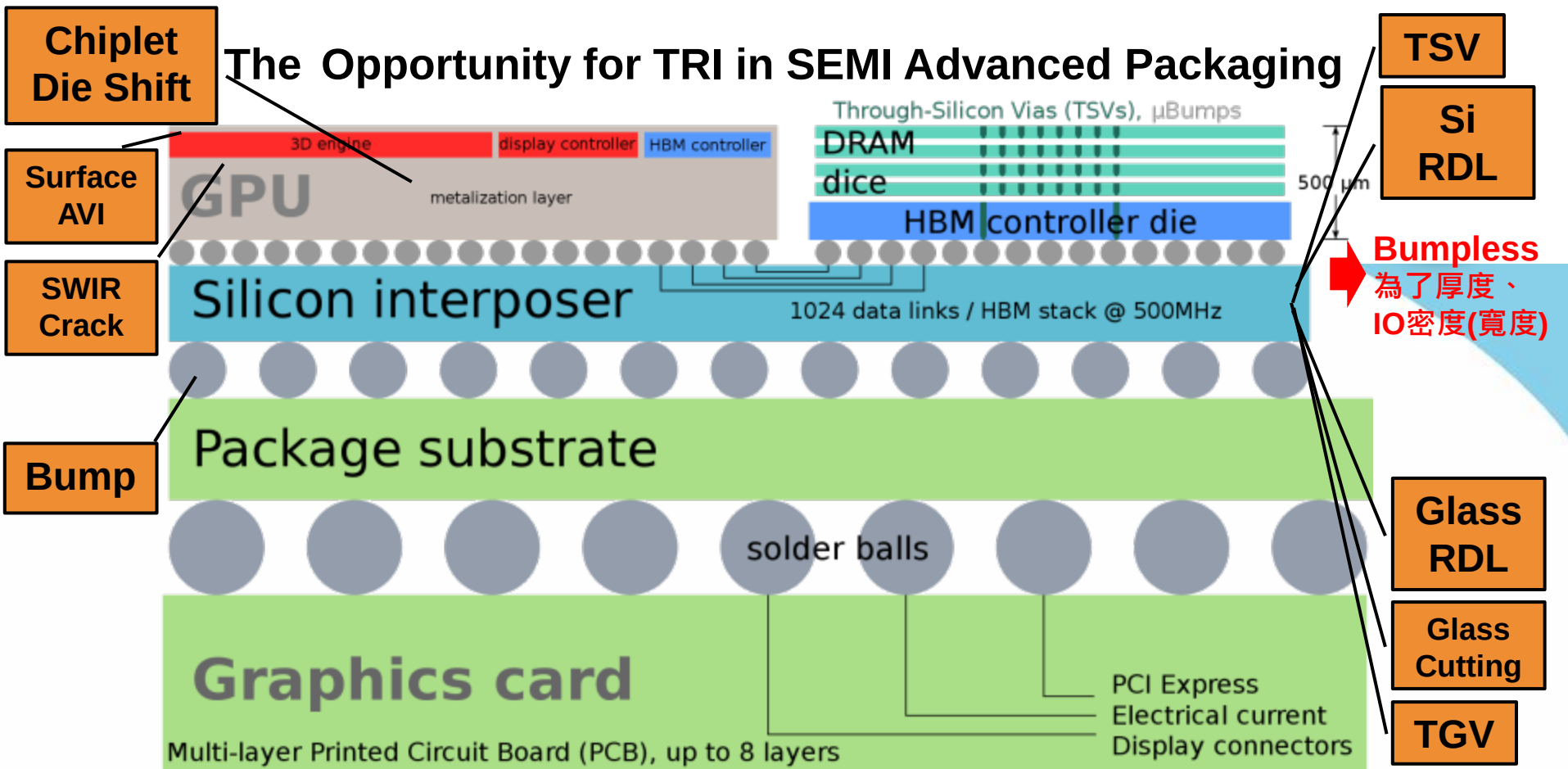
SiP

Underfill

Epoxy / Flux / Glue



The Opportunity for TRI in SEMI Advanced Packaging



TR7700Q SII TR7950Q SII TR7600 S3 Plus

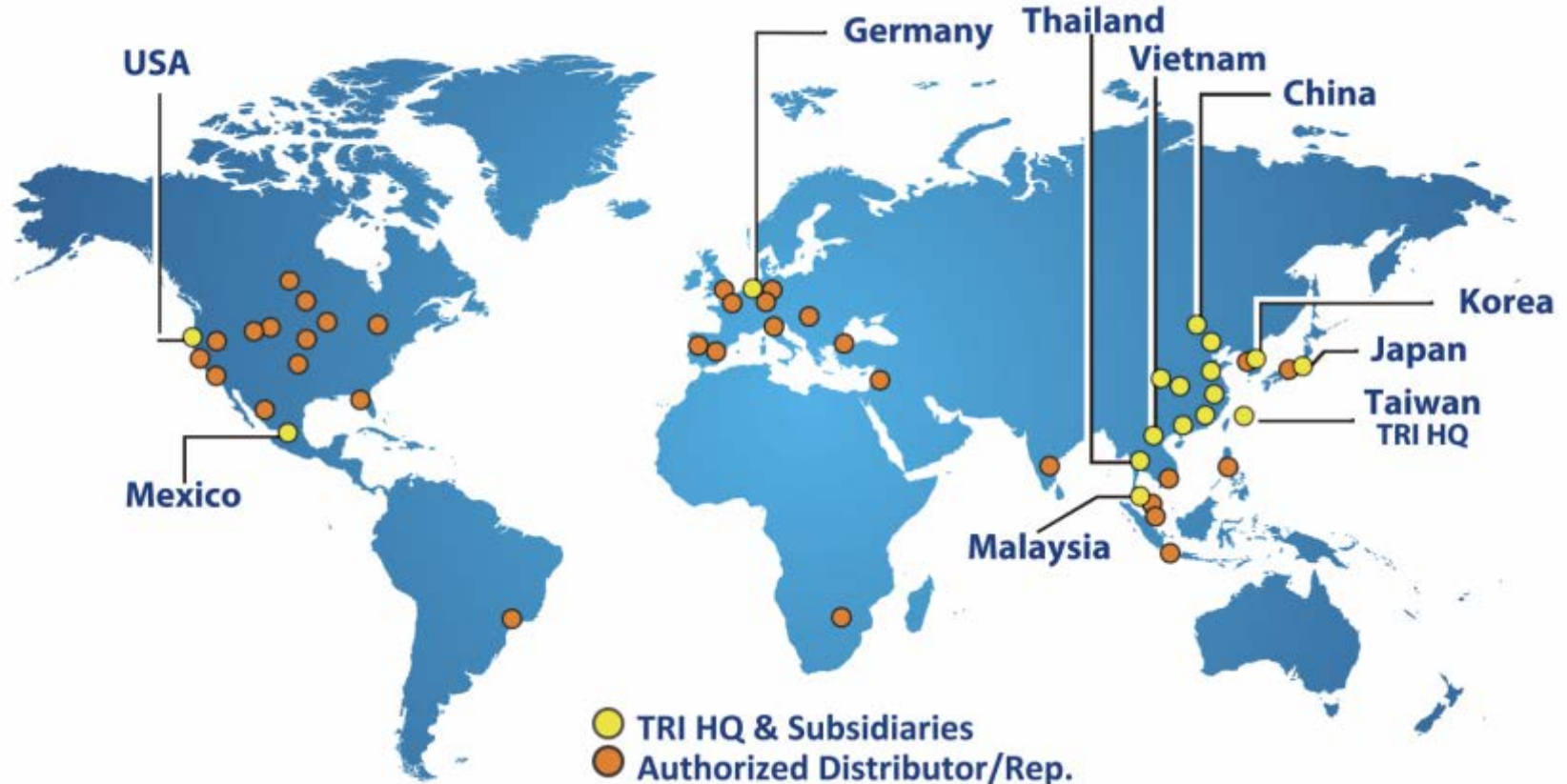
Major Competitors

- 韓國: Koh Young/Pemtron/Parmi/Mirtec
- 日本: Omron/YAMAHA/Saki
- 中國大陸: Jutze/Sinic-Tek/Holly/Unicomp
- 馬來西亞: Vitrox
- 美國: Keysight/Teradyne/Camtek(SEMI)/MVP(SEMI)
- 德國: Viscom/SPEA

