New Inspection Solution for Probing Technology

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Overview

- Background / Introduction
- Inspection Solution for Probing Technology
  (1)In Line Inspection Solution : AOI / Prober
  (2)Off Line Inspection Solution : Probe Card AOI / 3DMS
- Future Work for the Inspection Solutions
- Conclusions
- Acknowledgement

“ To Be , or not to Be :

That is a Question! ”

Probing Inspection

Background: Cost is Key!

(1) Usually, Test Hourly Rate not include Full Inspection Cost!

Test Cost just cover minimum inspection investment!

(2) The Inspection Technology must cover the Probing Quality Control as

KGD / Zero Defect Business!

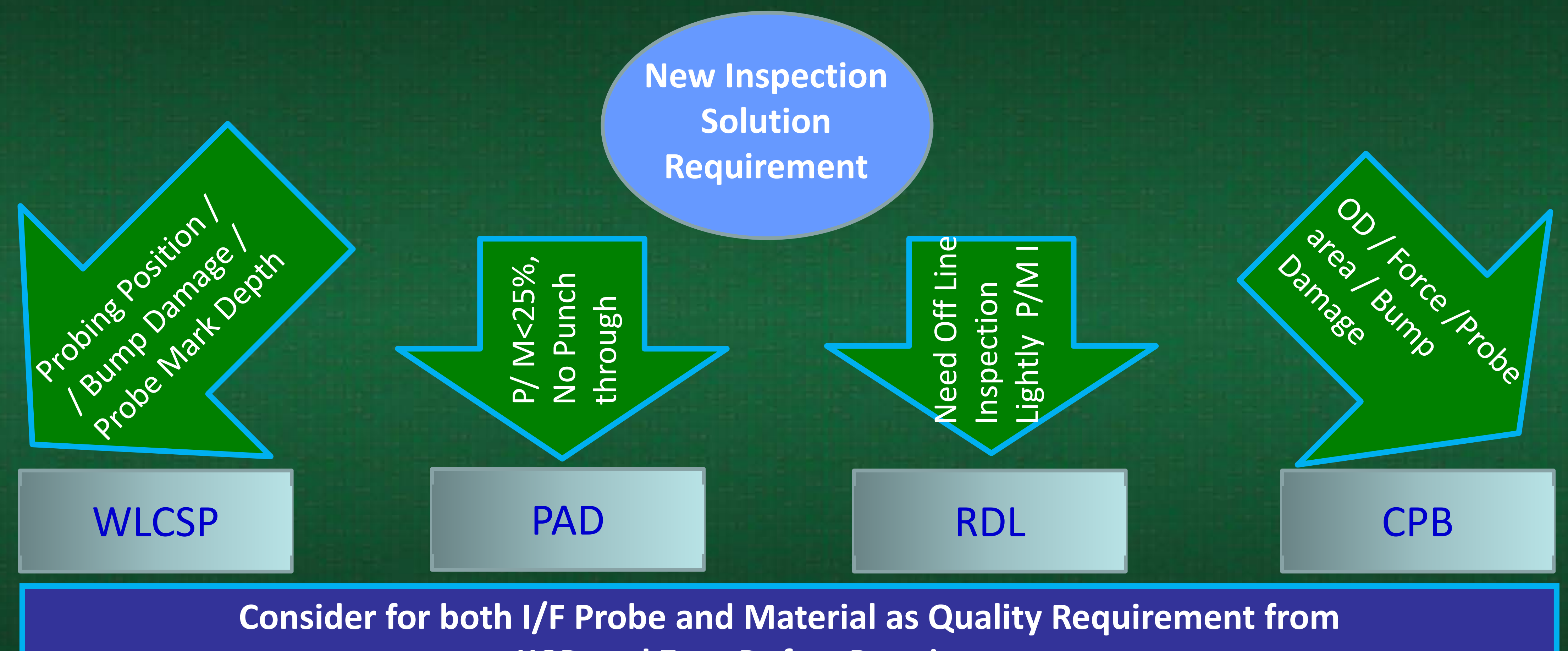
(3) Reasonable Inspection cost could keep driving Probing Technology Continue

Improvement Progress and DFM!

Introduction: New Inspection Solution for Probing Technology

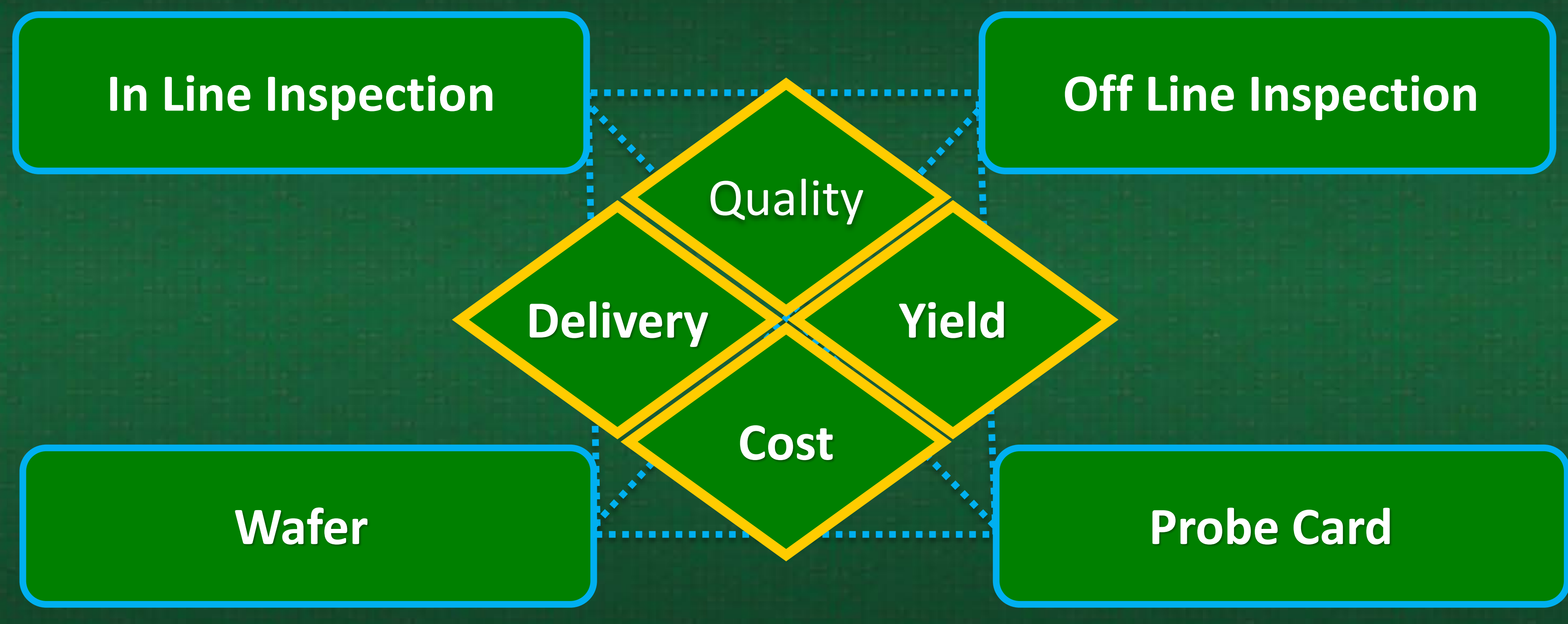
- **The Probe and Probe Mark Quality Control were Key Issues for Wafer Level Package Probing Technology. How to measure the Probe and Probe Marks from in-line and off-line tools will discuss at this presentation.**
- **We development the new tools for probe card /probe mark inspection. New tools provide more efficiency data for clearly engineering information and related setup issues.**
- **We believe the New Inspection Solution could more helpful from user and supplier and improve the probing technology. Will share relate information with partners .**

Why Need Inspection for WLP Probing Technology

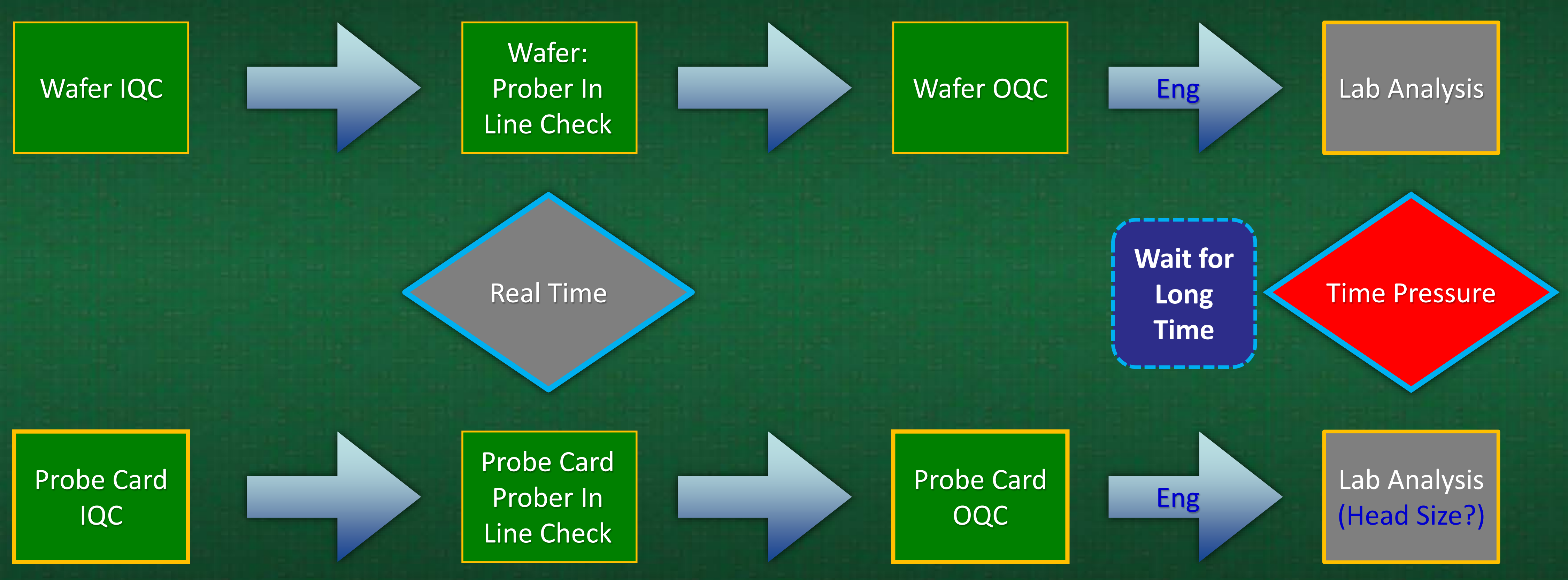


Consider for both I/F Probe and Material as Quality Requirement from KGD and Zero Defect Requirement.

