Test Research, Inc.

www.tri.com.tw

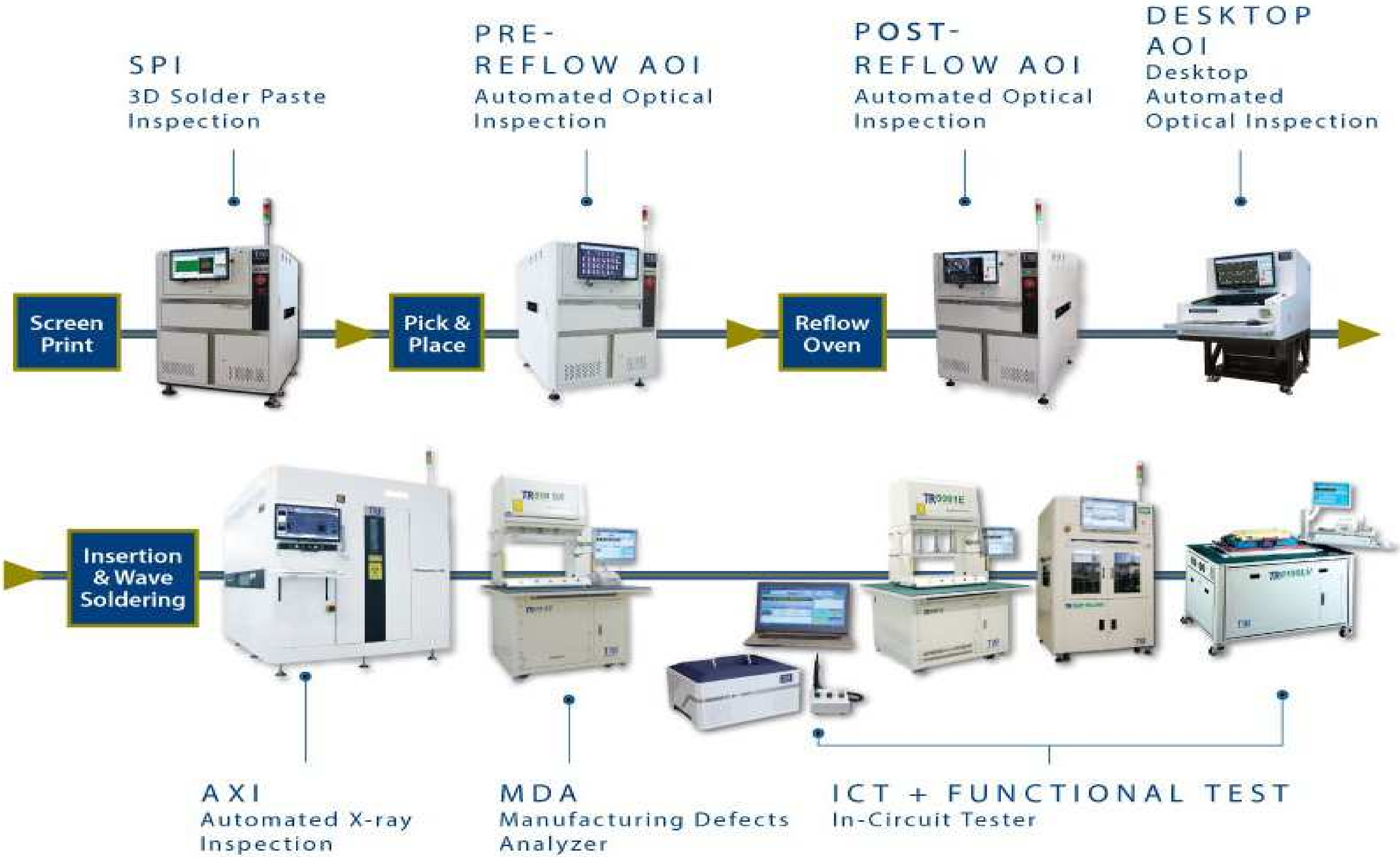
Test Research, Inc.