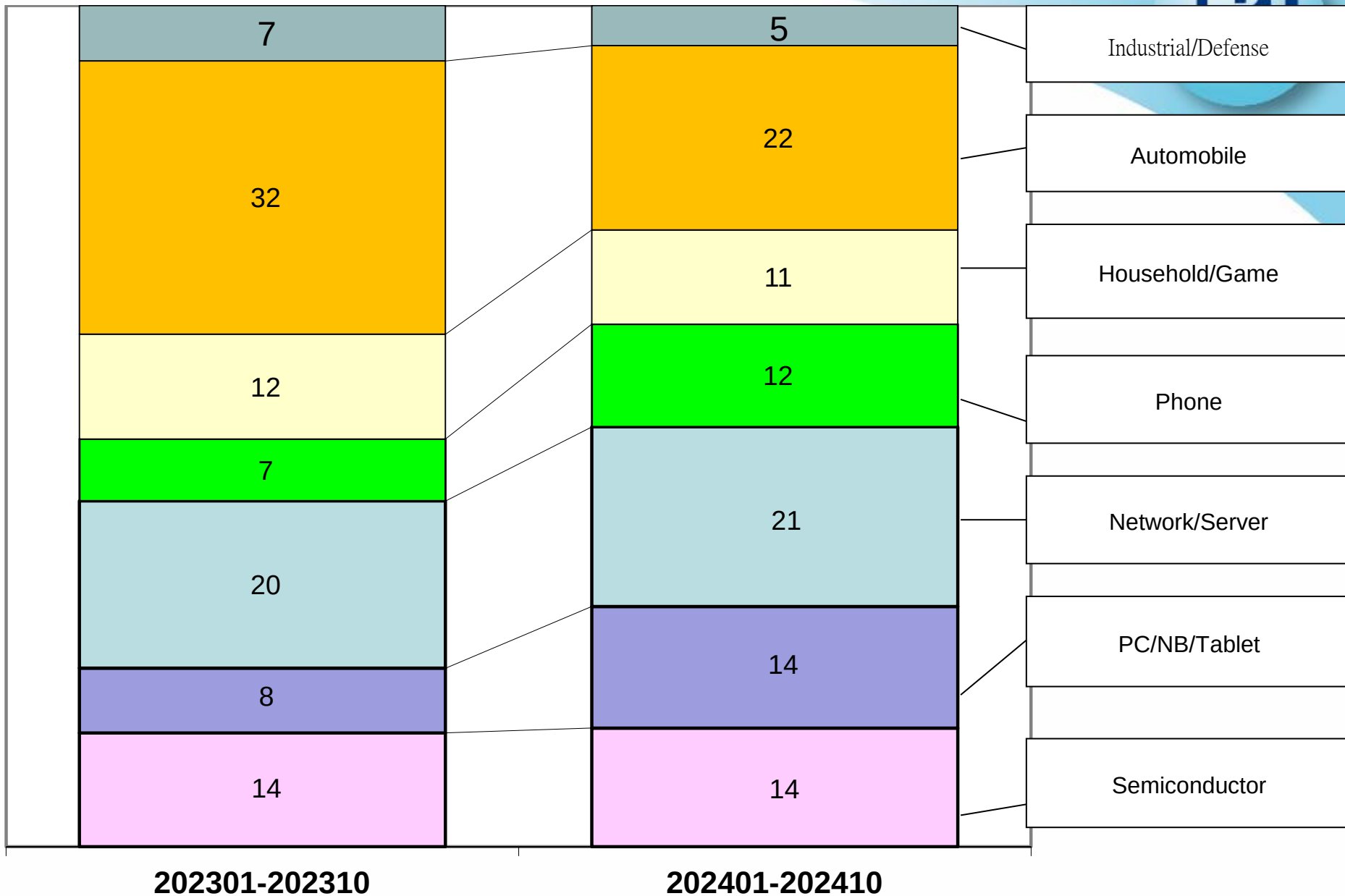
Global Service Network



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



Electronic Industry/Revenue Movement



Annual Sales

TRI

NTD Million

10000

9000

8000

7000

6000

5000

4000

3000

2000

1000

0

'07

'08

'09

'10

'11

'12

'13

'14

'15

'16

'17

'18

'19

'20

'21

'22

'23

'24~10

2541

2074

1706

3778