Inspection Requirement in Probing Technology

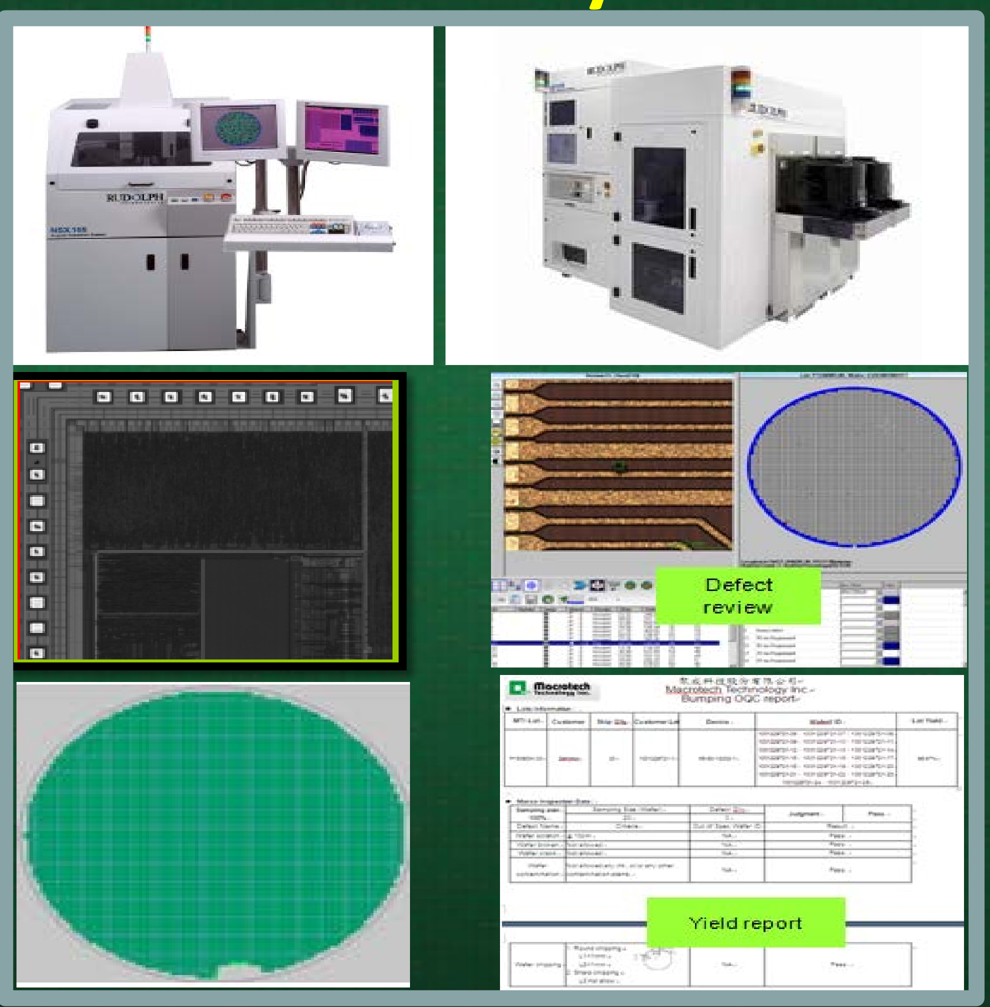


Wafer and Probe Card Inspection Process Flow

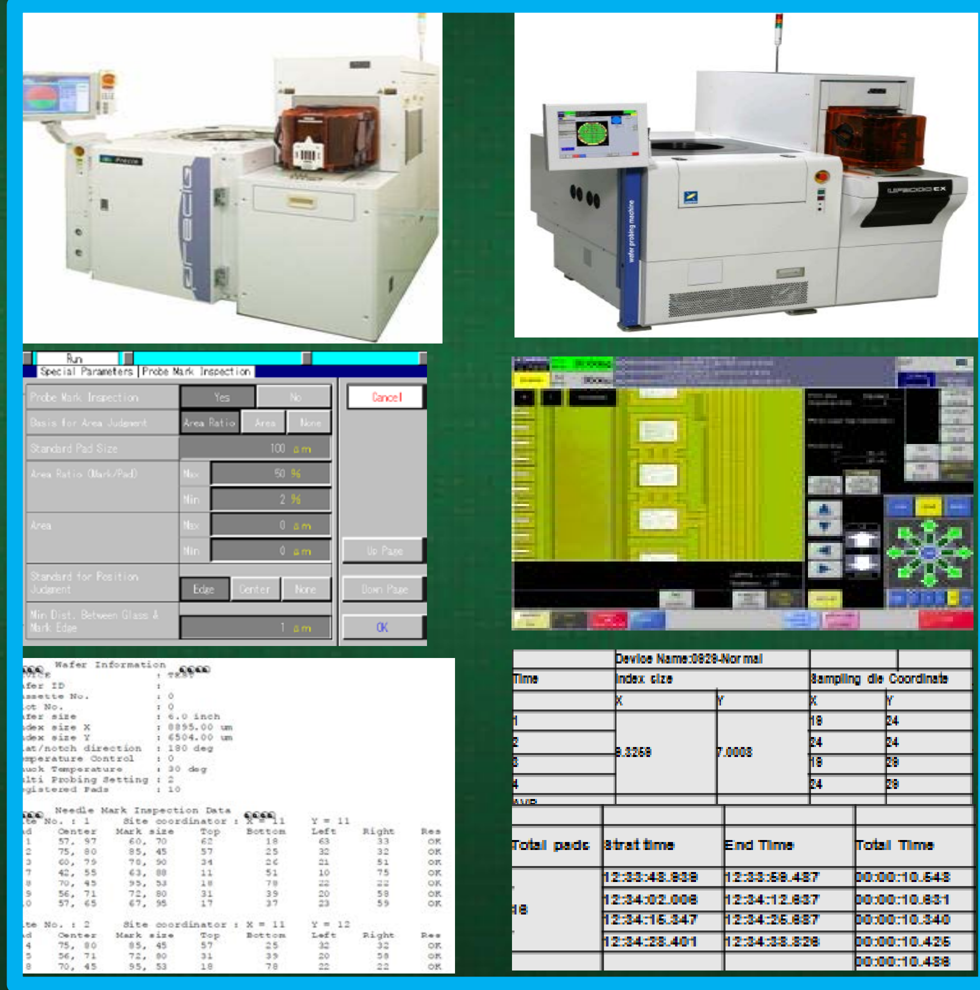


(1)In Line Inspection Solution-AOI & Prober

- Wafer AOI Analysis



◆Prober PMI Analysis

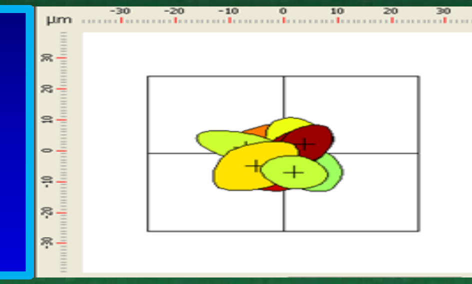


AOI Probe Mark Analysis for 2 TD Probe card Set Up :

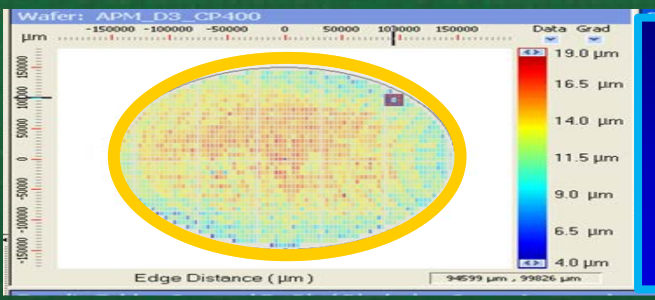
KGD Challenges ： 2TD P/C for Probe Mark Area and Keep Out Control

Wafer center is under control

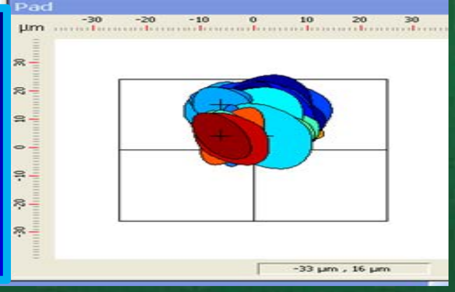
Probe Mark A/A <25%
Production P/M Keep Out >5um



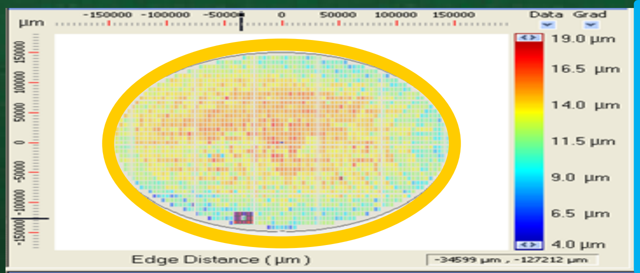
Wafer edge get Worst need special Set Up



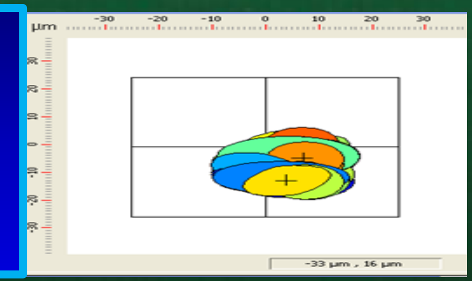
Production P/M Keep Out <5um
(Vender only ensure Off Line Check @RT >5um)



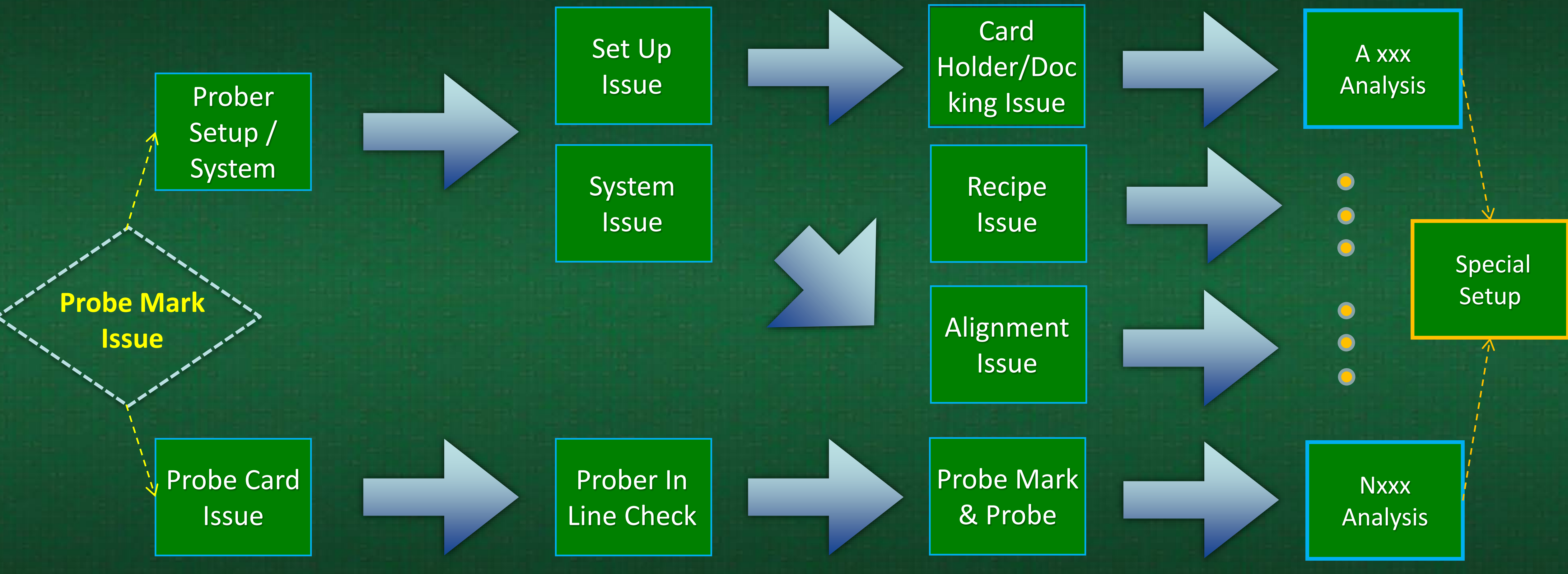
Probe Mark Shift in Spec but the means get shift