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

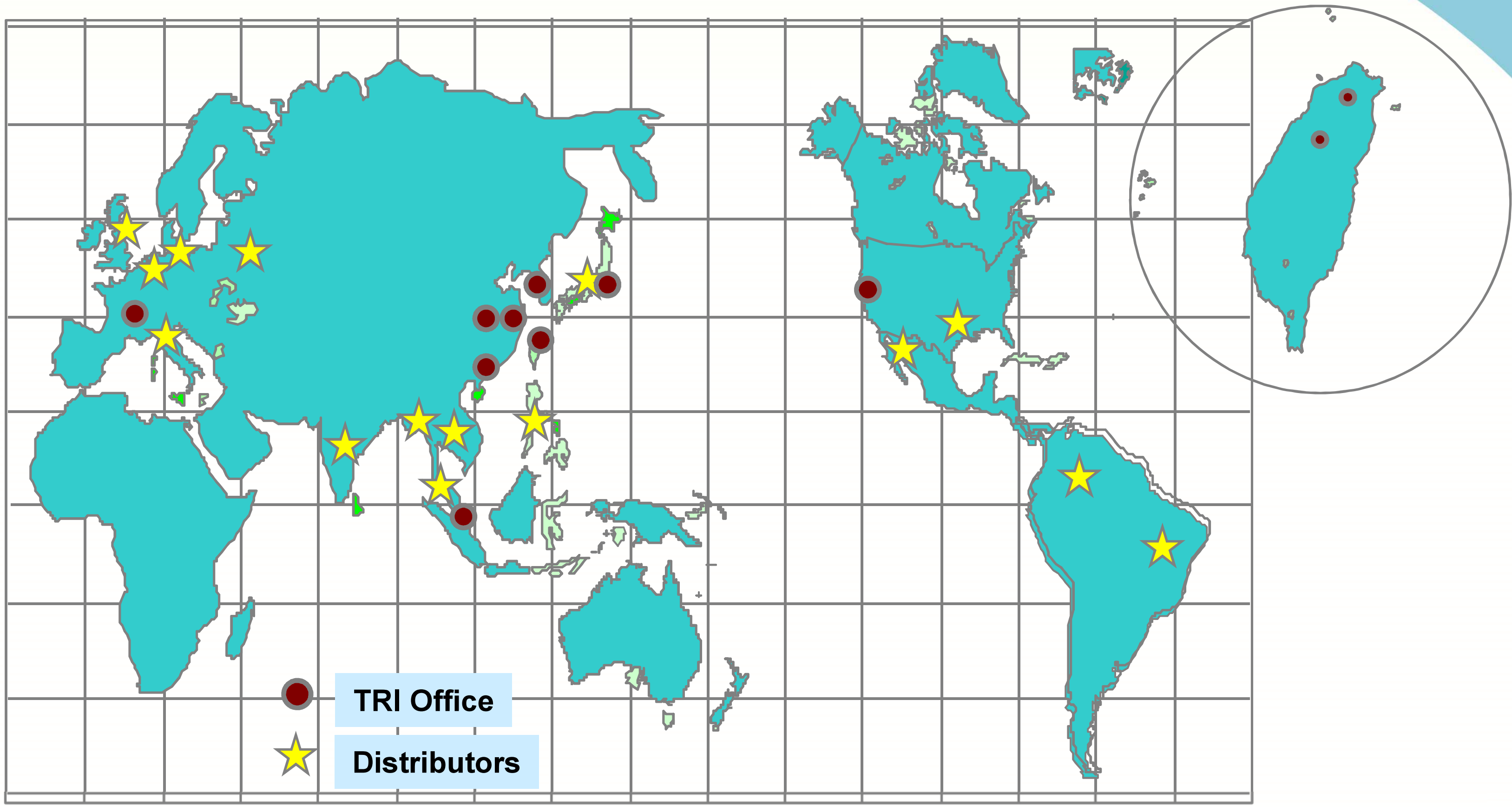
Main Product Line

- ☆ **IT(Image Tester)**
  - ☆ **SPI(Solder Paste Inspection)**
  - ☆ **Pre-reflow AOI / Post-reflow AOI**
  - ☆ **AXI(Automatic X-ray Inspection)**
- ☆ **BT(In-Circuit Board Tester)**
  - ☆ **MDA**
  - ☆ **ICT**

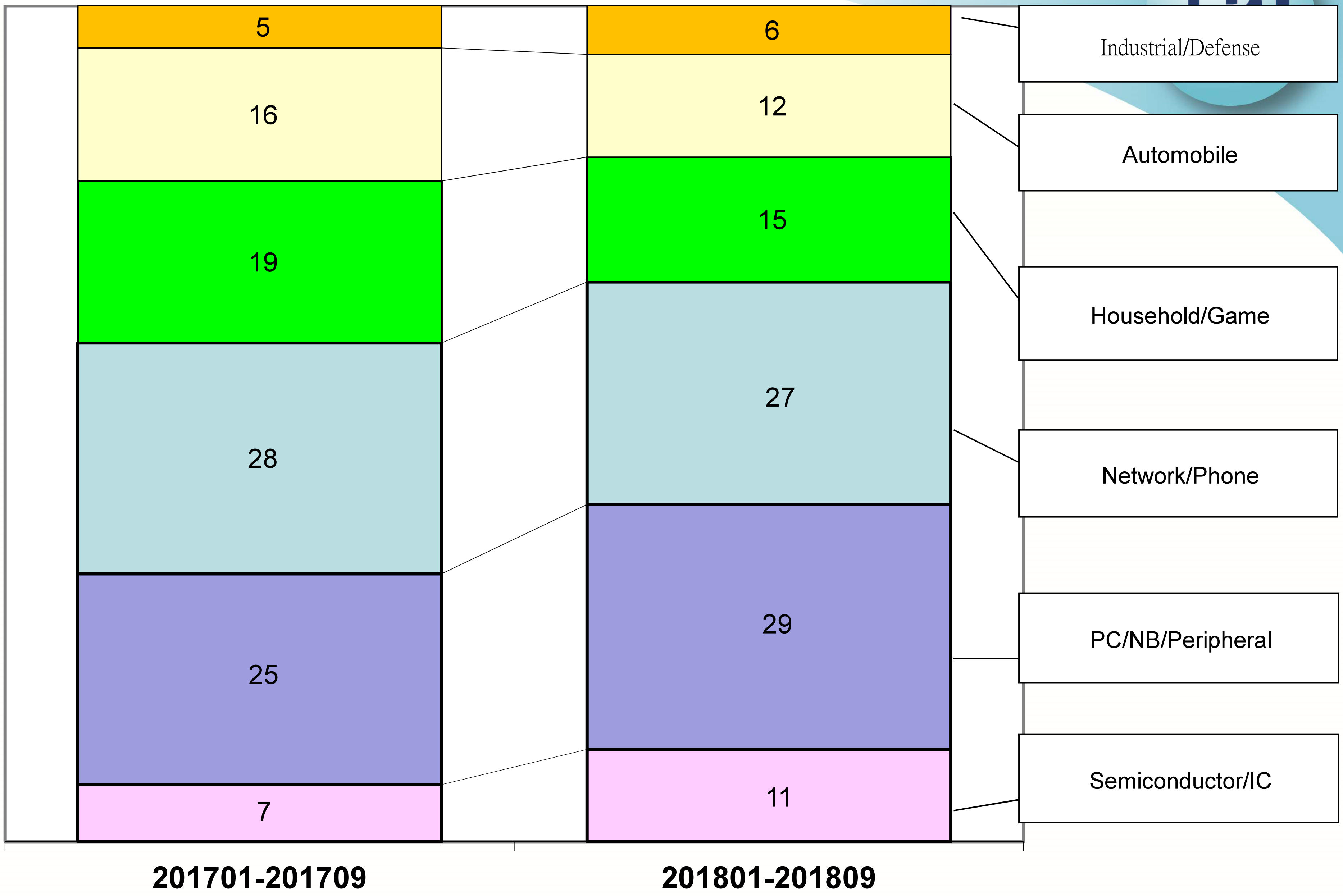
One Stop Solution Provider in PCBA Production