3894

5388

4084

5870

4754

3100

3601

4919

4387

4951

5607

6709

4435

5379

Rush capacity
buy triggered
by economic
recovery

New FCT
+7500/L

Economic
recession

Decline of
PC/NB
application

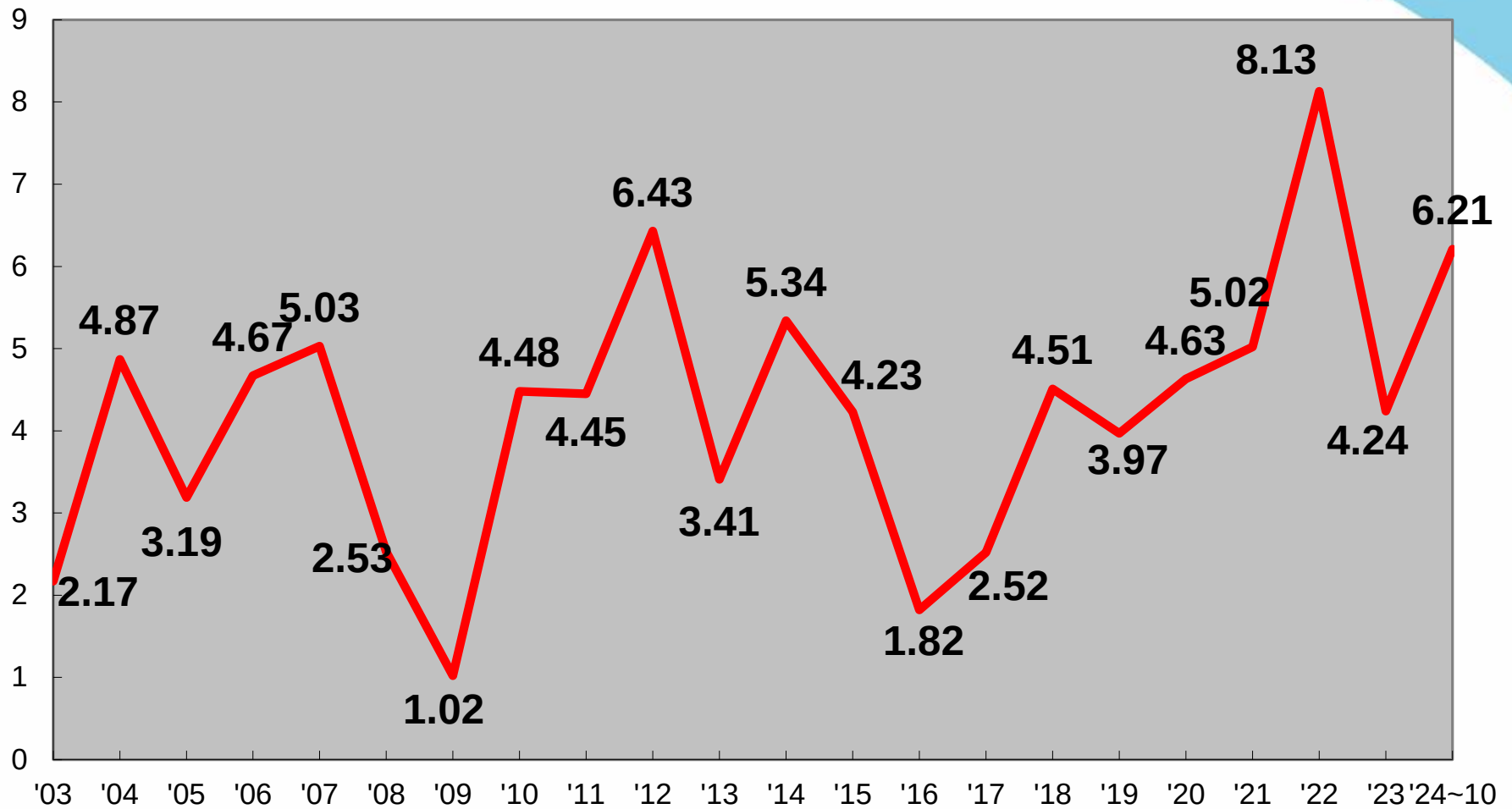
Increase of
smart mobile
devices
application

-Uncertainty of
global economy
-Delay of 3D
AOI launch
-Low price
competition in
China