Probe Mark A/A <25%
Production P/M Keep Out >5um

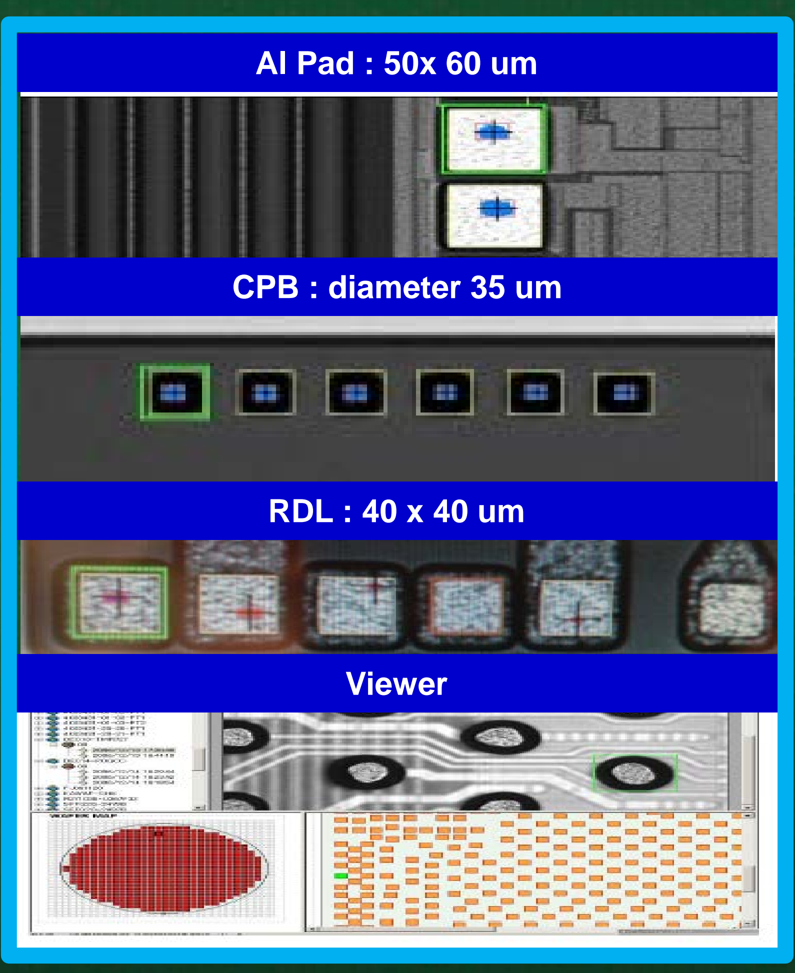


More Data to Analysis

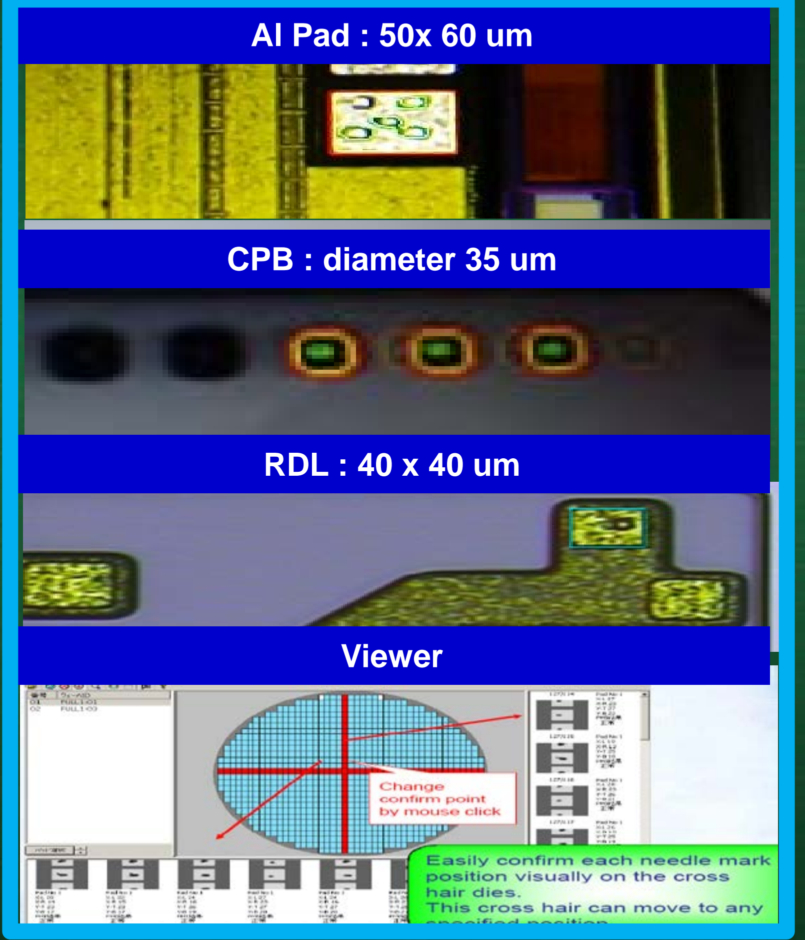


Prober PMI Technology

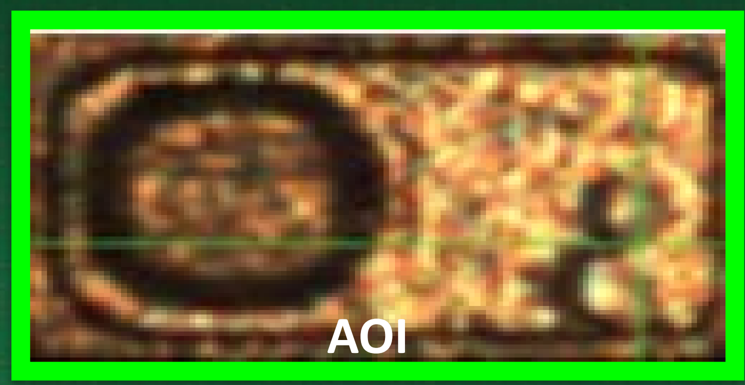
◆TEL Precio -PADSi

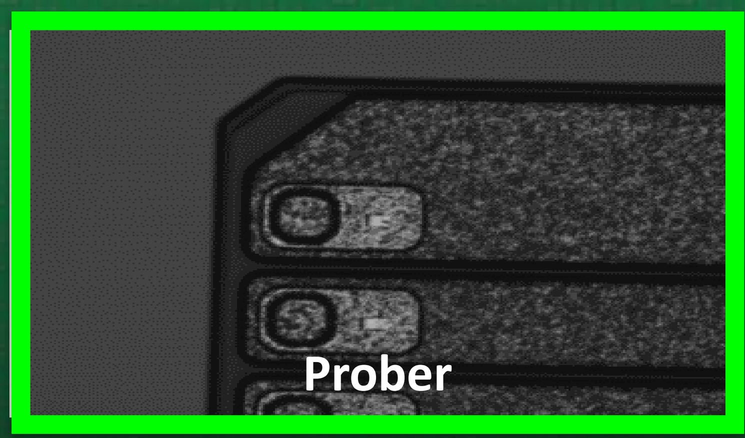


◆Accretech UF-3000 –Fast PMI



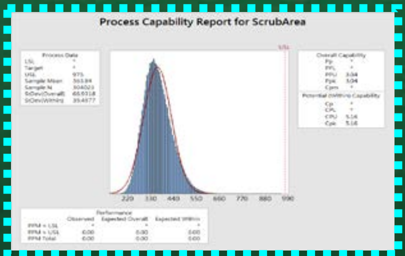
In Line Challenge: AOI and Prober for RDL Probe mark Inspection