Global Service Network

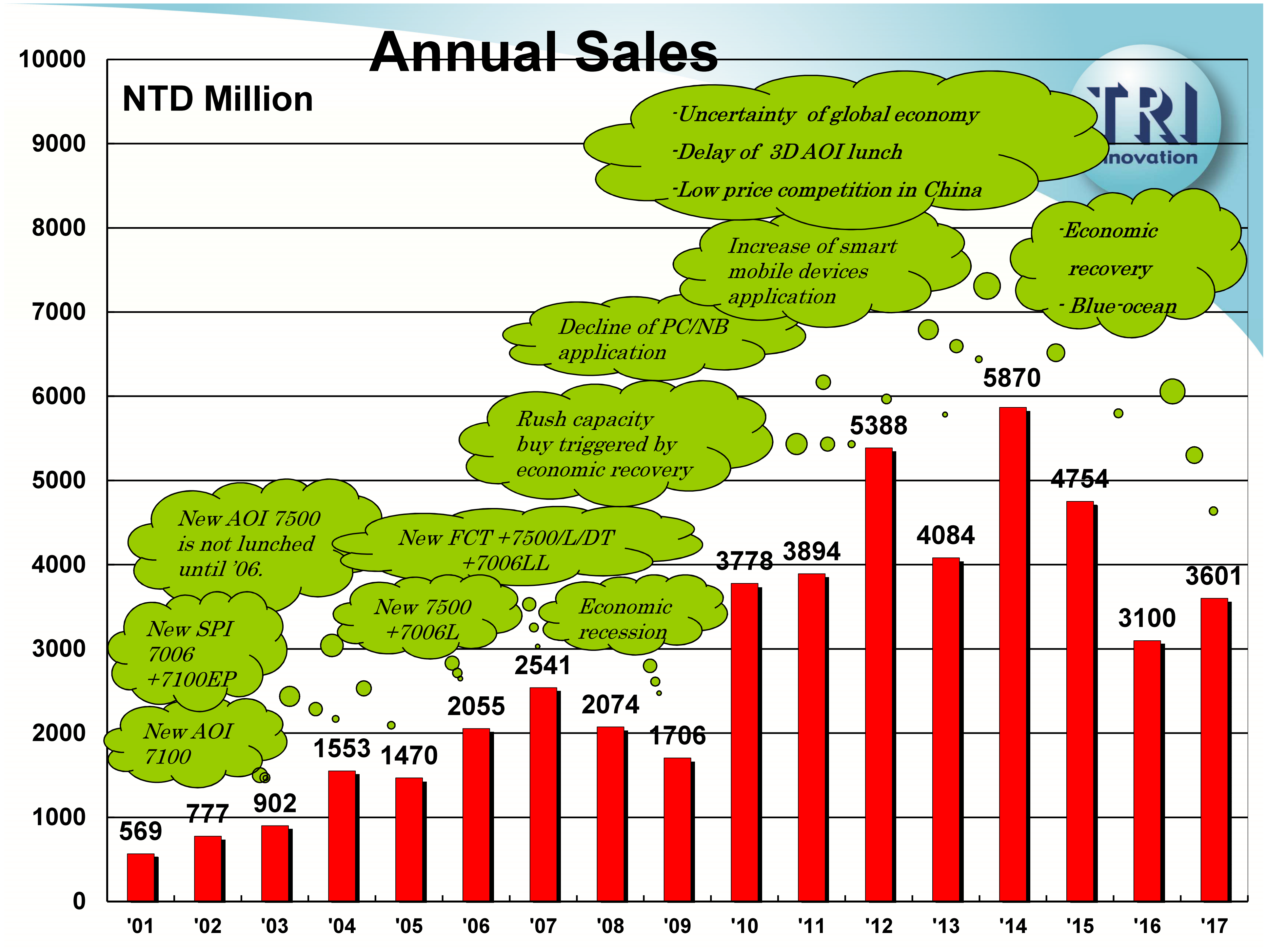


Electronic Industry/Revenue Movement



Major Competitors

- Korea: Koh Young
- Japan: Omron
- China: Jutze/Sinic-Tek/Holly
- Malaysia: Vitrox
- USA: Keysight/Teradyne
- Europe: Viscom/SPEA