-Economic
recovery
-3D AOI
-Blue-ocean

Improved
product
competitiveness

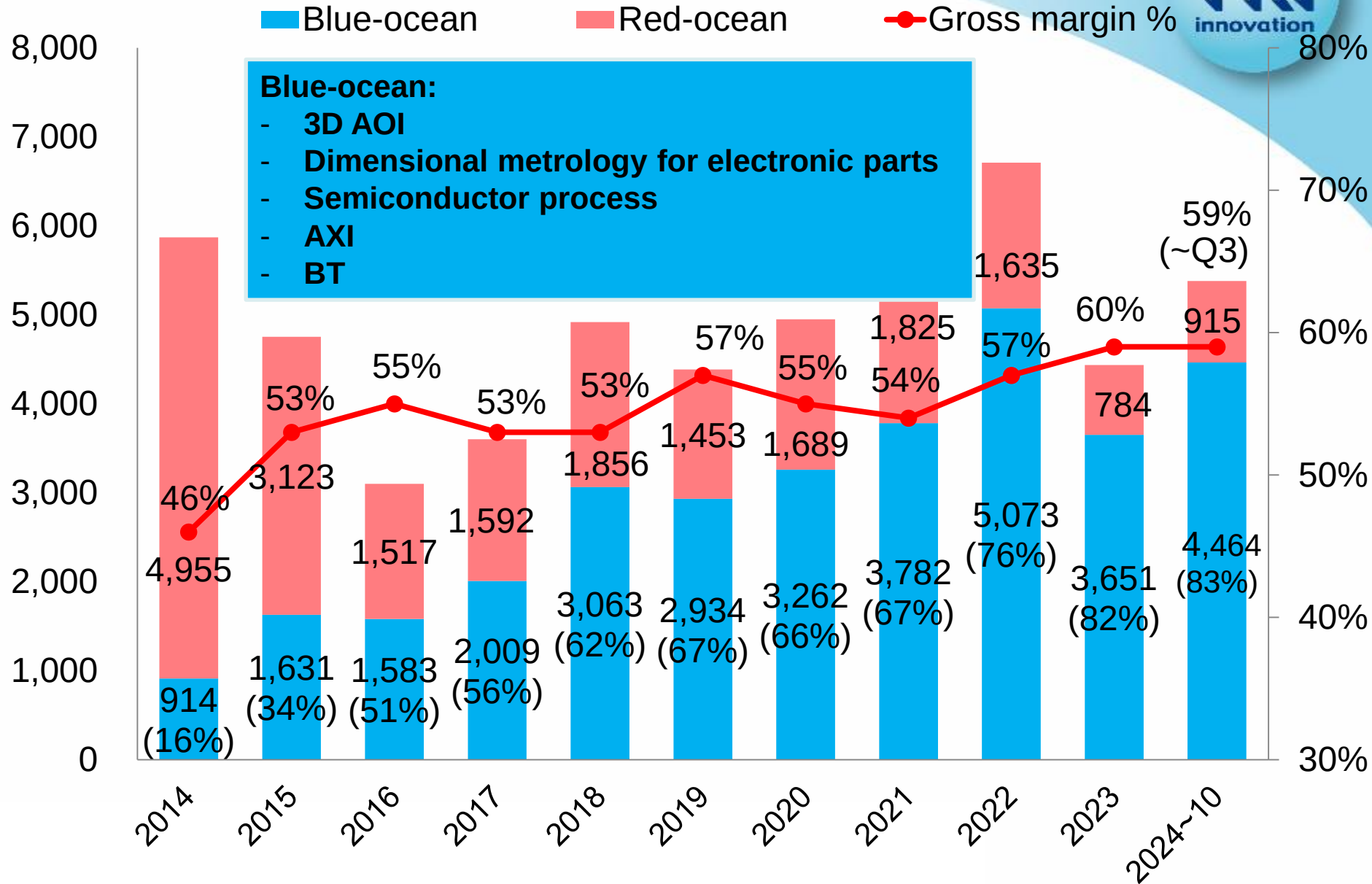
EPS



Red & Blue-ocean Market Movement in Revenue



NTD Million

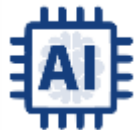




TRI 3D AOI Advantages



High Speed Line



AI-Powered Algorithms



Metrology Measurements



Smart Programming



Top or Bottom View Camera



Side-View Cameras



Smart Factory Solution



Ultra High Speed 3D Inspection!

TR7700QH SII

80 cm²/s

TR7700Q

23 cm²/s



TRI AOI supports Multiple 3D Technologies



Quad Digital
Fringe Pattern
Technology



Laser
Module



Depth from Focus (DFF)
Module

General Application

**Reflective &
Transparent
Part Inspection**

**Optimal Focus
0.5/1 μ m
High Resolution**

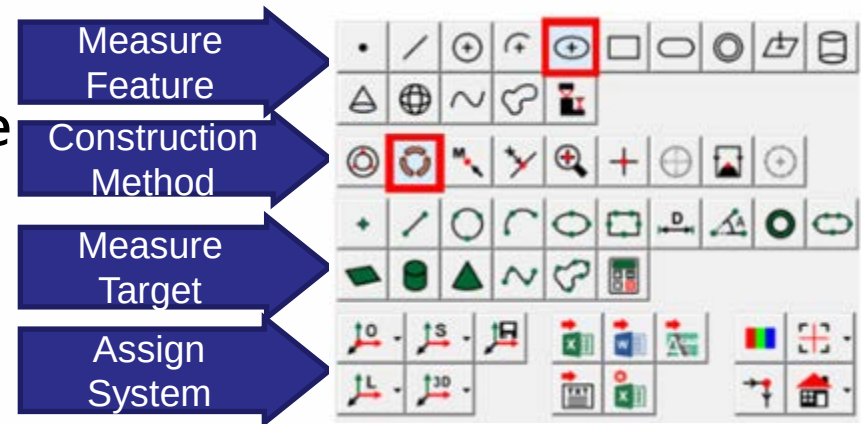
TRI Optical Measurement Functions (AOM)



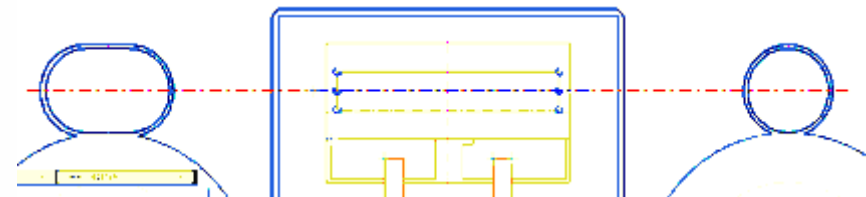
- ❖ UI: New designed and friendly user interface



- ❖ Features: More complete measurement functions will be available



- ❖ High Flexibility: Multi-Layer measurements





TRI SPI Innovations



*Fast Inspection
Speed*

3.5 μm

*Precision
Inspection*

High Resolution

Enhanced Lighting

Metrology Measurements

High Inspection Range



Solder Paste, Mini-Bumps, Glue, Flux, Mini LED Solder, Bare Board / Pad, Foreign Material

TRI AXI Advantages



High Speed Line



AI Algorithms:

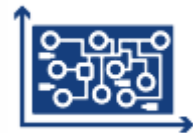
AI Voids Detection,
AI Programming,
AI Repair Station