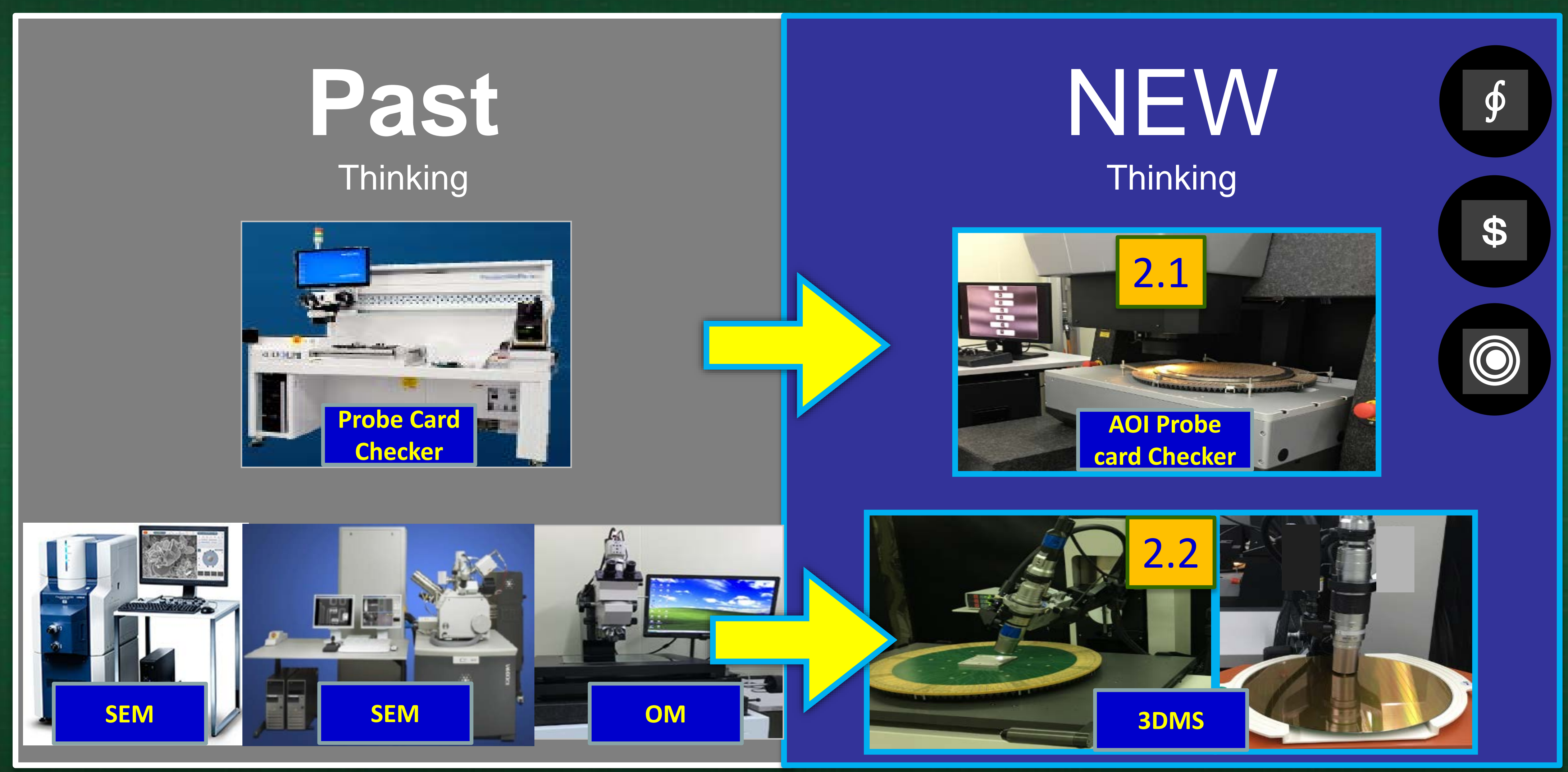


[Issue]:

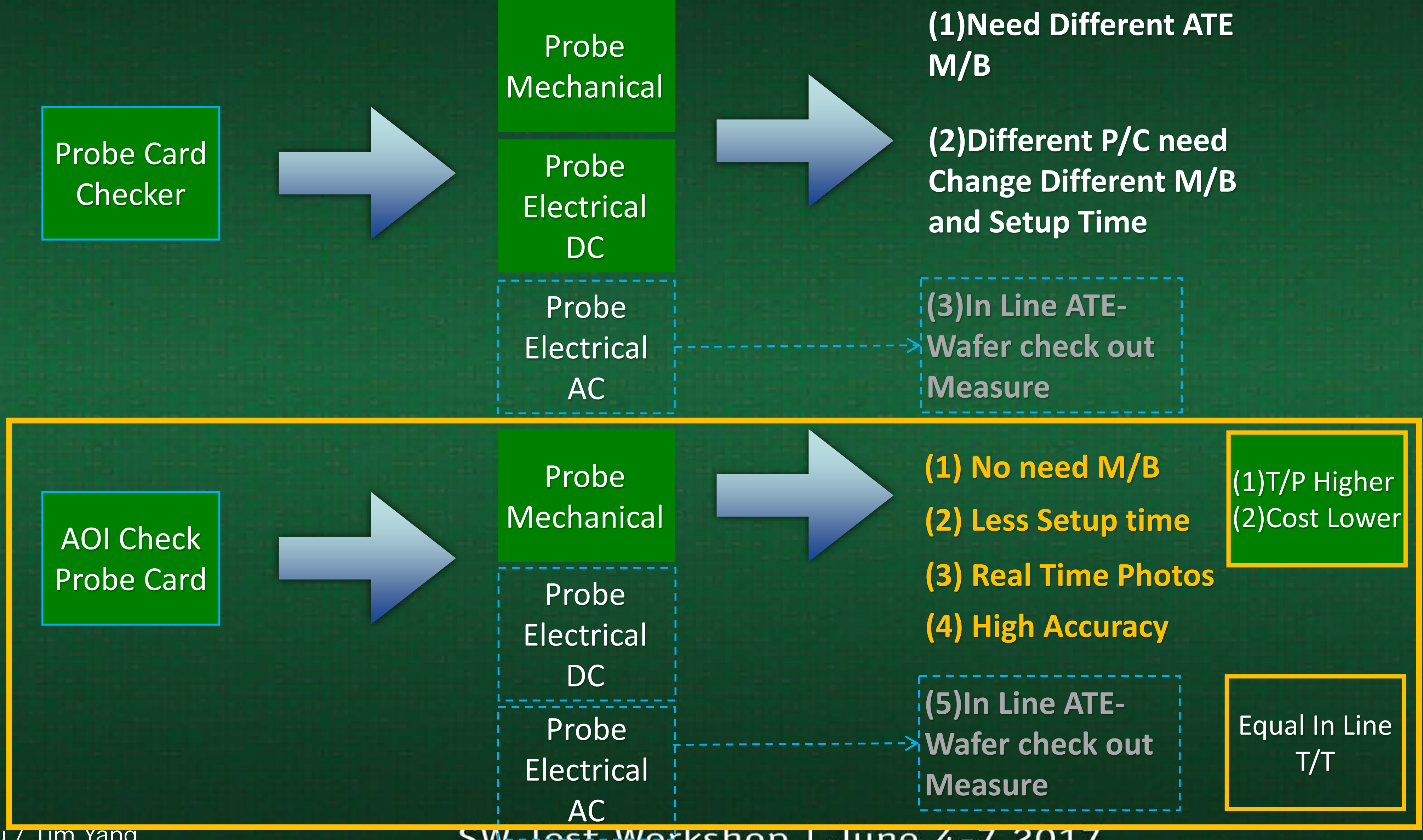
1. Customer Spec: Not allow probing out of RDL Pad.
2. AOI and Prober both can detect the Probe Mark under the RDL Pad or Not. But could not identify the Clearly P/M size with OD!
   That will hard to check the setup issue!
3. Probe mark Inspection Analysis Technology still need vender support to development.



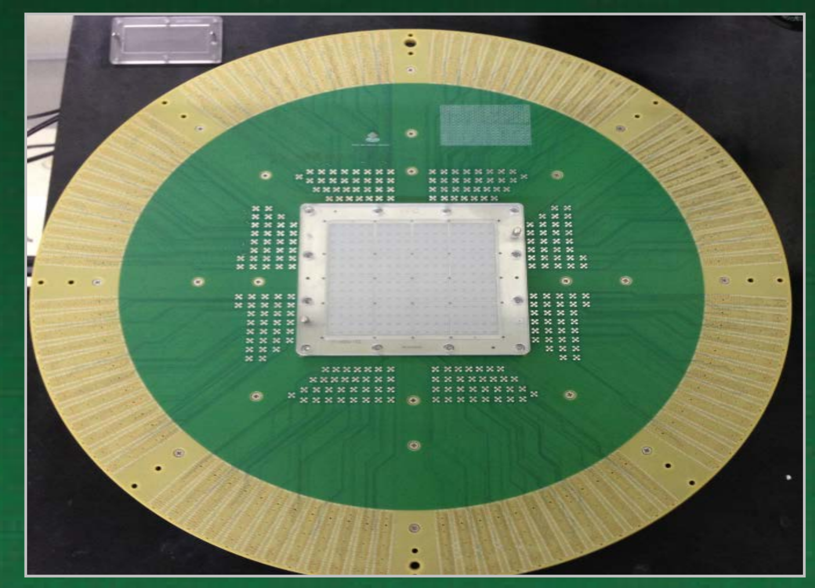
(2)Off Line Check Solution : AOI / 3DMS Technology

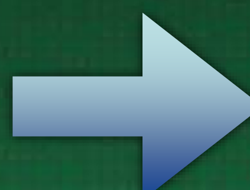


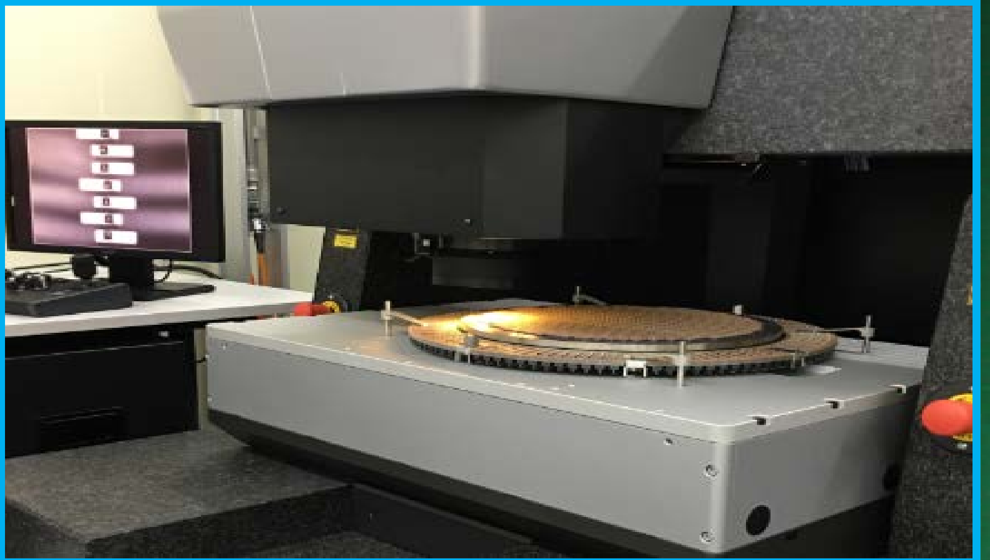
(2.1)AOI System Development Concept for Probe Card



