IEEE SW Test Workshop

Semiconductor Wafer Test Workshop

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Automatic Probe Assembly Machine

TSE

Technology & Science Enabler

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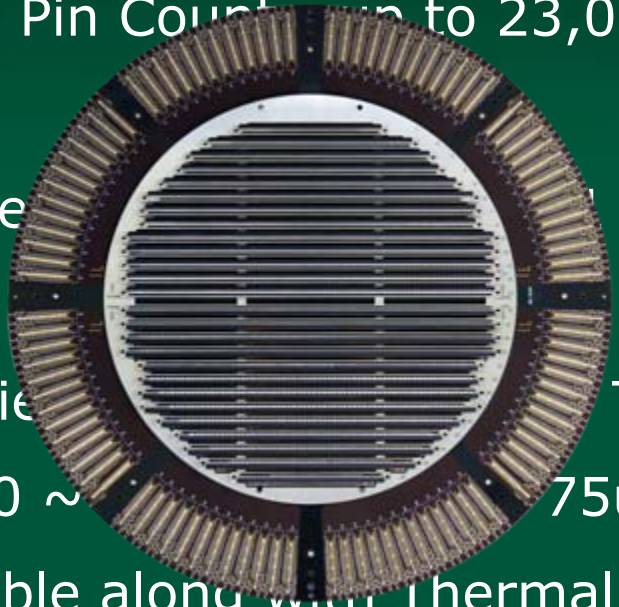
CPC (Compact Probe Card)

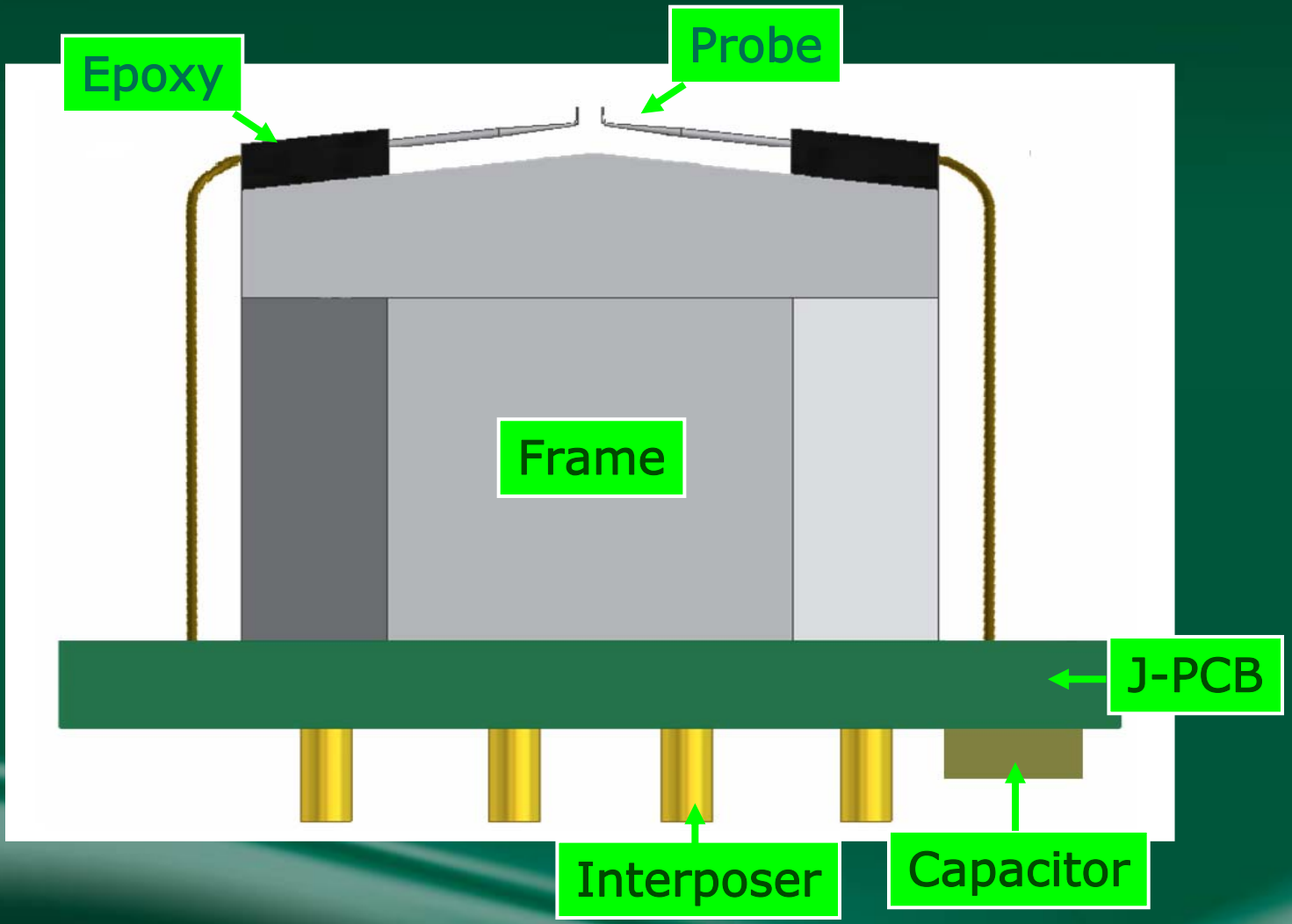
- High Pin Coun to 23,000 Pins (depend on ATE resource)