Annual Sales
NTD Million
TRI
nnovation
10000
9000
8000
7000
6000
5000
4000
3000
2000
1000
0
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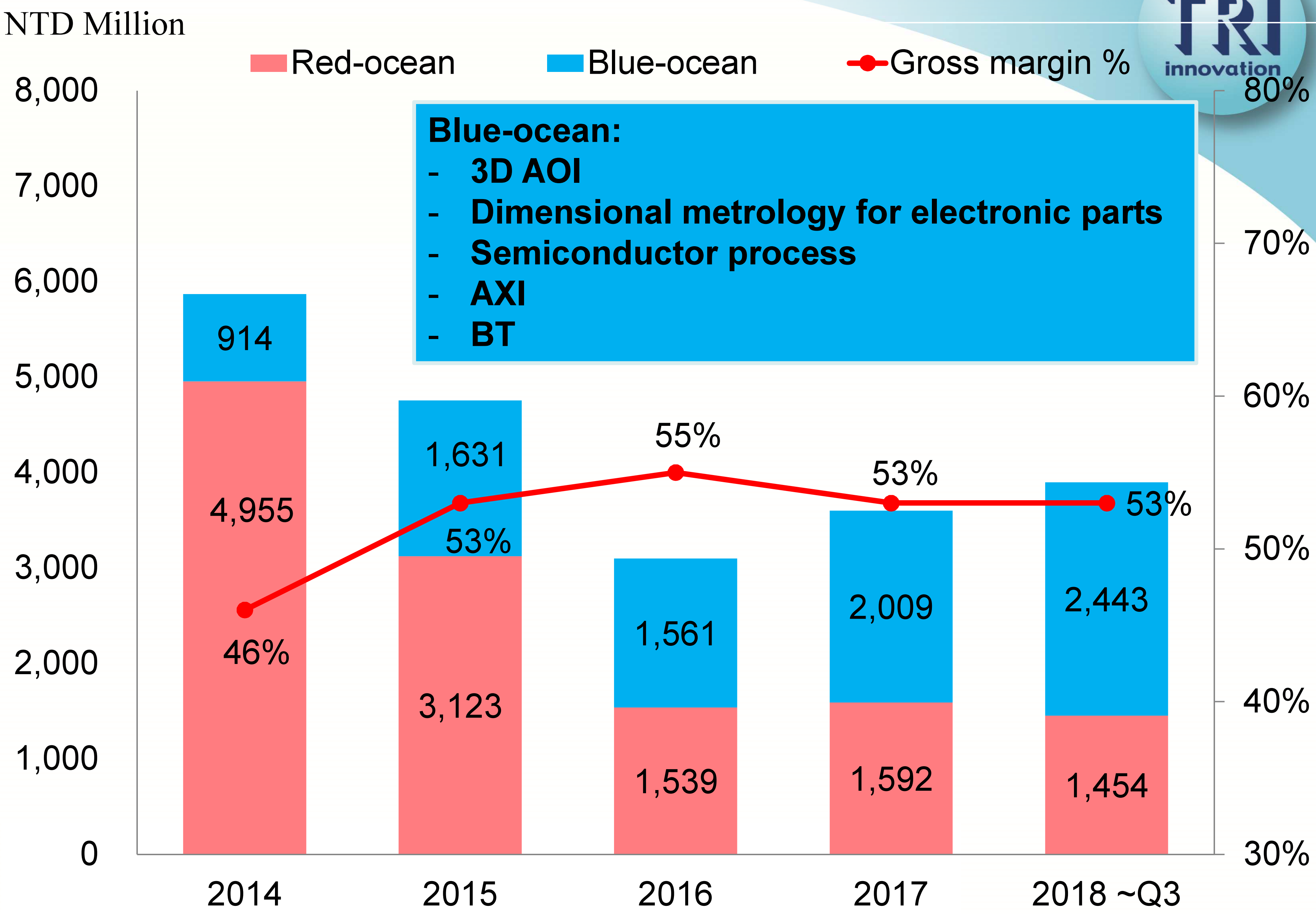
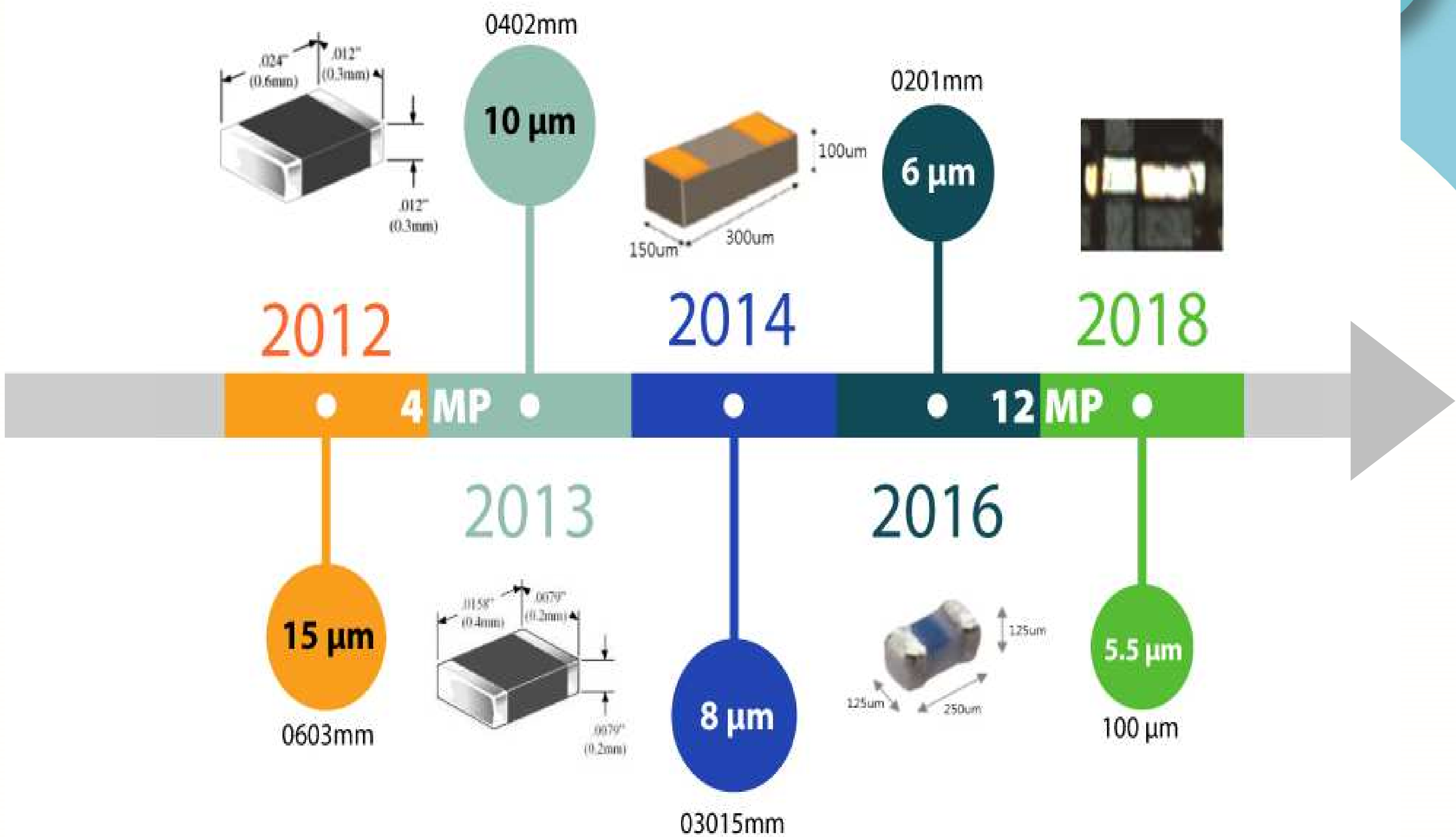
2541
2074
1706
3778
3894
5388
4084
5870
4754
3100
3601
New AOI 7100
New SPI 7006 +7100EP
New AOI 7500 is not lunched until '06.
New 7500 +7006L
New FCT +7500/L/DT +7006LL
Economic recession
Rush capacity buy triggered by economic recovery
Decline of PC/NB application
Increase of smart mobile devices application
-Uncertainty of global economy
-Delay of 3D AOI lunch
-Low price competition in China
-Economic recovery
- Blue-ocean