(2.1)Probe card Measurement _ AOI Solution

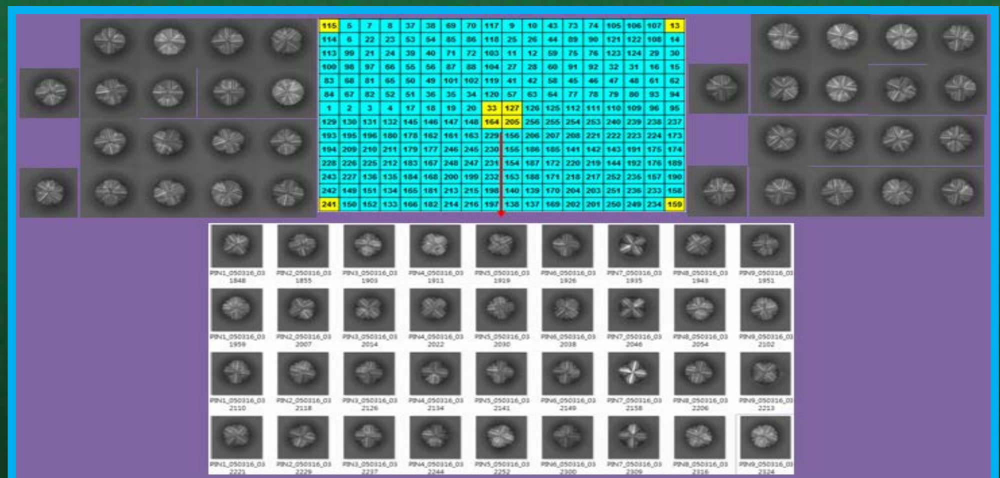




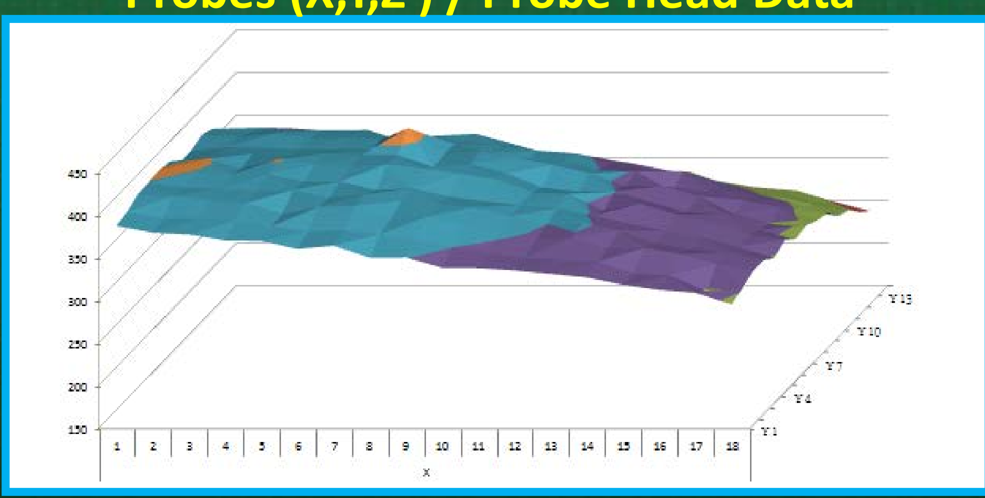


(1) No Limited for Exist ATE P/C
(2) High T/P
(3) High Accuracy

Probe Pictures



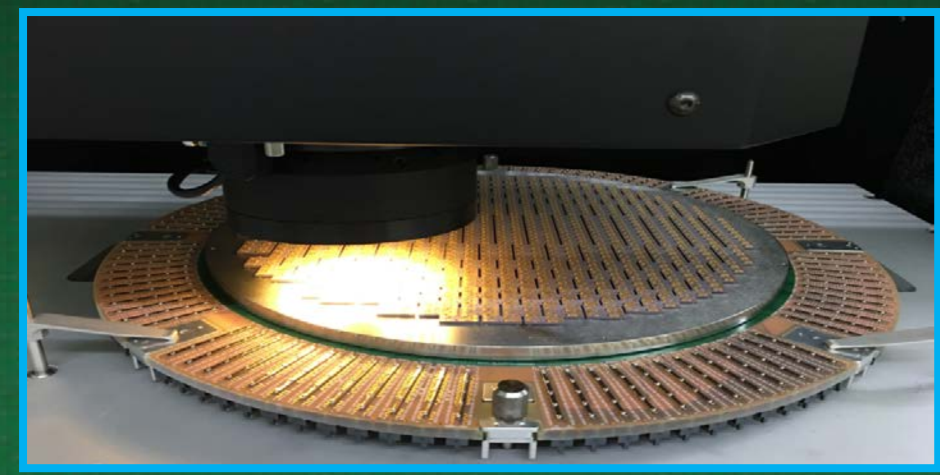
Probes (X,Y,Z) / Probe Head Data



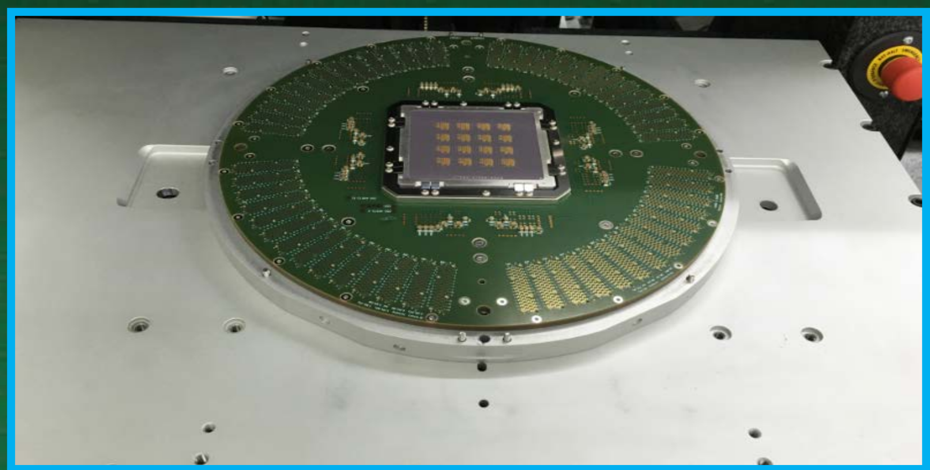
Probe Cards AOI Checker Solution

No Need Any Mother Board

T5377s-Full Contact Card

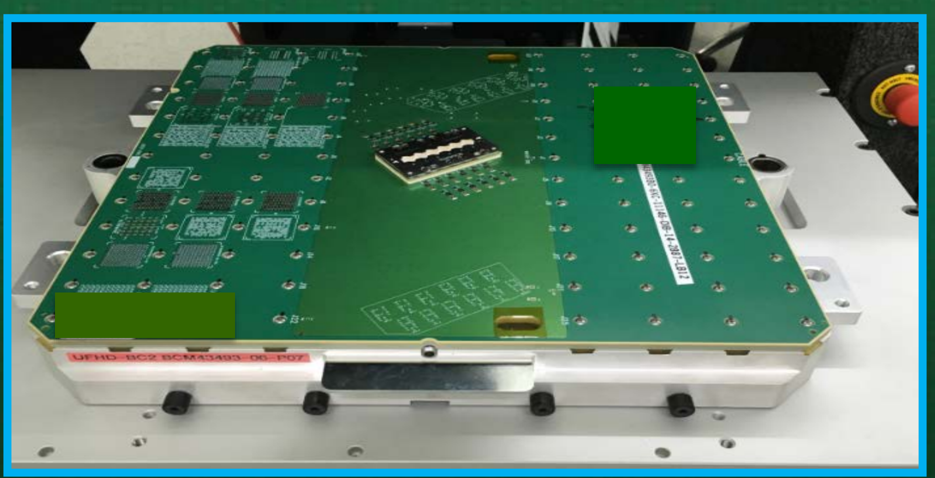


T5593 KGD Card

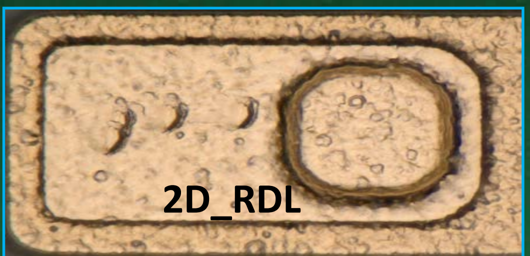


93K-DD Card

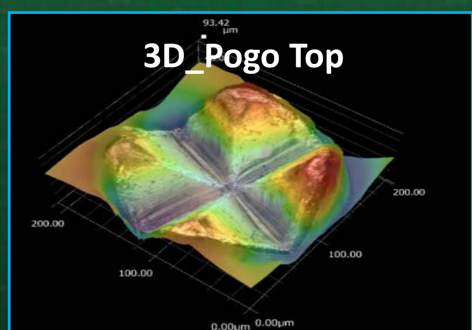
uFlex-DD Card



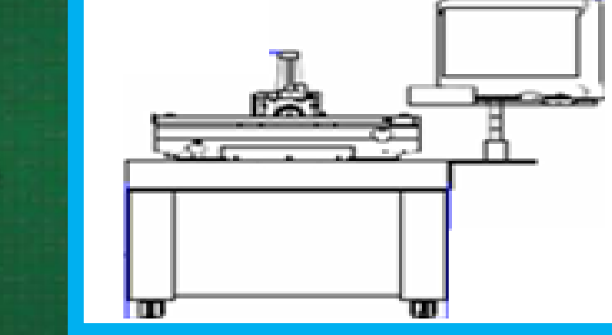
2016 SWTW :
Trying make 3D Microscope for WLP / Probe card
Engineering Analysis

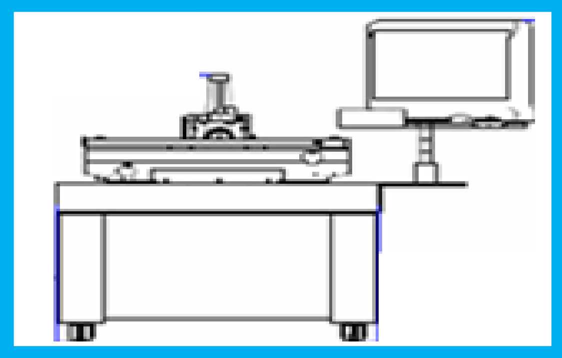


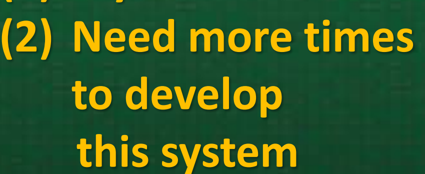
3D_RDL



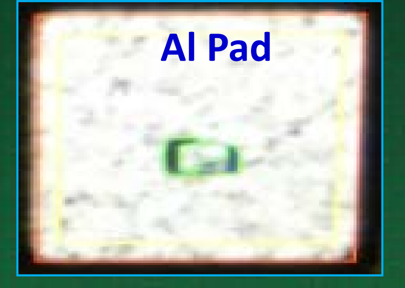
Development for
Wafer and Probe card
Inspection