- Large Touch Down
- Applie Temperature
  (-30 ~ 75umX75um)
  - Stable along with Thermal Deformation

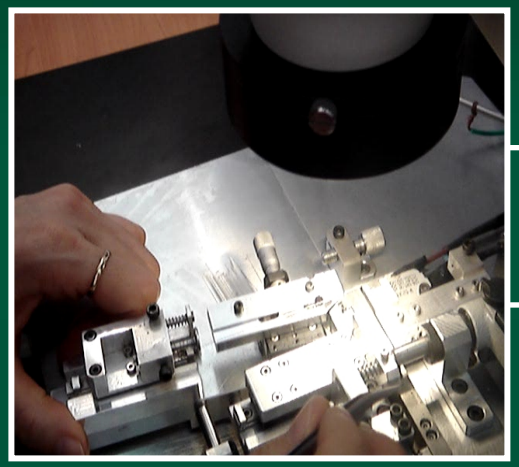
1T/D 12” NAND Flash CPC

CPC Structure (Sectional View)



Conventional Manufacturing Process.

1.Probe Bending



2.Positioning

3. Aligning

Disadvantages

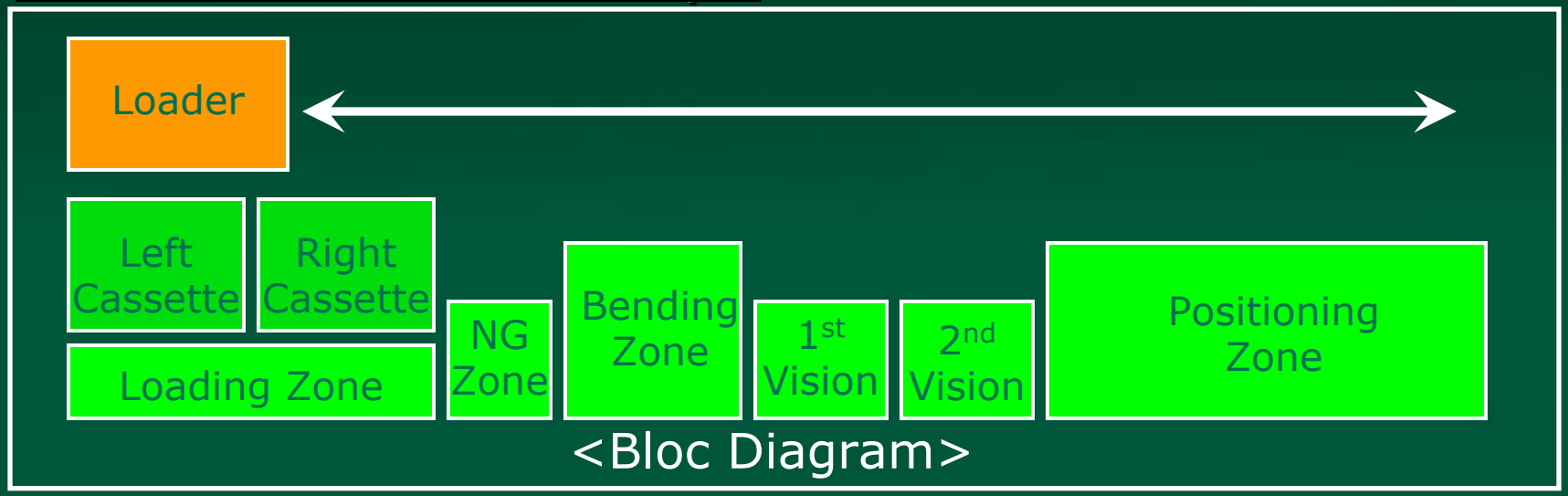
1. Labor & Time Required
2. Less Reliable for Partial Inspection
3. Technicians Demanded