Red & Blue-ocean Market Movement in Revenue

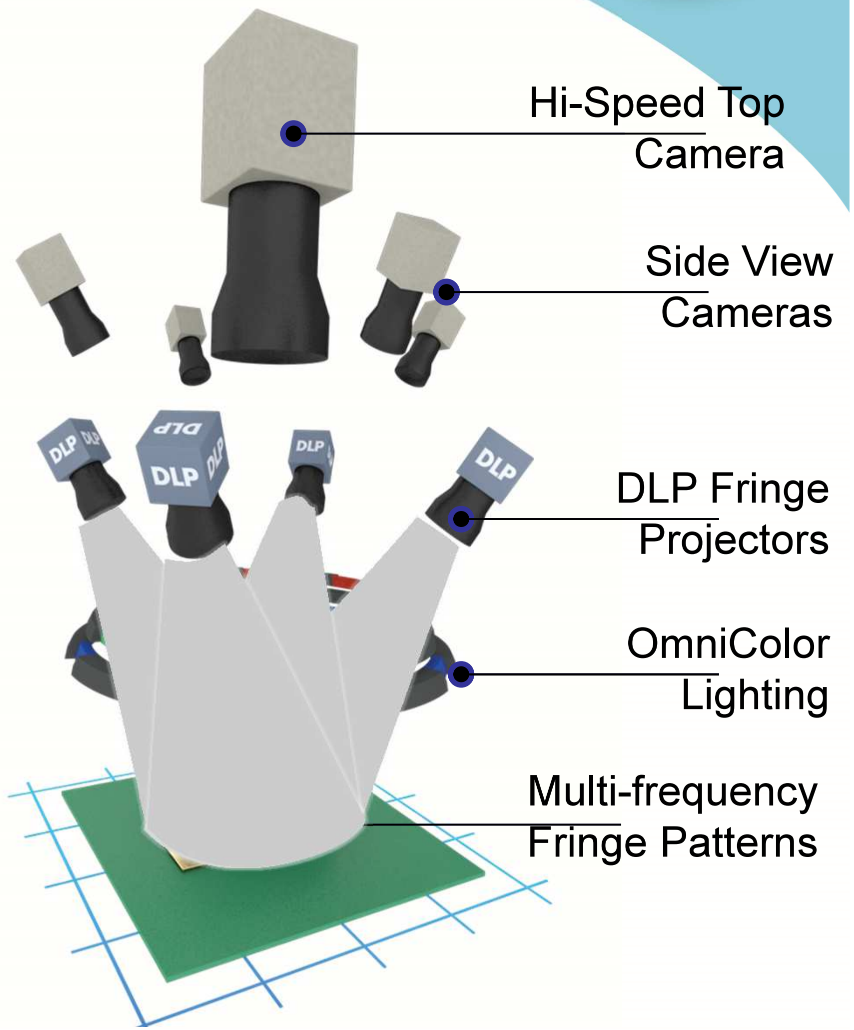


TRI AOI Milestone



3D AOI with 2D+Side view

	2D AOI	3D AOI	2D+3D AOI	Side View
Missing/ Extra comp.	Good	Good	Good	
Shift	Good	Partial	Good	
Polarity mark	Good	N/A	Good	
OCV/OCR/ Bar code	Good	N/A	Good	
Bridging	Good	Partial	Good	
Lifted comp.	Partial	Good	Good	Good
Height measurement	N/A	Good	Good	
Fine short close to comp.	Partial	Partial	Partial	Good

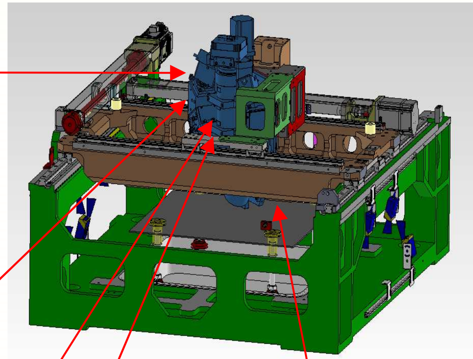


Zero escape

Integration of Vision Technologies for the Demands of Dimensional Metrology for Electronic Parts & Semiconductor Process

TRI innovation

Hardware Platform



1/5 camera + 3D Laser Optical module

1/5 camera+ 3D Fringe Pattern(F/P) Optical module

DFF(Depth from Focus) Optical module

Dual mode/high precision X,Y,Z table motion control

- Linear motor
- Enhanced Lighting
- Conveyor
- Robot

Software

- 2D
- AOM
- AVI
- Laser 3D
- F/P 3D
- DFF 3D
- Algorithm

A Full Line of 3D In-Line AXI

TR7600 SIII

a new generation of TRI's hallmark inline PCBA inspection solutions. Designed for 100% inspection coverage at production line speed, industry's fastest high resolution imaging speed with greatly improved image quality in the industry's most advanced automatic X-ray inspection.

TR7600LL SIII

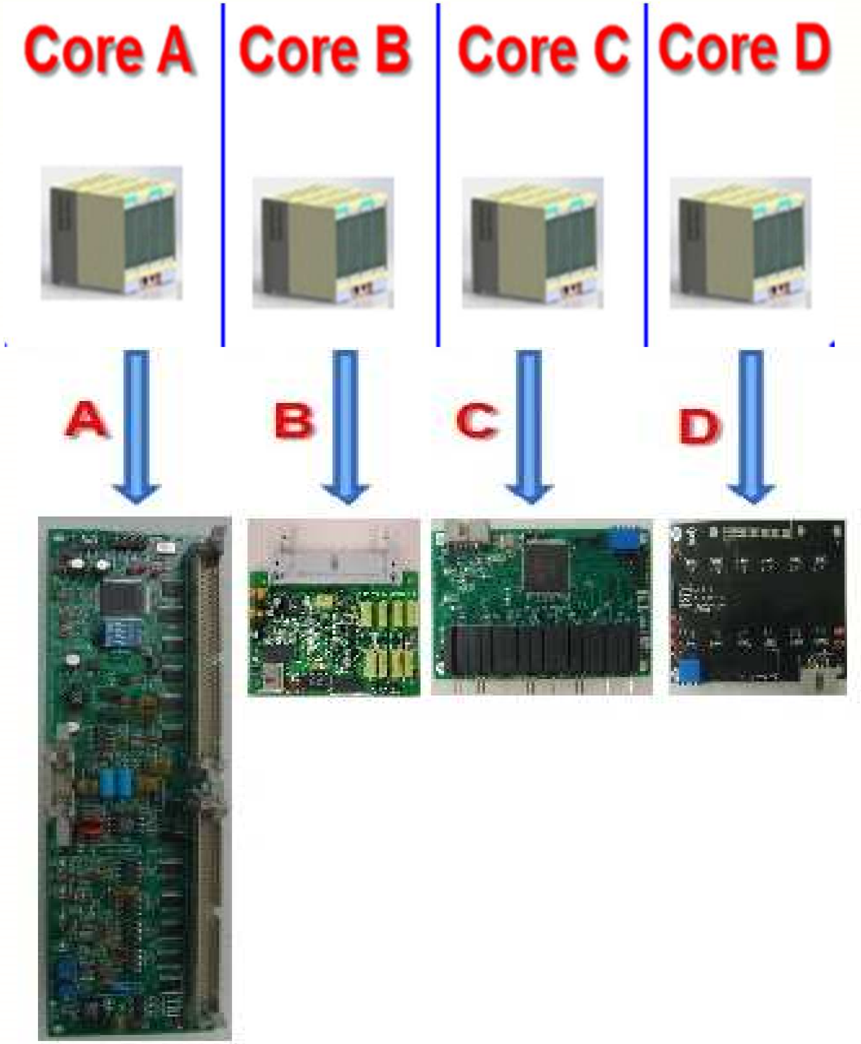
high performance and high speed 3D AXI for the largest server, networking and power PCBs. TRI's Planar CT technology brings true 3D solder joint review for maximum inspection accuracy