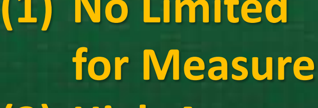




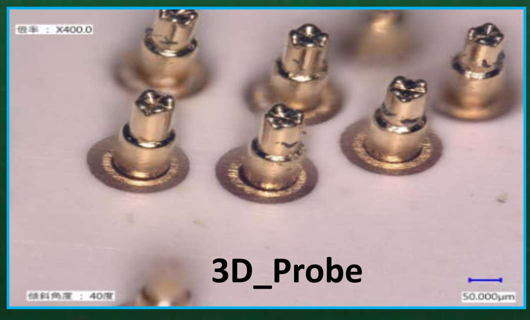


(1) Try & Error for CIP
(2) Need more times to develop this system

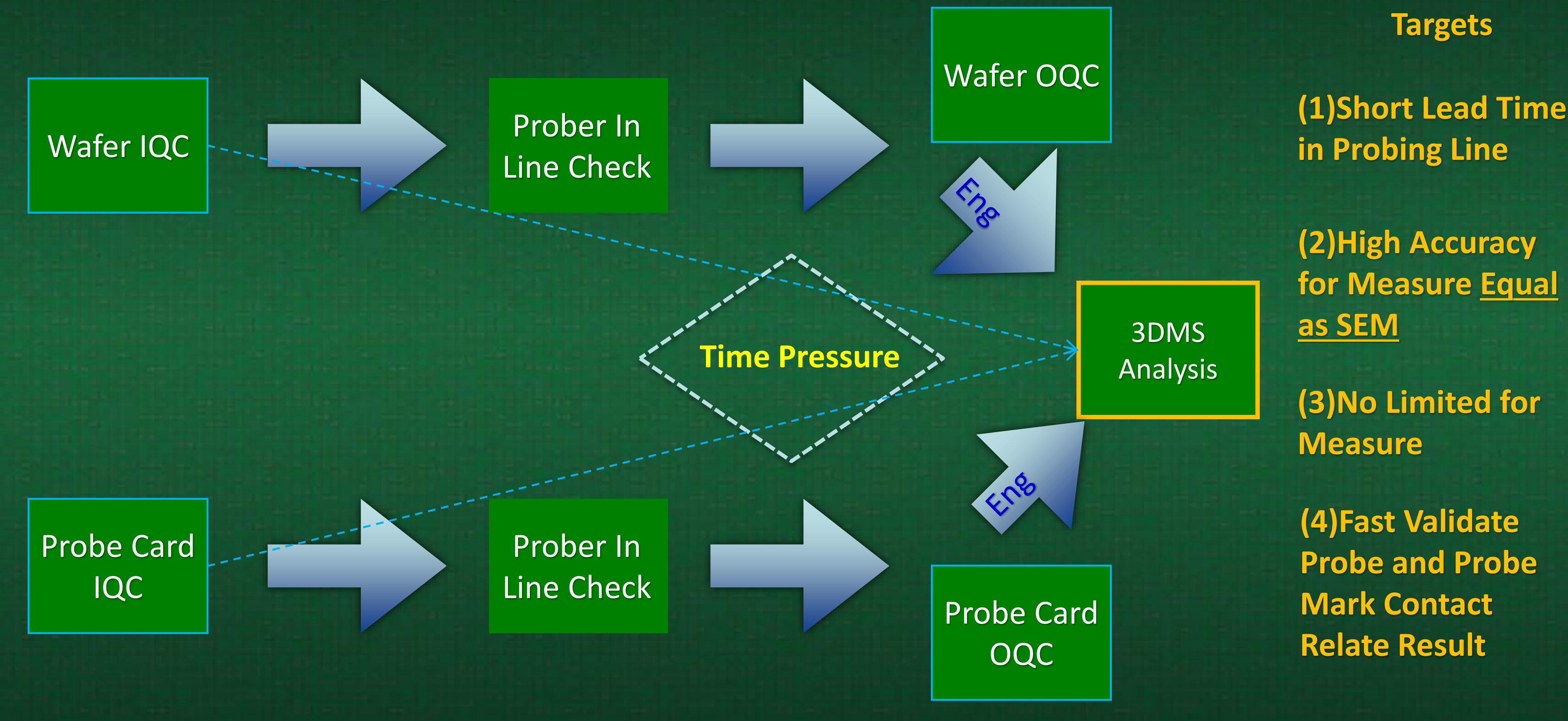




(1) No Limited for Measure
(2) High Accuracy like SEM



(2.2)New Inspection System Development Concept for Probe Card and Wafer



Targets

(1)Short Lead Time in Probing Line

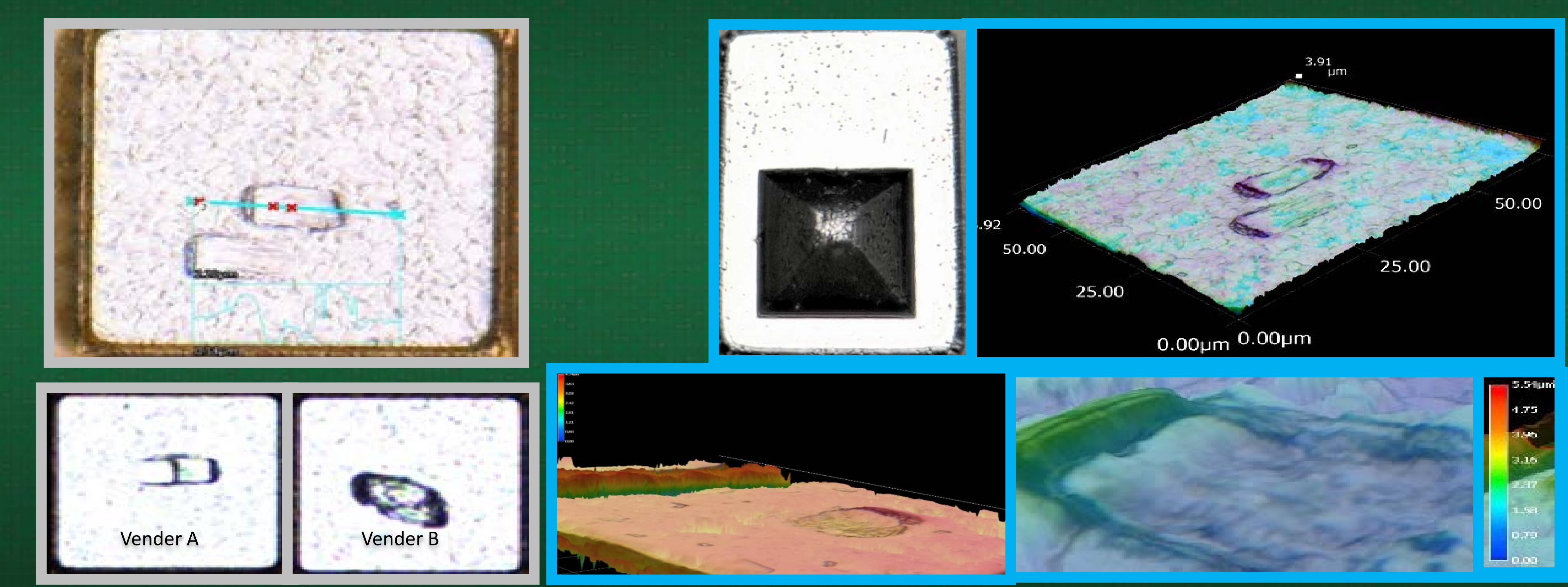
(2)High Accuracy for Measure Equal as SEM

(3)No Limited for Measure

(4)Fast Validate Probe and Probe Mark Contact Relate Result

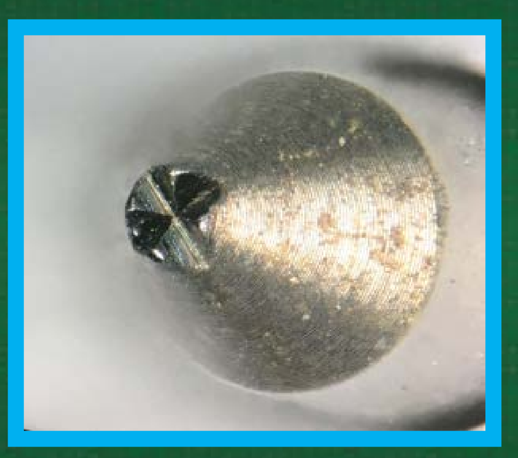
2D/3DMS for Al Pad Probe mark

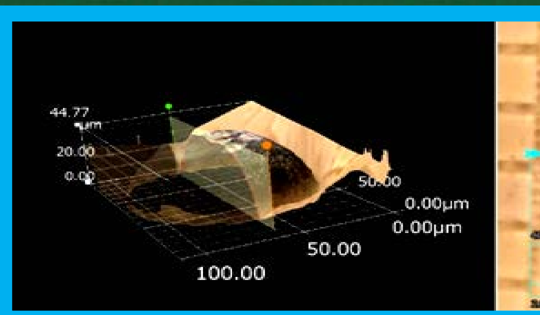
◆2DMS: Probe Mark Inspection ◆3DMS: Probe Tip /Probe Mark Depth

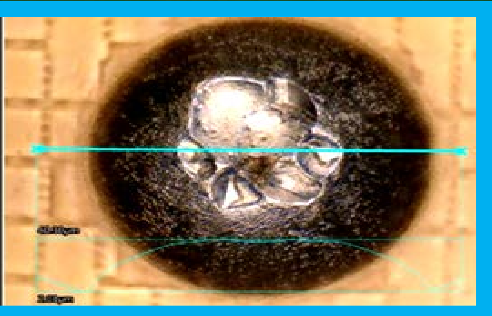
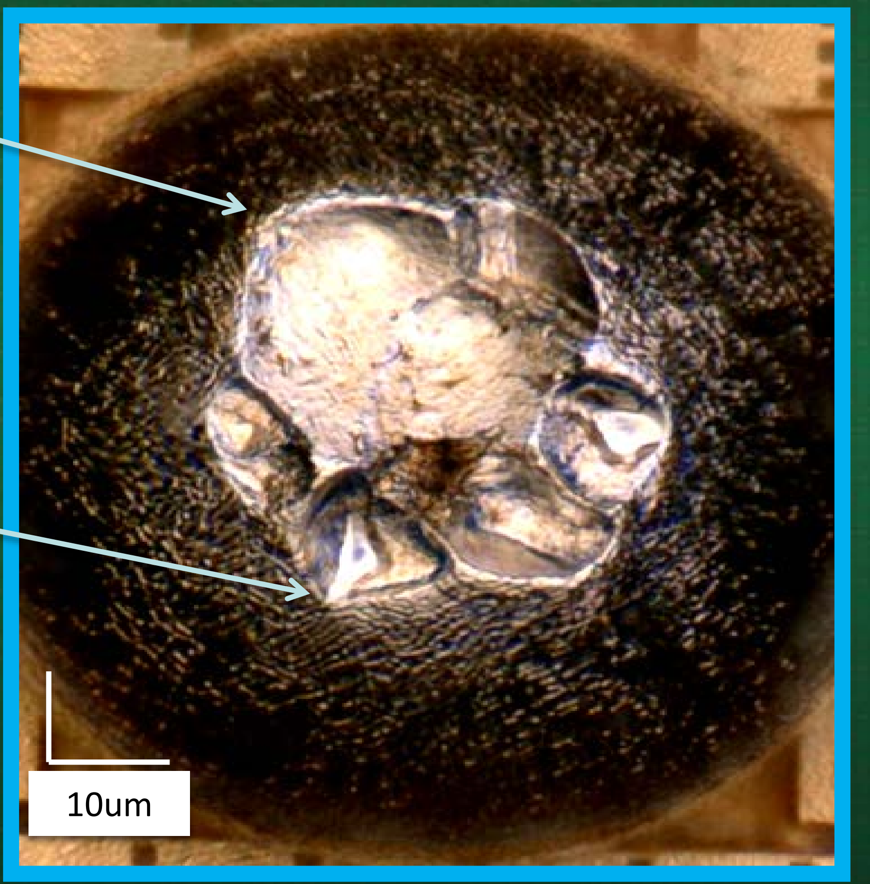