Automatic Probe Assembly Machine (IM-800)

1. Objectives
- Full Probe Inspection
- Productivity Improvement
- Quality Consistency

2. Features
- High Resolution Image Processing
- Highly Accurate & Repeatable Positioning

IM-800 Process Steps



<Bloc Diagram>

1. Loading a Pin from Cassette
2. Probe Inspection before Bending
3. Bending
4. Probe Inspection after Bending
5. Probe Tilt Inspection
6. Probe Positioning

Advantages

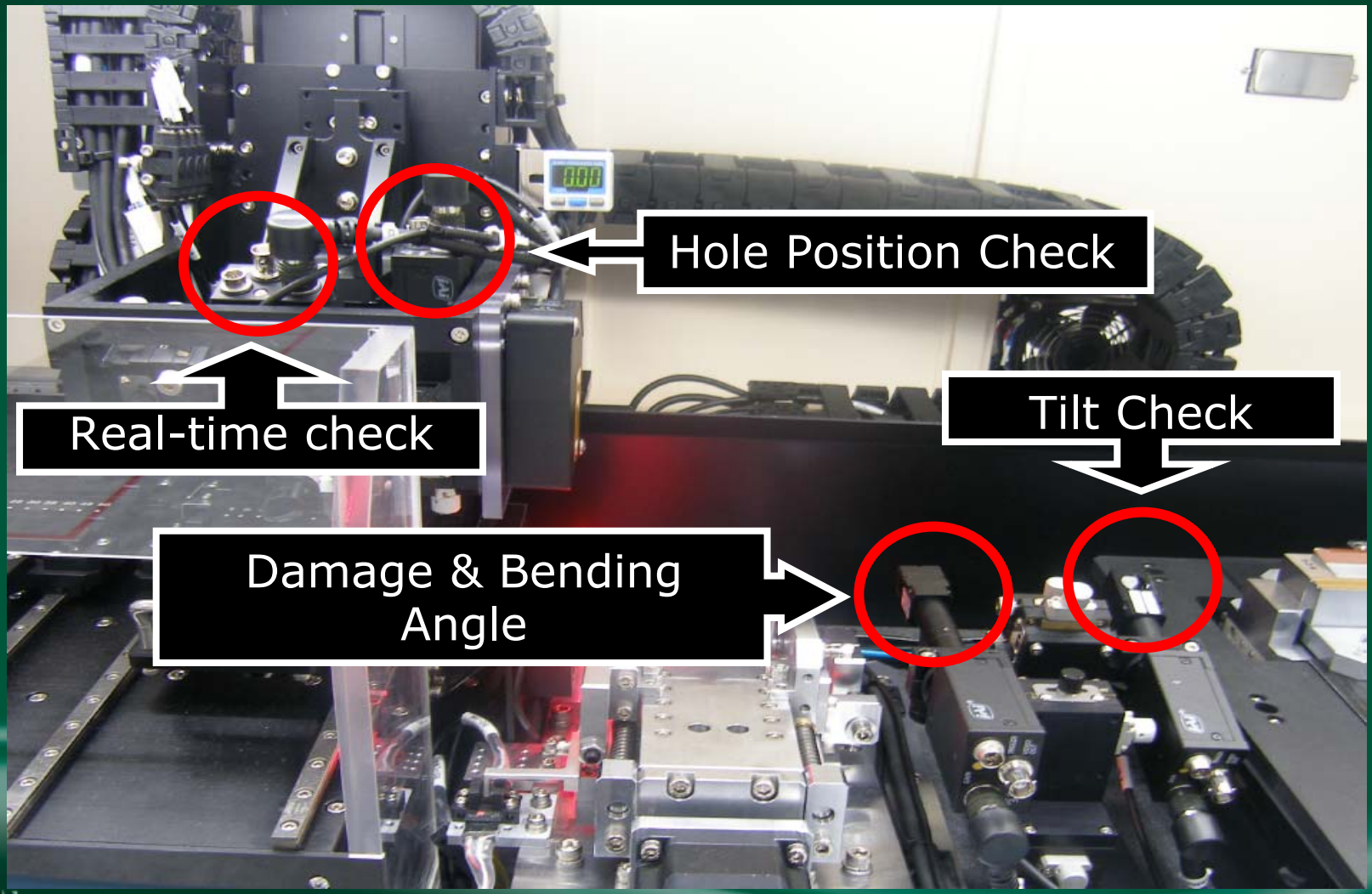