TR7600F3D

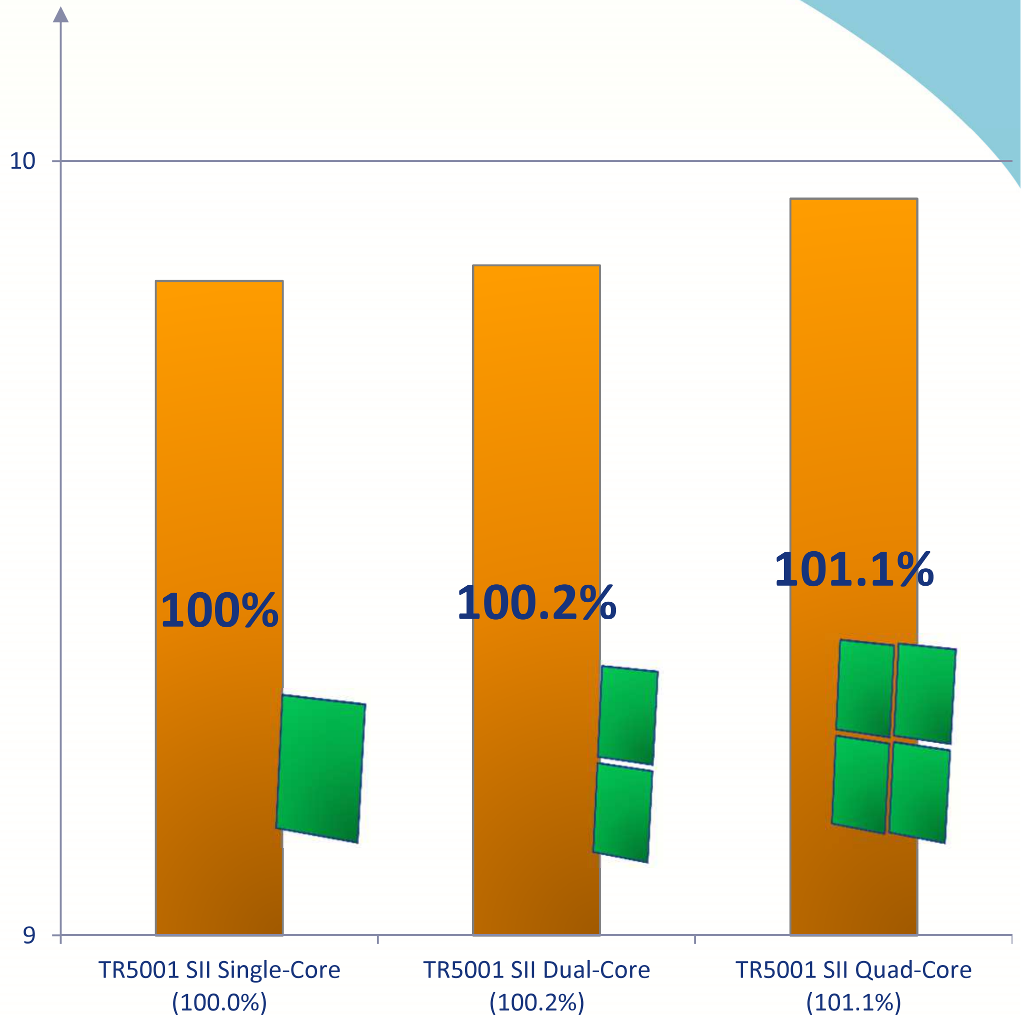
highest image quality maximize production yields on any production line

BT Parallel Test for Different DUTs (Multi-Program)