3DMS check for Probe and Bump

- Probe tip – Geometry / Debris
- Probe Depth Measurement

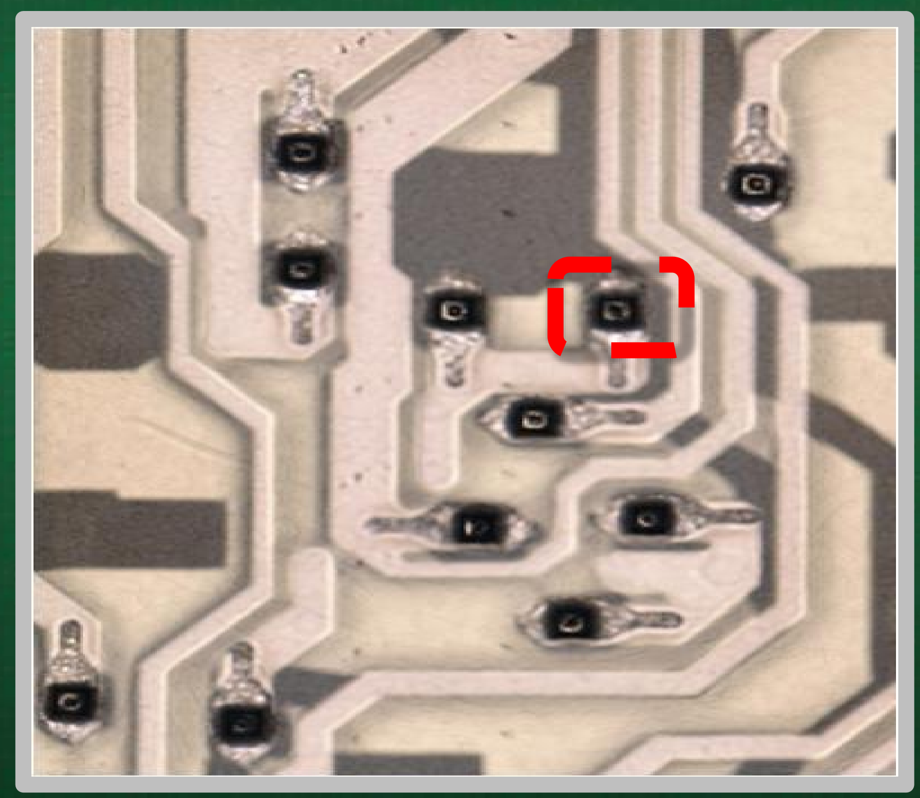




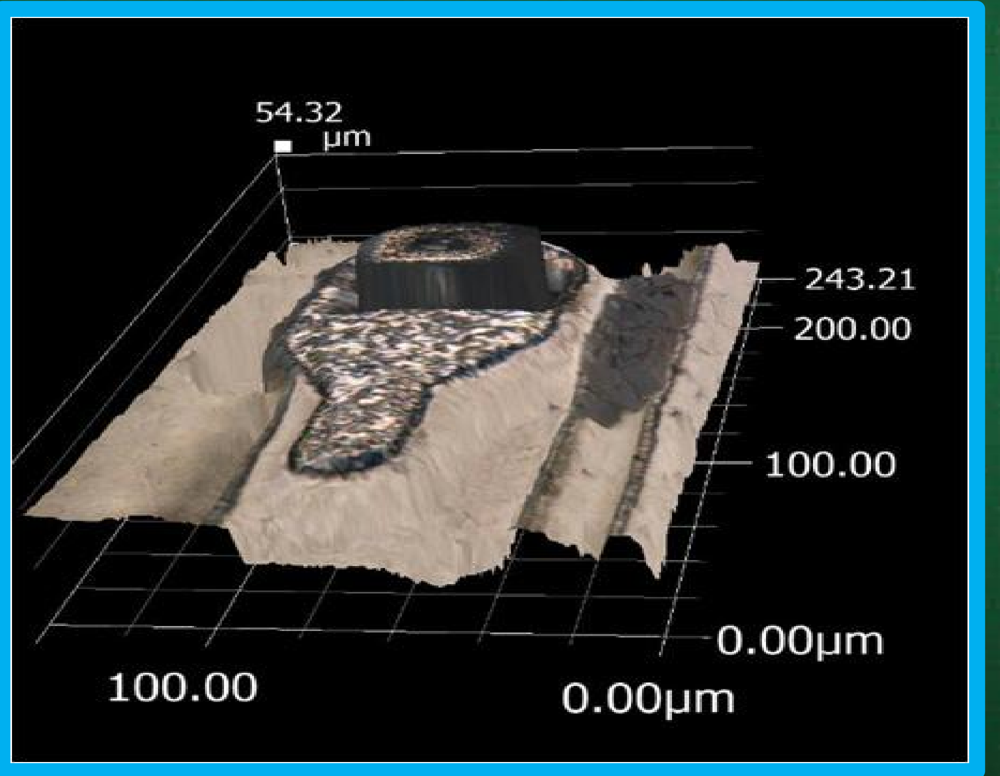



2D/3DMS finding for Probe Lifetime

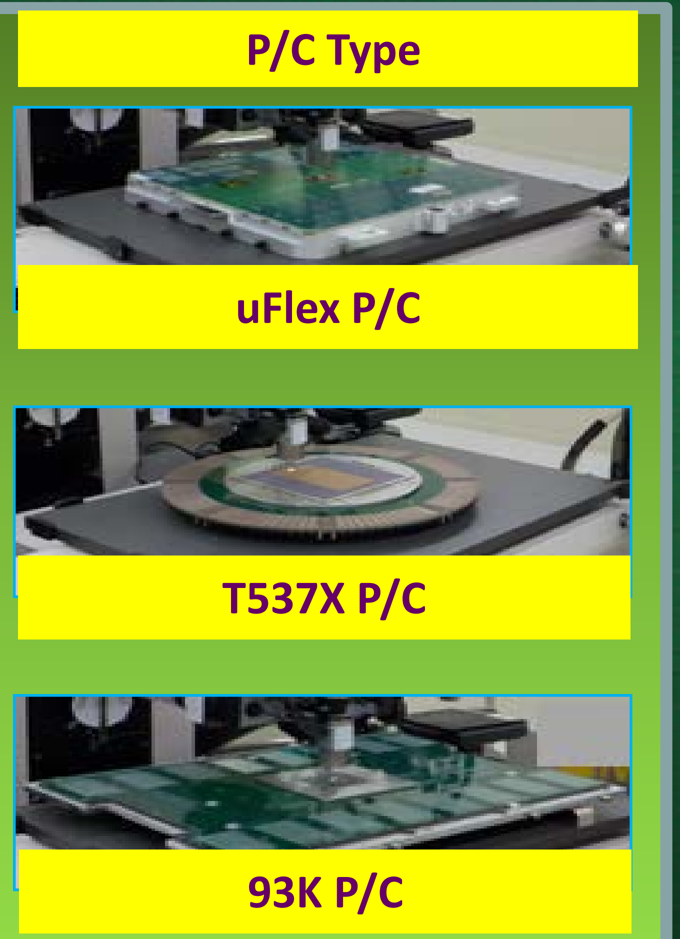
- **2DMS- Probe Diameter/ Height- Probe Wearing Issue**