1. Full Inspection & Data Logging

   - Inspect Tip Length, Bending Angle, Probe Tilt
   - Record Inspection Data

2. High Precision Repeatability

   - Increased the Uniformity of Tip Length
   - Increased the Uniformity of Probe Bending Angle

Full Inspection

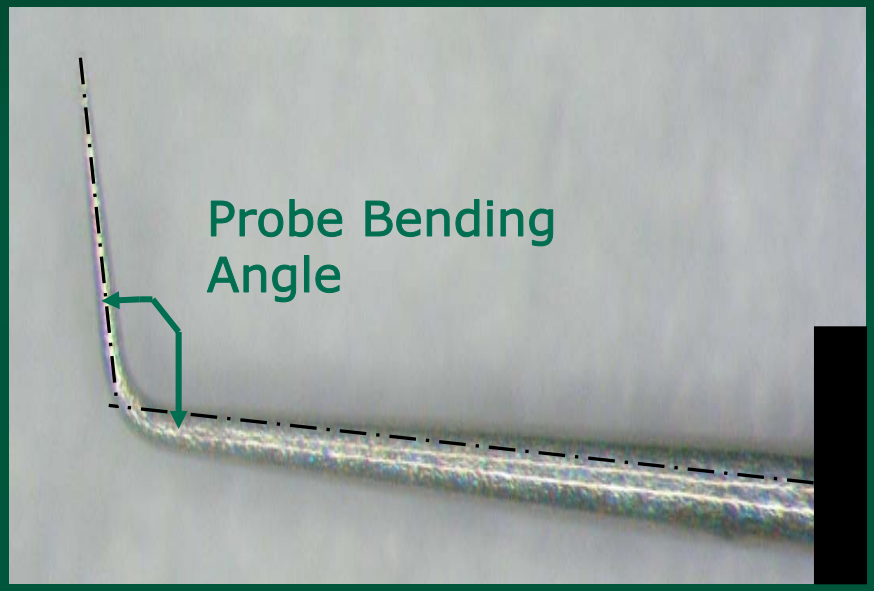


High resolution Image processing

- Probe Bending Angle / Tip Length / Tilt Check

Specifications	
FOV (Field of View)	1.6mm * 1.2mm
Accuracy	± 2㎛
Repeatability	± 2㎛