TR5001 SII Quad-code System

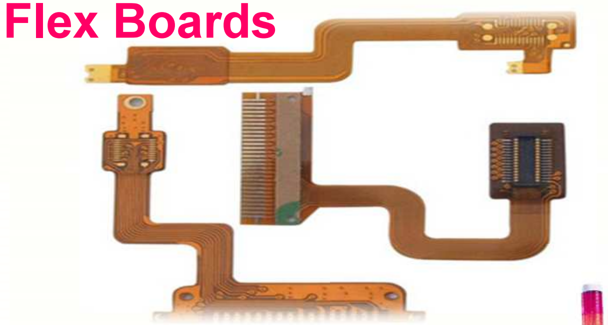


Testing Time Comparision



BT Application

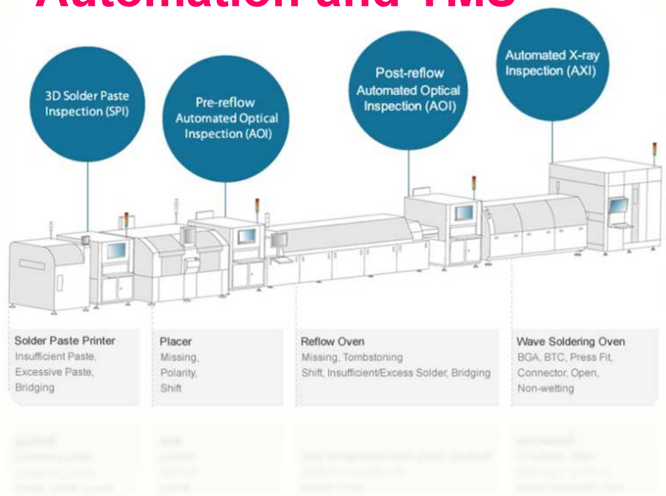
Flex Boards



White Goods

Automobile

Automation and YMS

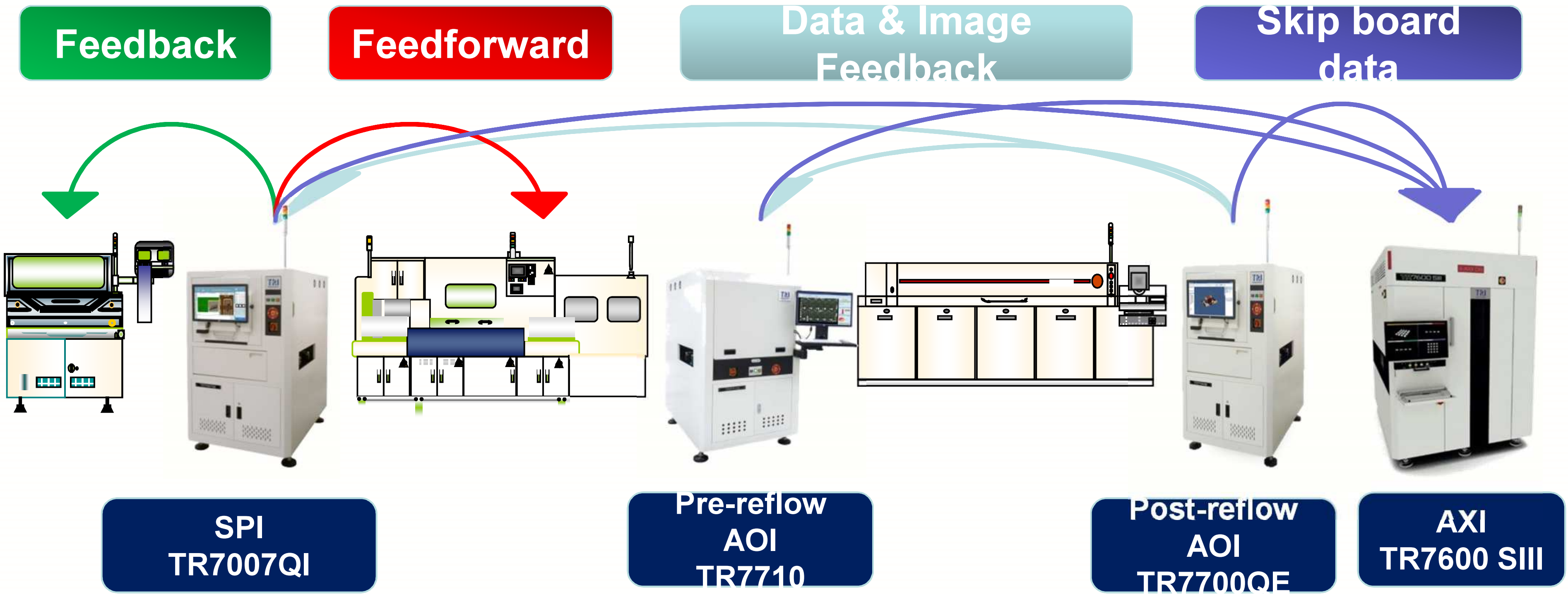


Customized FCT

TRI ICT/FCT Solutions

TRI Support Closed Loop Solutions

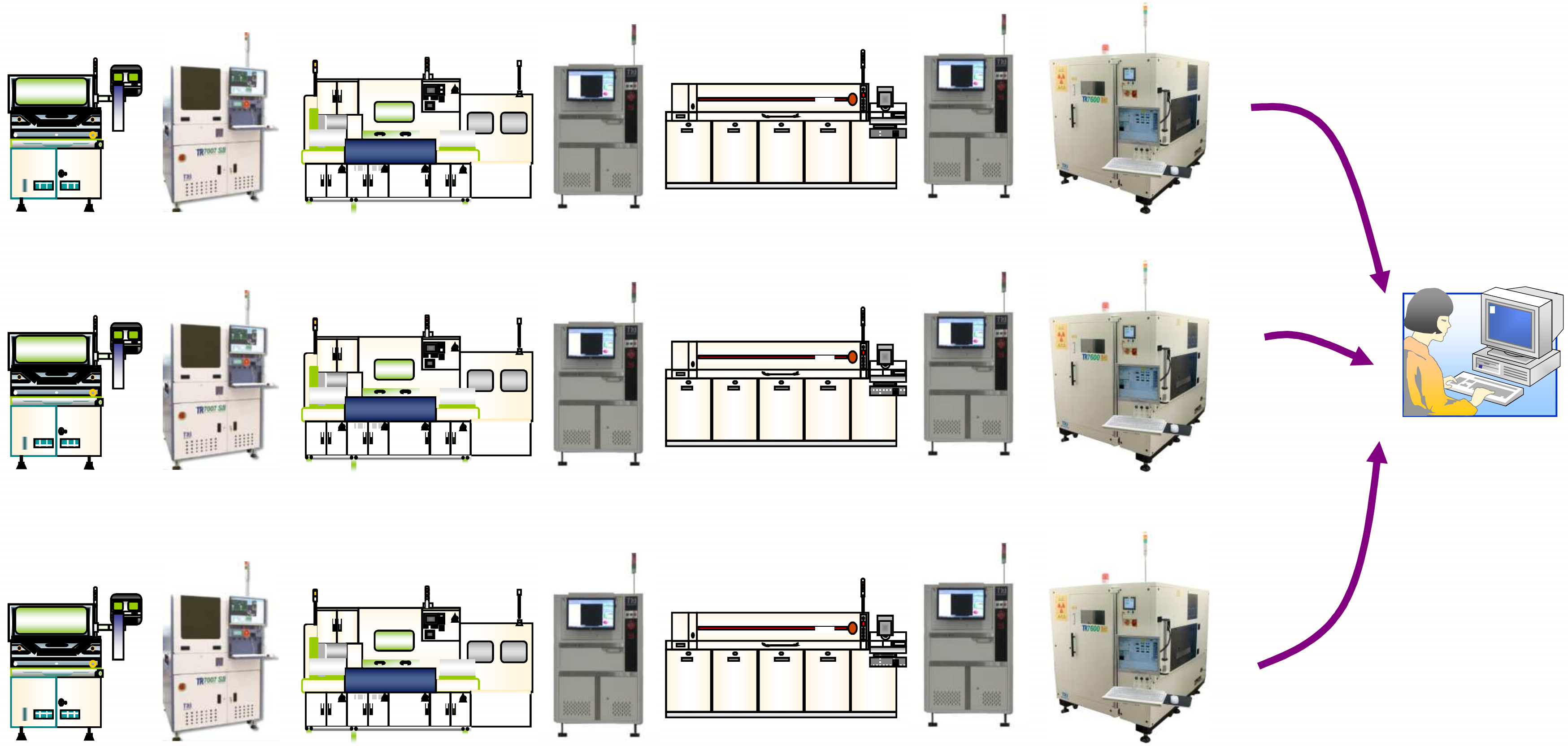
TRI SPI, AOI, AXI Inspection Integration



YMS 4.0 Support Industry 4.0

TRI combines SPI, AOI & AXI Data to Improve Yields with **Y**ield **M**anagement **S**ystem (**YMS**) by:

- Overall Image and Data Integration
- SPC Trend Monitoring
- Drill Down Root Cause Analysis



In-house RD Team

- Optical Dept.
- Mechanical Dept.