Big Data Applications

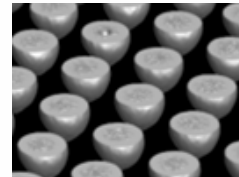
2- 30 μm

Multi-Resolution Multi-Applications

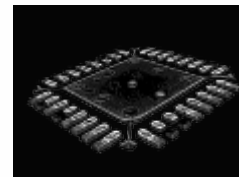


Up to 2100 x 510 mm

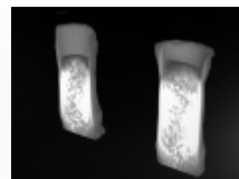
Large Board Inspection



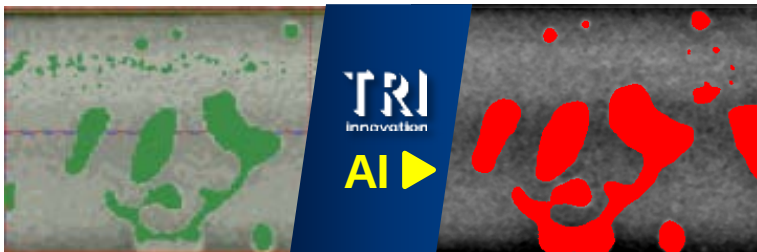
BGA Inspection



QFN 3D AXI



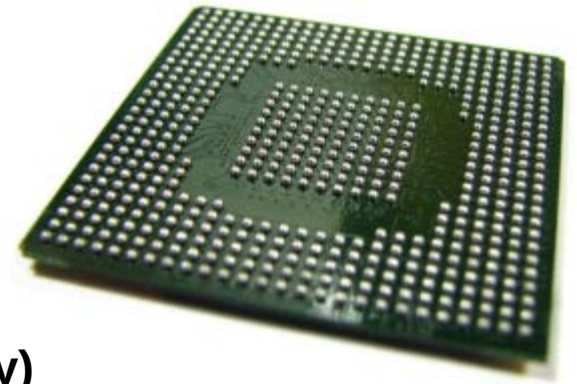
PTH/THT Filling level



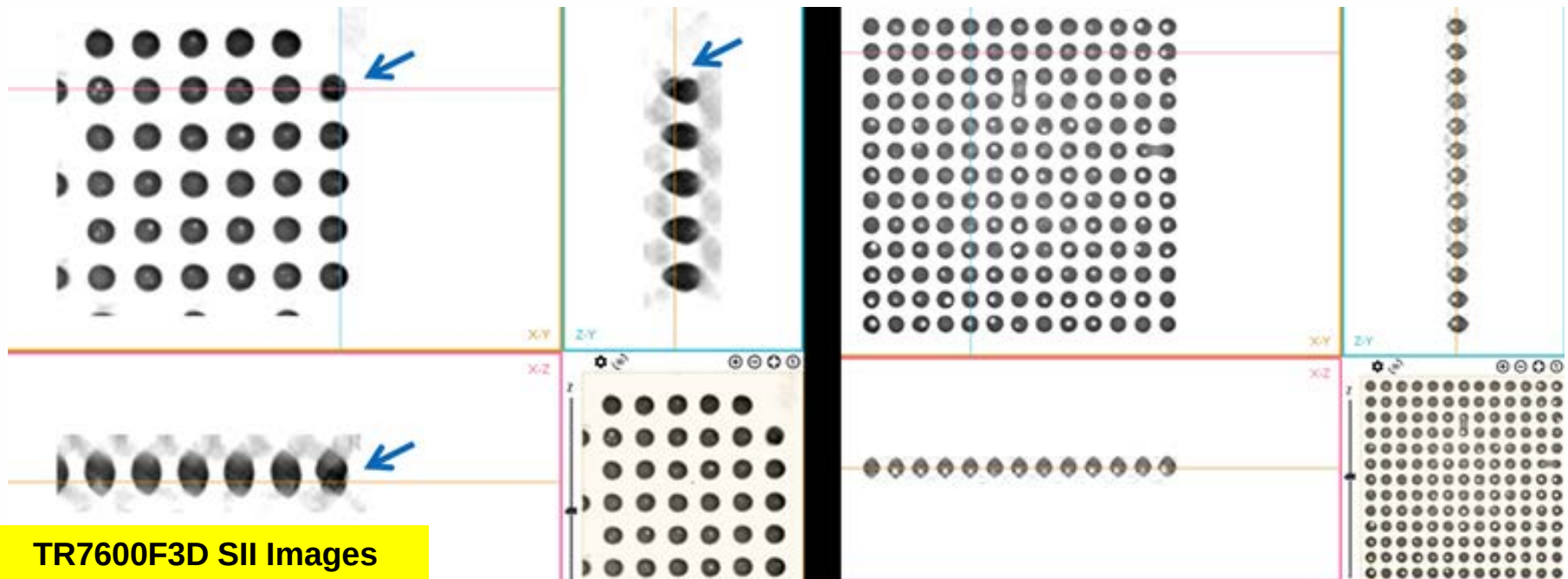
TRI AXI - BGA Inspection Application



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



3D CT (Computer Tomography)