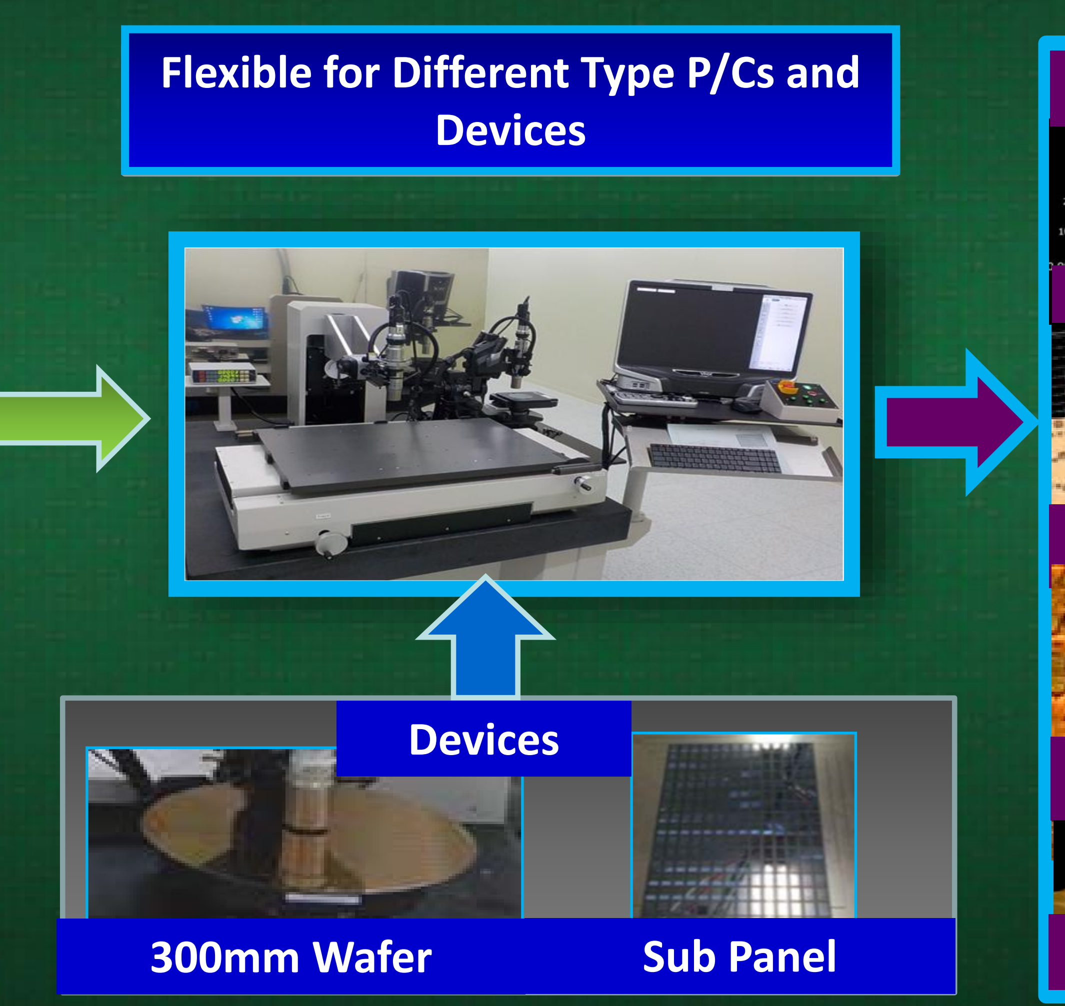


- **3DMS-New Finding- + Membrane Structure Issue**

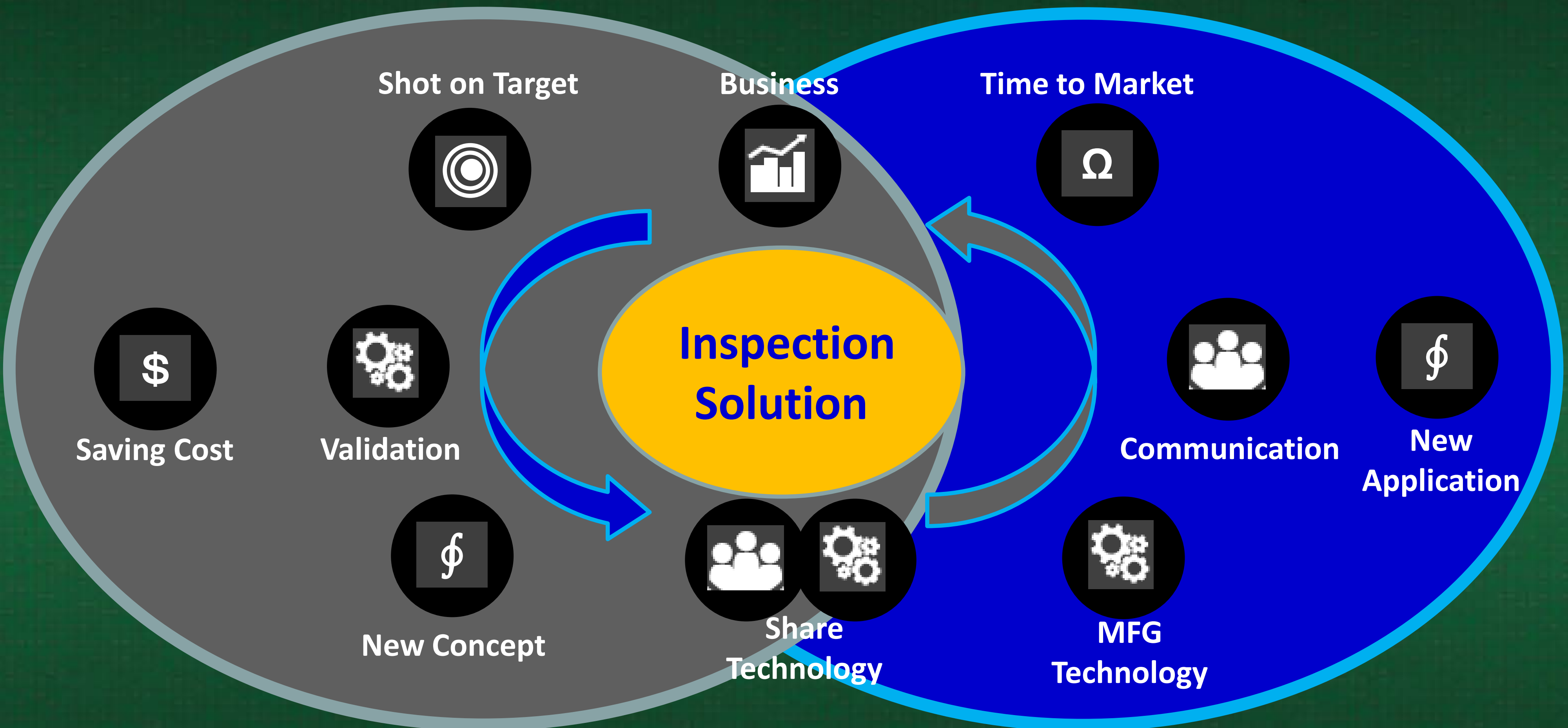


3DMS for All P/Cs and Devices for Engineering Analysis Capability





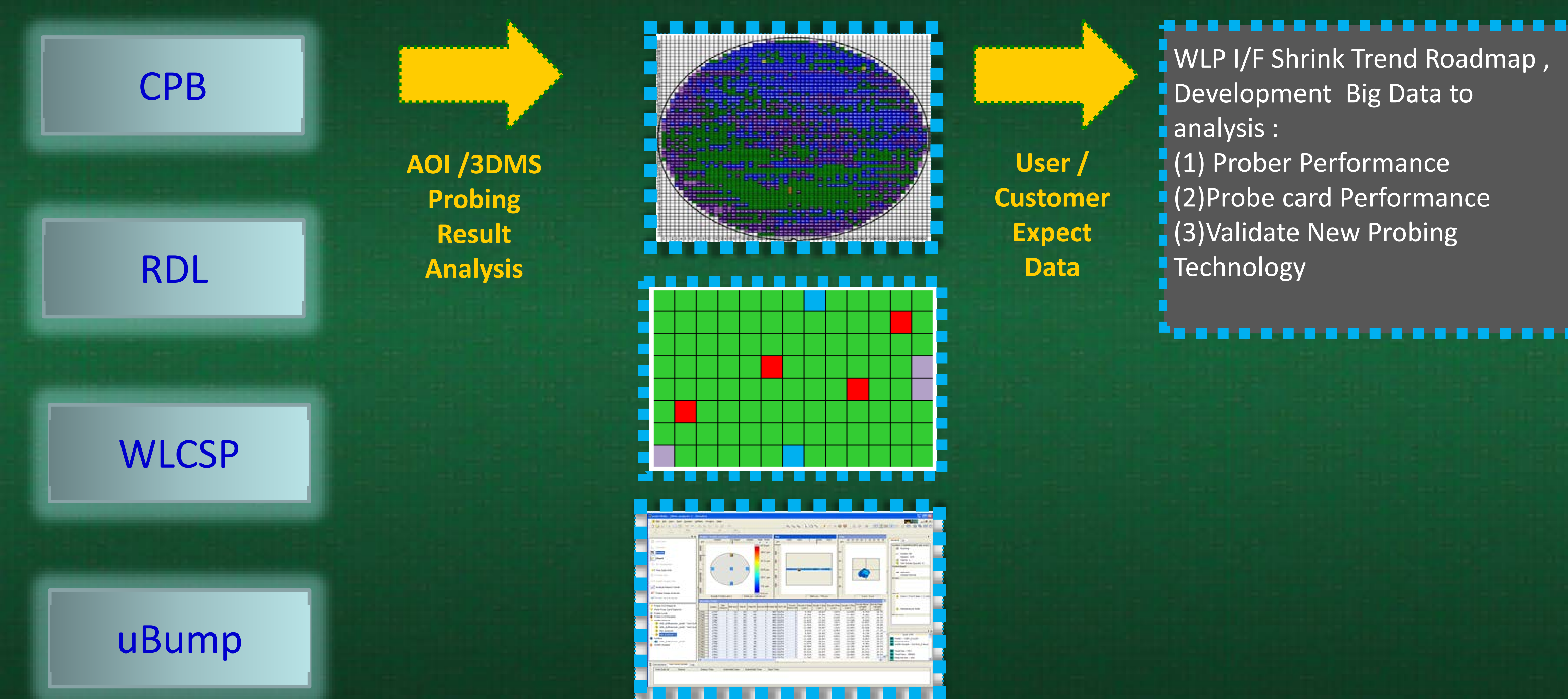
Conclusion



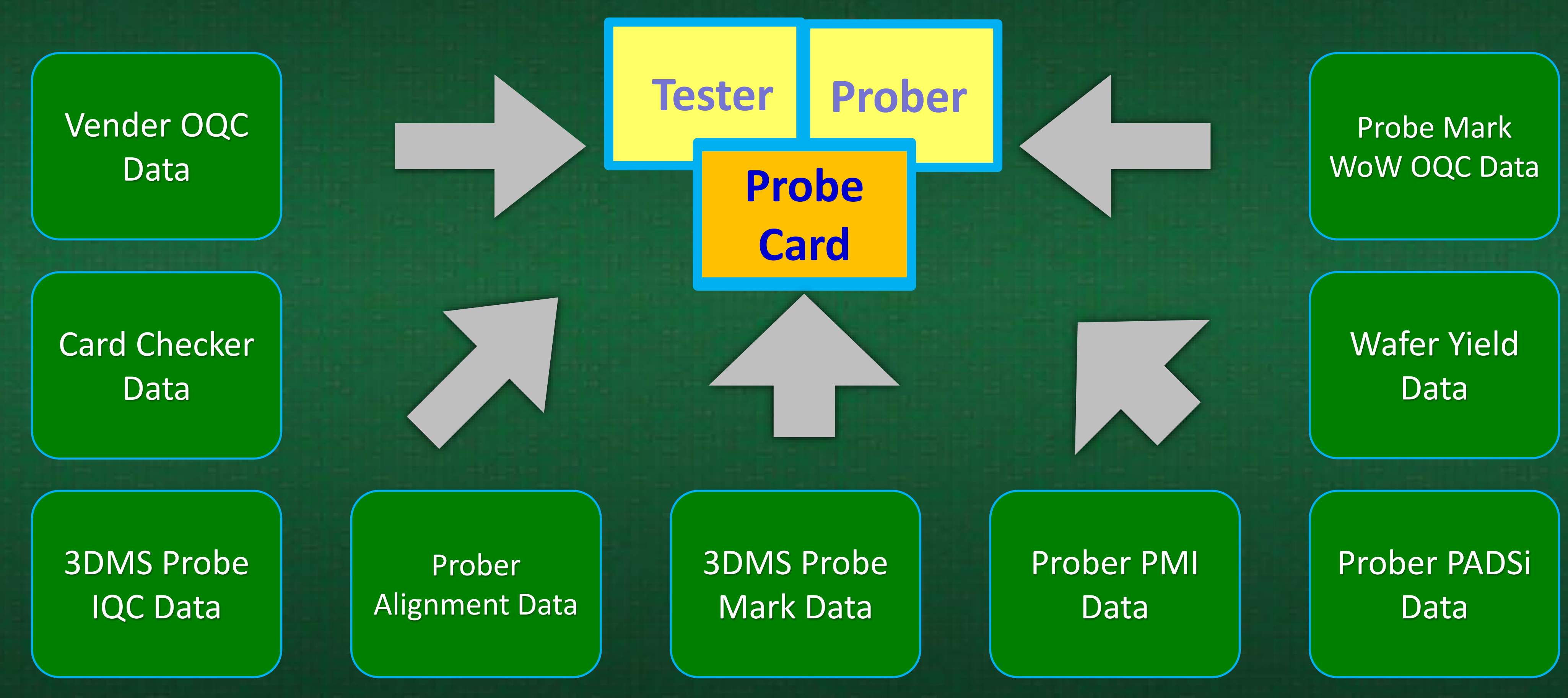
Build up the new working model for Customer Service & Probe suppliers! Helpful for Next Step Development!

Future Work:

AOI New Function for WLP Probe mark Analysis



Future Work: Many Data Streams for Big Data



Acknowledgments

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(1) Henry Tseng

(2) Allan Ku

(3) James Hsieh

Also thanks suppliers fully support this project.

(1) Taiwan Local Suppliers

(2) Accretech / Rudolph / TEL

Thank you!