.
- system S/W
  YMS, R/S

- PLC control
- Lighting control

IT

BT

130^{+} RD
5 PhD

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 Tomosynsis Algorithm/ CT algorithm

Center of Measurement Standards, Industrial Technology Research Institute Taiwan
-- Length/ Camera / Color calibration

Recent Milestones

- 2015 EM Asia Innovation Award
- 2015 Global Technology Award
- 2016 EM Asia Best Supplier Award
- 2016 Global Technology Award
- 2017 EM Asia Innovation Award
- 2017 Circuits Assembly NPI Award
- 2018 EM Asia Innovation Award
- 2018 Circuits Assembly NPI Award

2018~Q3

Financial Statements

Consolidated Income Statement

(NTD M)	'18~Q3 (A)	'17~Q3 (B)	Diff. (C=A-B)	% C/B	Remark
Revenue	3,897	2,746	1,151	42%	The increase of market demand & product competition capability
Gross profit margin	2,056	1,444	612	42%	2018~Q3: 52.8% vs. 2017~Q3: 52.6% The depreciation of USD(30.54→29.92)
Operating expenses	1,024	839	185	22%	The increase of personnel expenses
Operating profit	1,032	605	427	71%	
Non-operating income & expenses	41	-36	77	NA	The appreciation of USD(29.76→30.53)
Profit before income tax	1,073	569	504	89%	
Income tax expense	213	91	122	135%	
Profit	860	478	382	80%	
EPS	3.64	2.03	1.62	80%	

Consolidated Balance Sheets

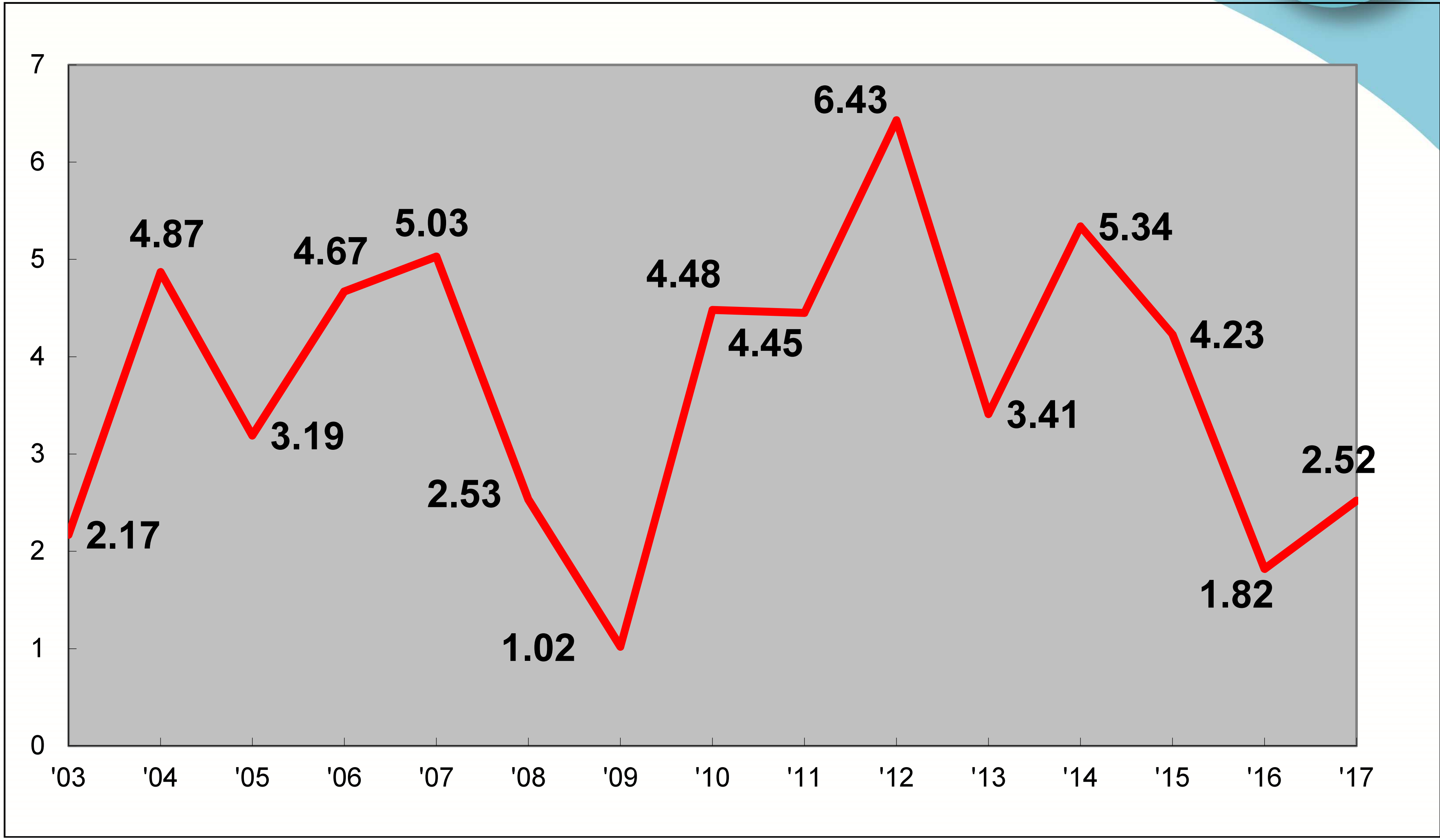
(NTD M)	2018/9	2017/9	Diff.	Remark
Cash	508	1,273	-765	The decrease of cash generated from operations
NR & AR	2,592	1,665	927	The increase of revenue
Inventory	1,023	728	295	The increase of revenue
Other current Assets	83	61	22	
Fixed assets	2,163	2,168	-5	
Other non-current Assets	92	65	28	

(NTD M)	2018/9	2017/9	Diff.	Remark
NP & AP	695	682	13	The increase of revenue
Income tax payable	183	48	135	The increase of income & tax rate
Expense payable	258	190	68	
Other current liabilities	35	32	3	
Non-current liabilities	146	113	33	

Consolidated Finance Ratio

	’14	’15	’16	’17	**’18~Q3**
Gross Margin %	46	53	55	53	**53**
Operating Income %	23	24	18	21	**26**
Net Income %	22	21	14	17	**22**
ROE	23	18	8	12	**17**
Accounts Receivable Days	68	101	160	150	**153**
Inventory Days	92	131	173	165	**152**
Liability Ratio(D/A)	16	14	11	17	**20**
Current Ratio	476	528	659	408	**359**

EPS



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1.02
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4.45
6.43
3.41
5.34
4.23
1.82
2.52

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

TRI innovation

THANK YOU!

For more information about Test Research, Inc.

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QA No.041005339
ISO 9001

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台灣精品標誌
SYMBOL OF EXCELLENCE
WINNER

TRI ne stop solution