TR7600F3D SII Images

TRI AXI Solution Benefits



TR7600F3D SII

Joints-oriented Inspections



In-depth
High-Resolution

Flat Panel Detector

TR7600LL SV

High Yield-rate Full-Inspection



High-Speed
Inspection

Line Scan Detectors

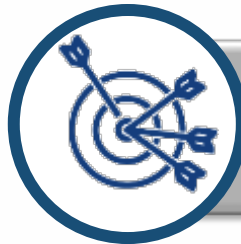
TR8100H SII Series ICT



NEW



High Pin-Count ICT
Up to 11,088 Testing Points



Full Coverage Test Solution
with Vacuum Fixture



High Speed Testing

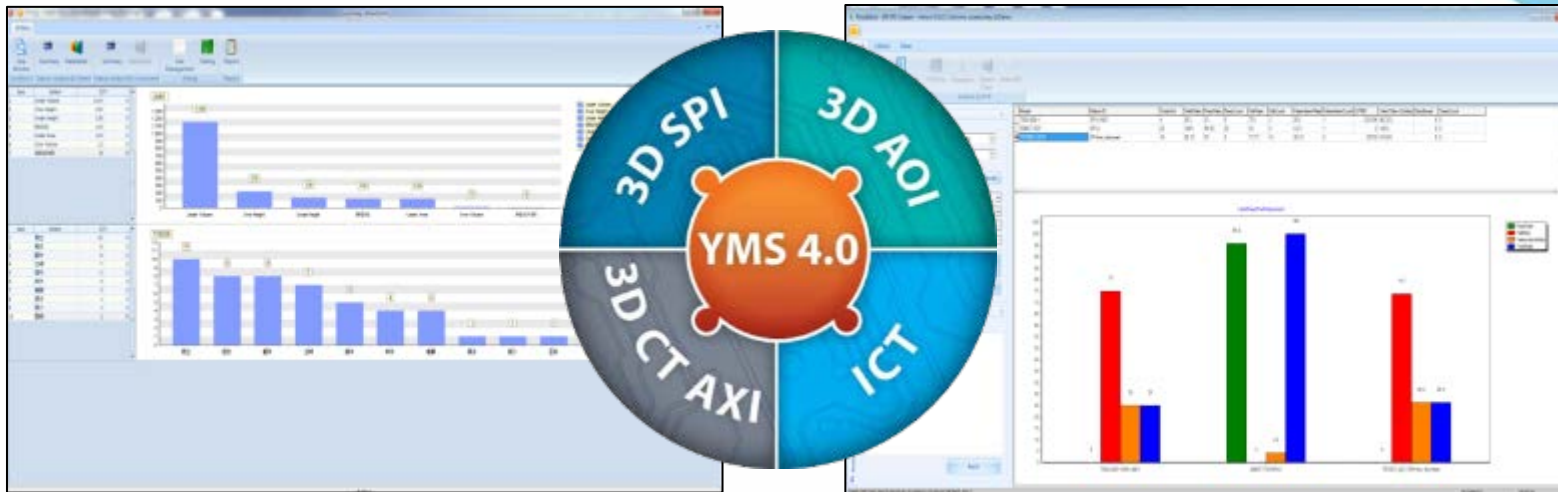
TRI's AI Solutions



1. **AI Smart Programing**
2. **AI Station**: Client-Server AI Inspection Fine-tuning
3. **AI Verify Host**: AI Repair Station (Under development)
4. **AI Inspection**:
 - AI OCV/OCR
 - AI Defect inspection
 - AI Cosmetic Inspection
 - AI Foreign Materials

TRI YMS 4.0

Yield Management System



- Improvement Monitoring
- Support Quality Improvement
- Output Reports to MES/SFCS
- PDCA improvement cycle
- Real-Time Inspection Status
- SPC and Productivity Monitoring
- Top 5 or 10 defects & Images
- Issue Drill Down line, station or process

Industry 4.0 Solution



Industry 4.0 Solution



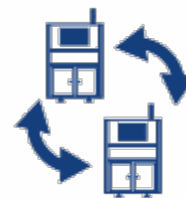
**SMART
FACTORY**



**MES
Connectivity**



**Real Time
SPC Trends**



**Closed Loop
Solution**

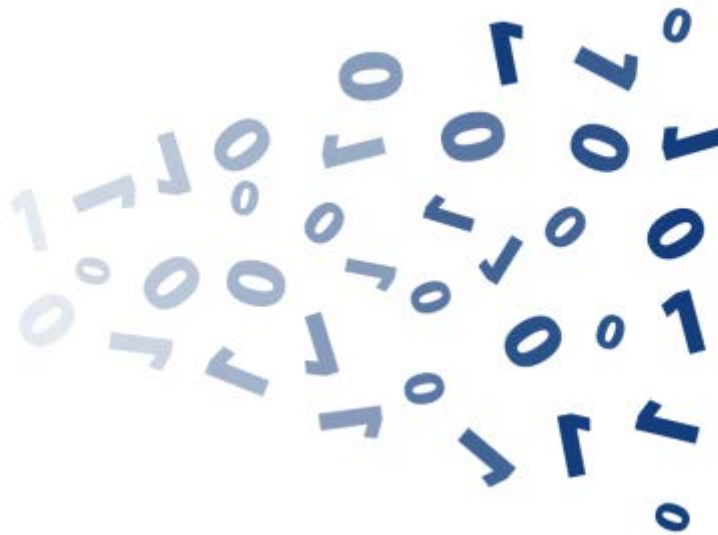


Repair Station

MES Customization – Big Data Collection



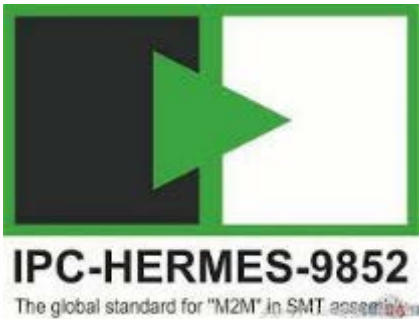
TRI solutions generate  for your MES Applications
To Improve your Production Yield Rate



Data

- PCB ID
- Component ID
- Inspection Image
- Area / Height / Volume
- Position (X,Y,Z)
- Shift (X,Y,Z)
- Void %
- *and more...*

Supports IPC-HERMES-9852 Standard



Machine-to-Machine (M2M) Communication Standard

- Based on TCP/IP and XML
- Automatically Change the Program.
- Automatically adjusts the conveyor belt width.
- Continuous tracing of boards throughout a SMT line.