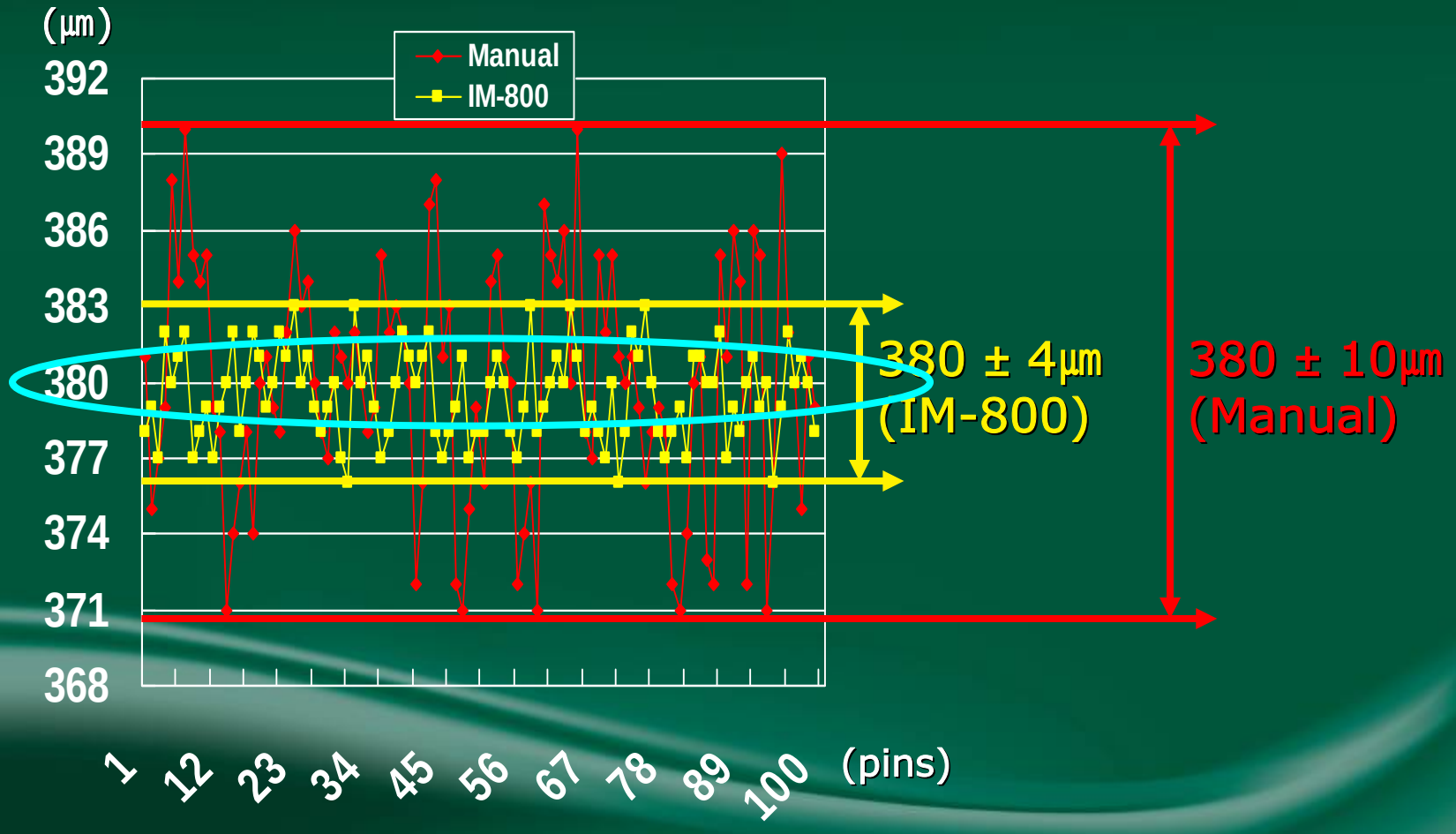
Repeatability



- Tip Length Tolerance
- Probe Bending Angle Tolerance

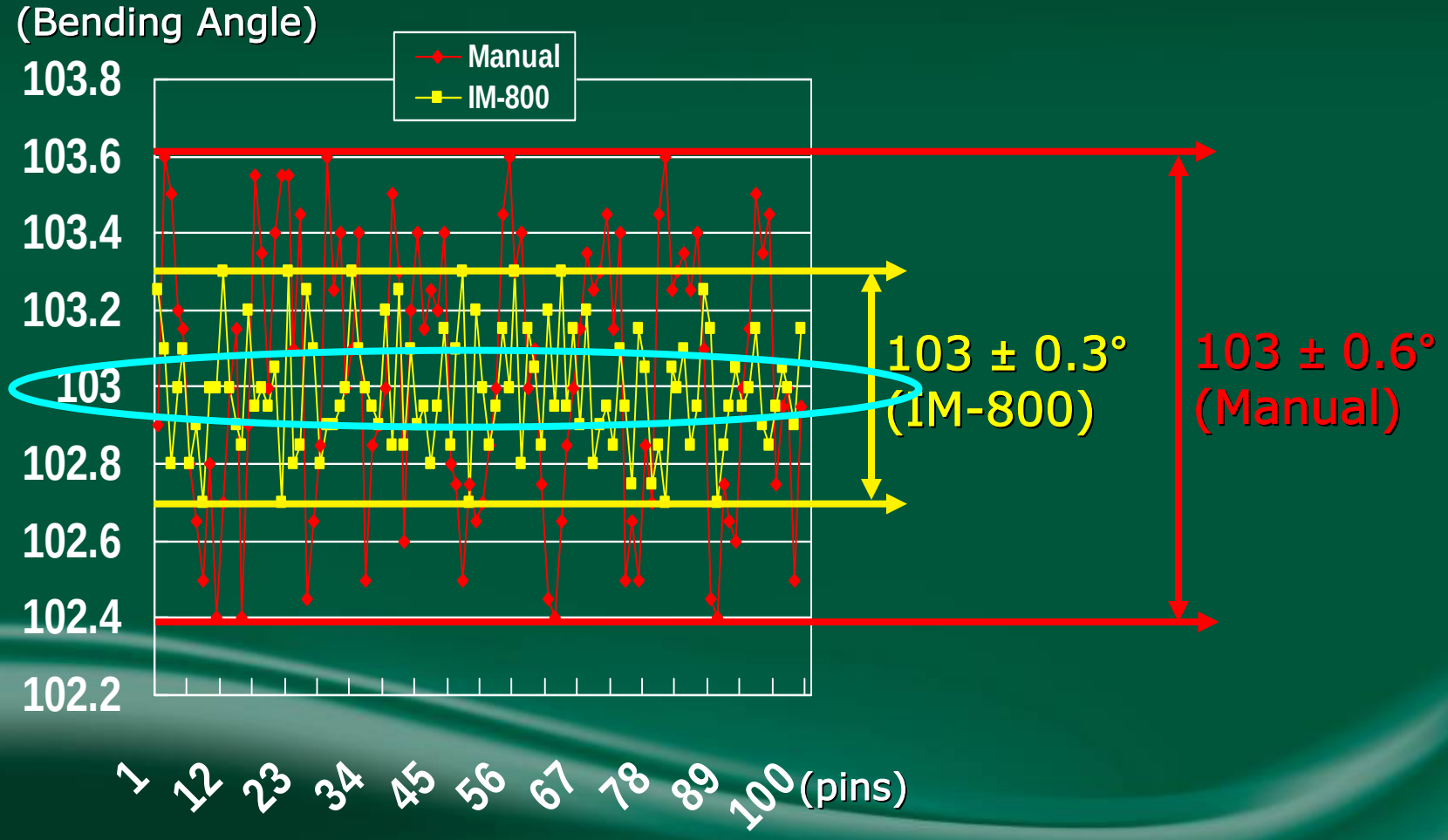
Repeatability

- Comparative data of Tip Length Tolerance



Repeatability

- Comparative data of Probe Bending Angle Tolerance



Effects

1. Productivity

- Enhanced Throughput
- Reduced Products Delivery

2. Quality

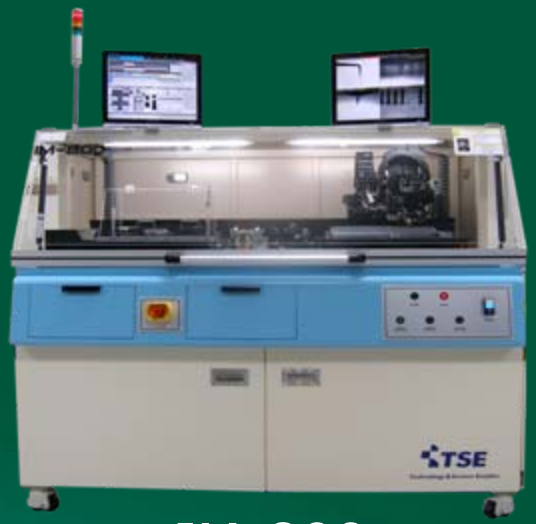
- Increased the Accuracy of the Tip Dia. By Precise Bending Angle of the Probe
- Enhanced Scrub Marks by Full Probe Inspection

Productivity Effects

1. Shorten Delivery Time by Automatic Process
   - CPC™ New Product : 5 → 4 weeks
   - CPC™ Repeat Order : 4 → 3 weeks

2. Compare

VS



Skillful Engineer
(More than 3 years)

IM-800

Productivity Effects

IM-800 VS Technician (With 3 Years Experience)