Supports IPC-CFX (IPC-2591) Standard



Qualified Products



SPI

TR7007 SII Series
TR7007 SII Ultra
TR7007D Series
TR7007Q Series
TR7007Q Plus Series



AOI

TR7500QE Series
TR7700 SIII Series
TR7700Q SII Series
TR7700QE Series



AXI

TR7600 Series
TR7600F3D Series

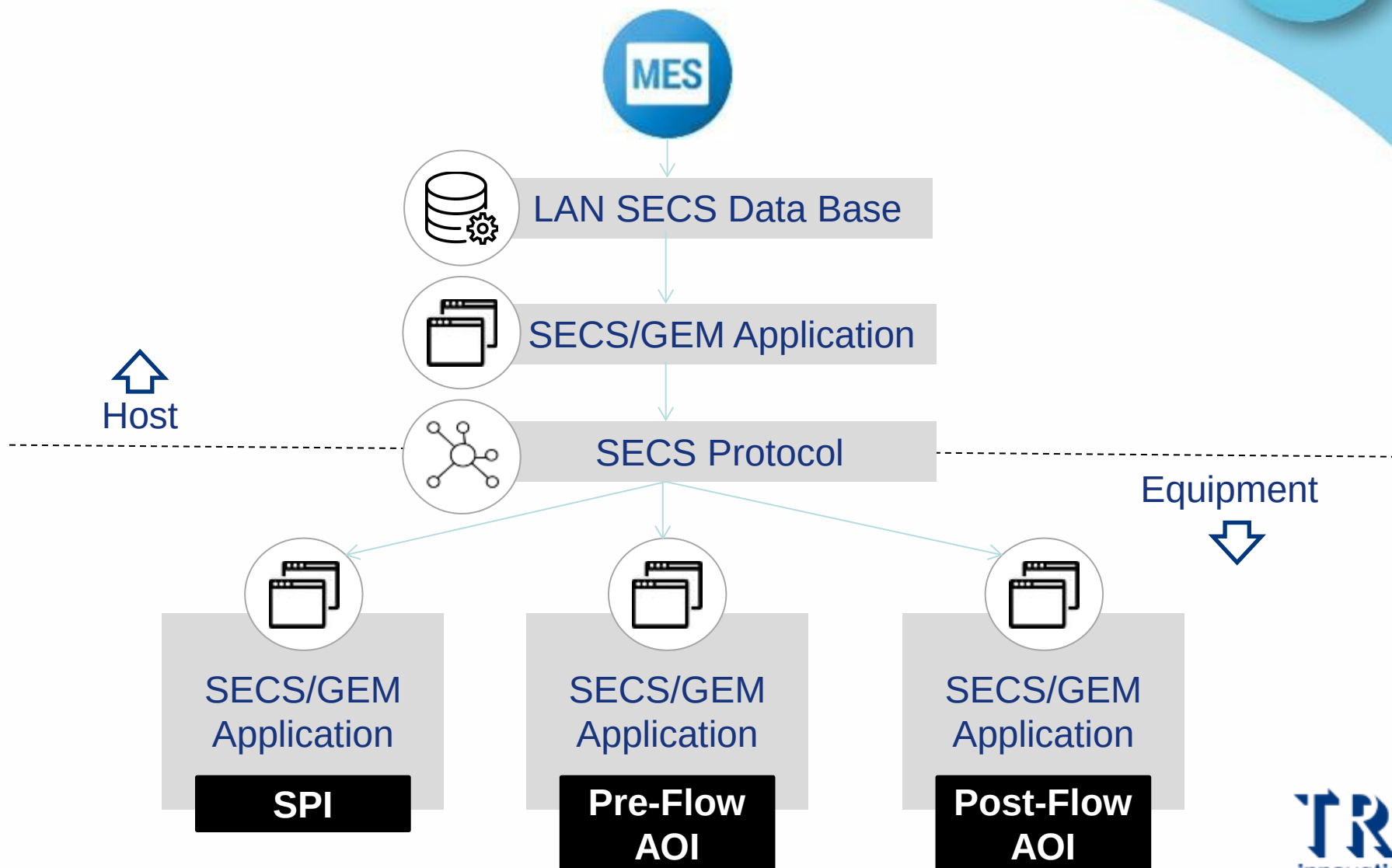


ICT

TR5001 Series

Supports SECS/GEM Structure

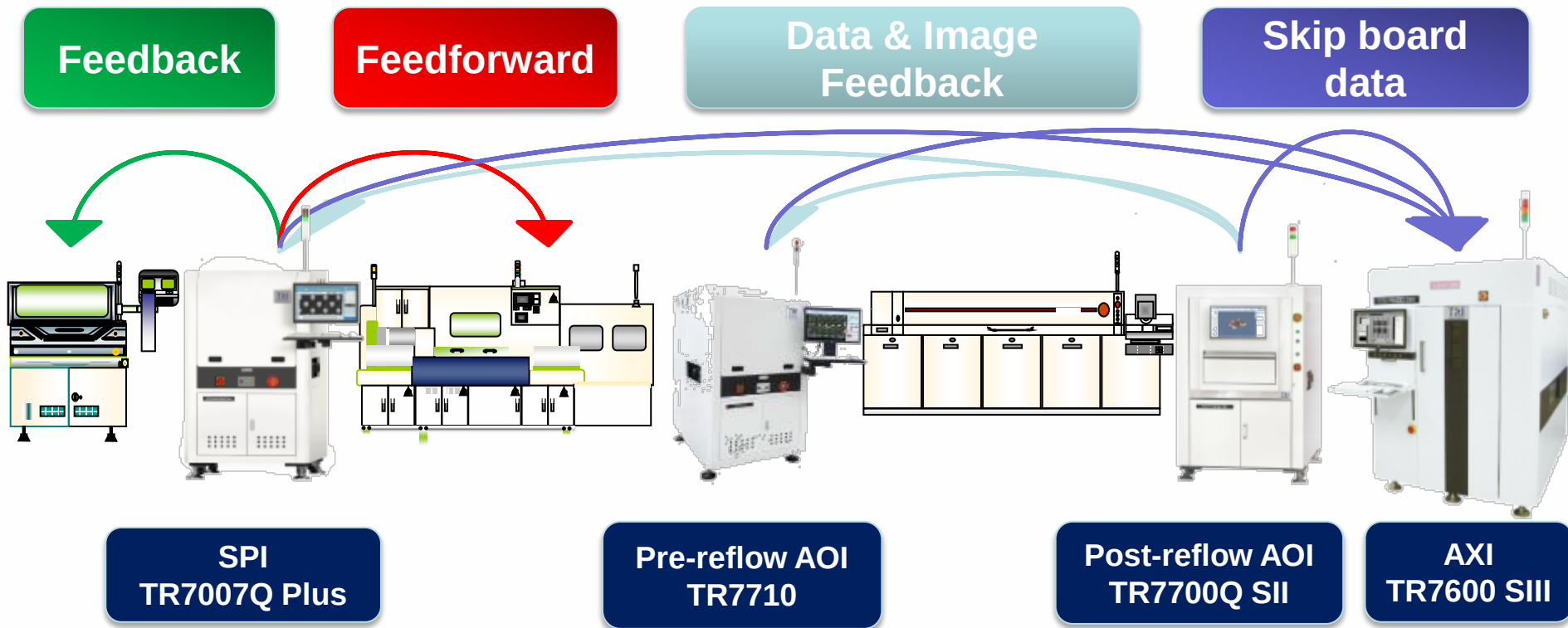
Communication Standard of Semiconductor Equipment



TRI Supports Closed Loop Solutions



TRI SPI, AOI, AXI Inspection Integration IPC CFX(data)/ HERMES(M2M)



CONNECT

Closed Loop
Industry 4.0 Standards
MES Customization

OPTIMIZE

AI Verify Host
AI Station
Shared Inspection Library
Remote Fine Tuning

MONITOR

Remote Alerts
Remote Control

VISUALIZE

Dashboard
Real time SPC Trends
Live Inspection Status

**SMART
FACTORY**
Test and Inspection

POWERED BY

TRI
Innovation



Case: TRI & NVIDIA



TRI, Taiwan's leading AOI equipment maker, has announced it's integrating **NVIDIA Metropolis** for Factories workflow and capabilities into its latest AOI systems and is also planning to use NVIDIA NIM to further optimize system performance.

- NVIDIA

[Article Link](#)



NVIDIA Metropolis is an application framework, set of developer tools, and ecosystem of companies that brings visual data and AI together to improve operational efficiency and safety across a variety of industries. It helps make sense of data created by trillions of sensors for some of the world's most valuable physical transactions.

Industrial and Manufacturing

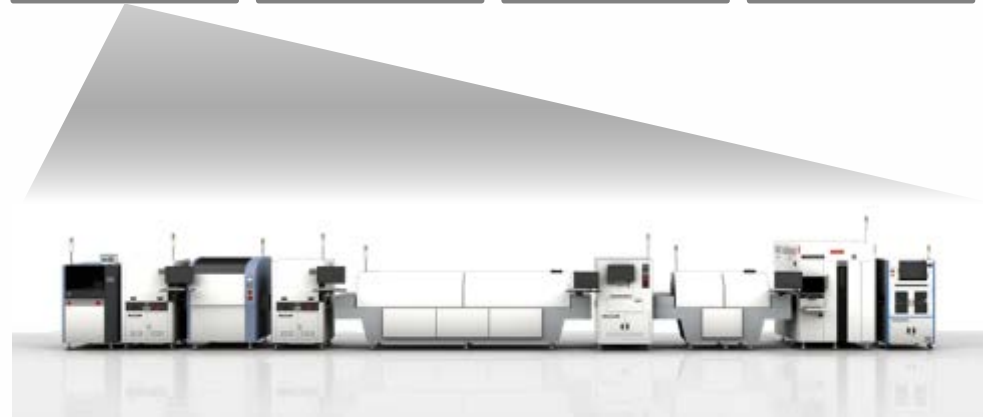
Improve industrial inspection, increase productivity, and reduce waste on manufacturing lines.

Automated
Optical
Inspection

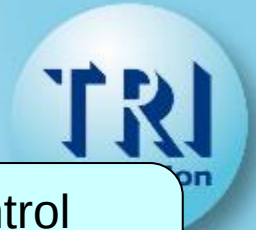
Preventive
Maintenance

Remote
Asset
Monitoring

Safety and
Compliance



In-house RD Team



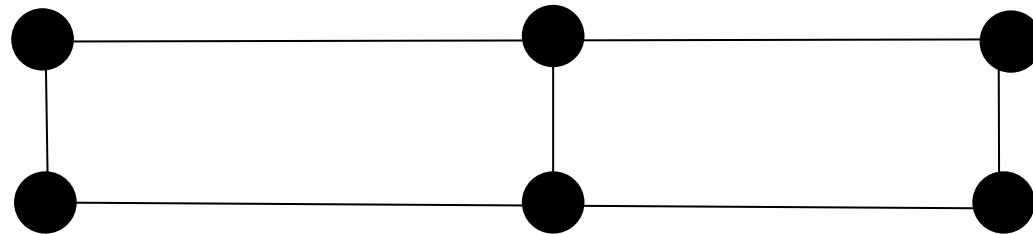
- Optical Dept.
- Mechanical Dept.

- system S/W
YMS, R/S

- PLC control
- Lighting control

IT

BT



230+ RD

Outside Support

Department of Computer science, National Taiwan Univ.

- Image processing / Understanding

Department of Power Mechanical, Tsing Hua Univ., Taiwan

- X-ray 3D Reconstruction/Digital Tomosynthesis Algorithm/ CT algorithm

Center of Measurement Standards, Industrial Technology Research

Institute Taiwan

-- Length/ Camera / Color calibration

Recent Awards



- 2018 Circuits Assembly NPI Award
- 2018 EM Asia Best Supplier Award
- 2019 Global Technology Award
- 2019 EM Asia Outstanding Product Award
- 2020 Global Technology Award
- 2021 EM Asia Innovation Award
- 2021 Global Technology Award
- 2022 EM Asia Outstanding Product Award
- 2023 EM Asia Innovation Award & Outstanding Product Award
- 2024 EM Asia Outstanding Product Award & Best Supplier Award

* TRI's Company Milestones:

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

Safe Harbor Notice



TRI's statements of its current expectations are forward looking statements subject to significant risks and uncertainties and actual results may differ materially from those contained in the forward-looking statements. Except as required by law, we undertake no obligation to update any forward-looking statement, whether as a result of new information, future events, or otherwise.

Better Testing Better Quality



THANK YOU!

***For more information about
Test Research, Inc.***



Please visit:

www.tri.com.tw