Time for 1pin	15 sec	30sec
Working time	20 hours	* 83%
Total Pins in a day	4800	960
Comparison	5X	X

Productivity Effects

IM-800

=

5 Technicians

Quality Effects

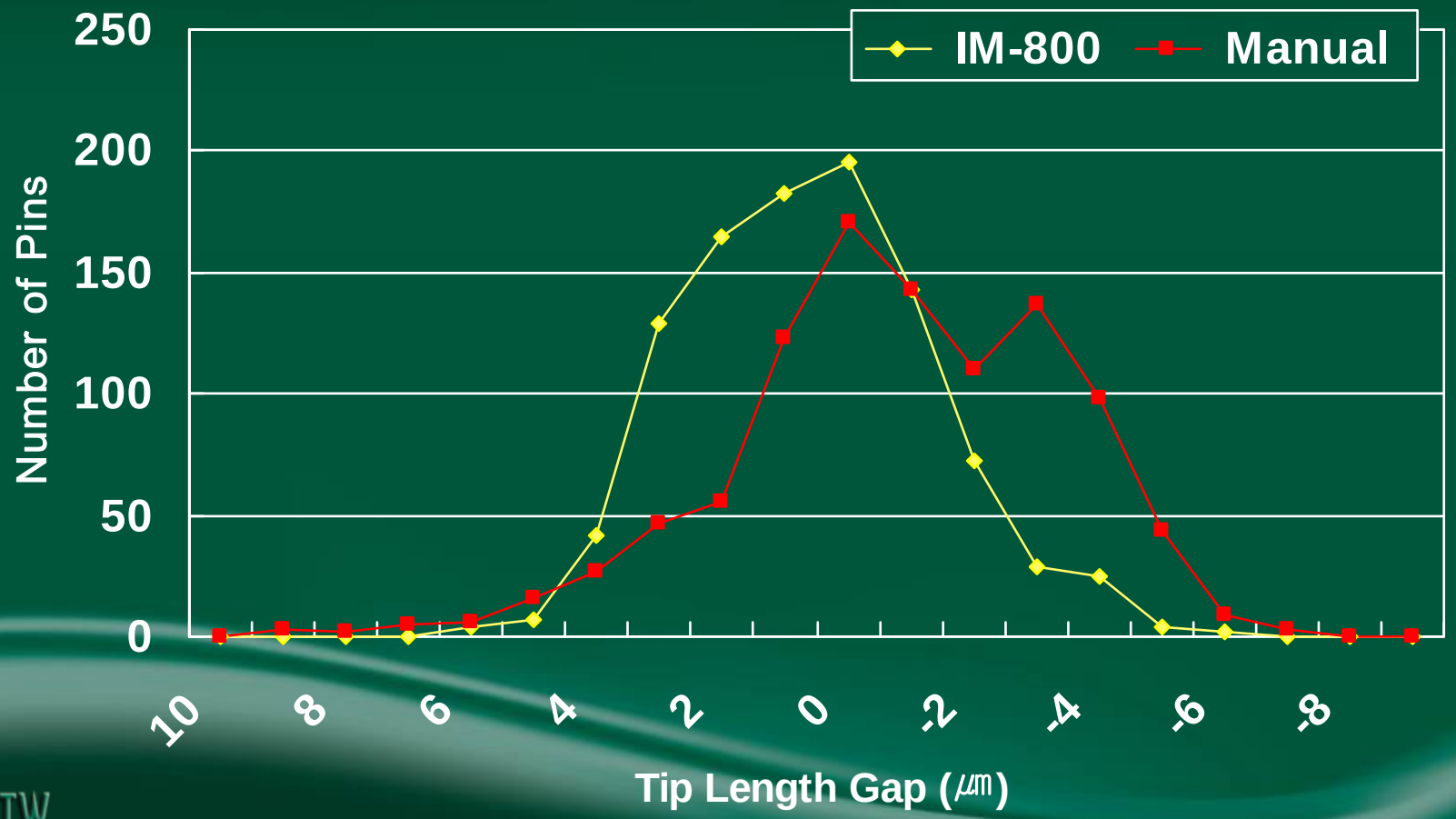
- Measuring Equipments

1. WaferWoRx

2. ProbeWoRx

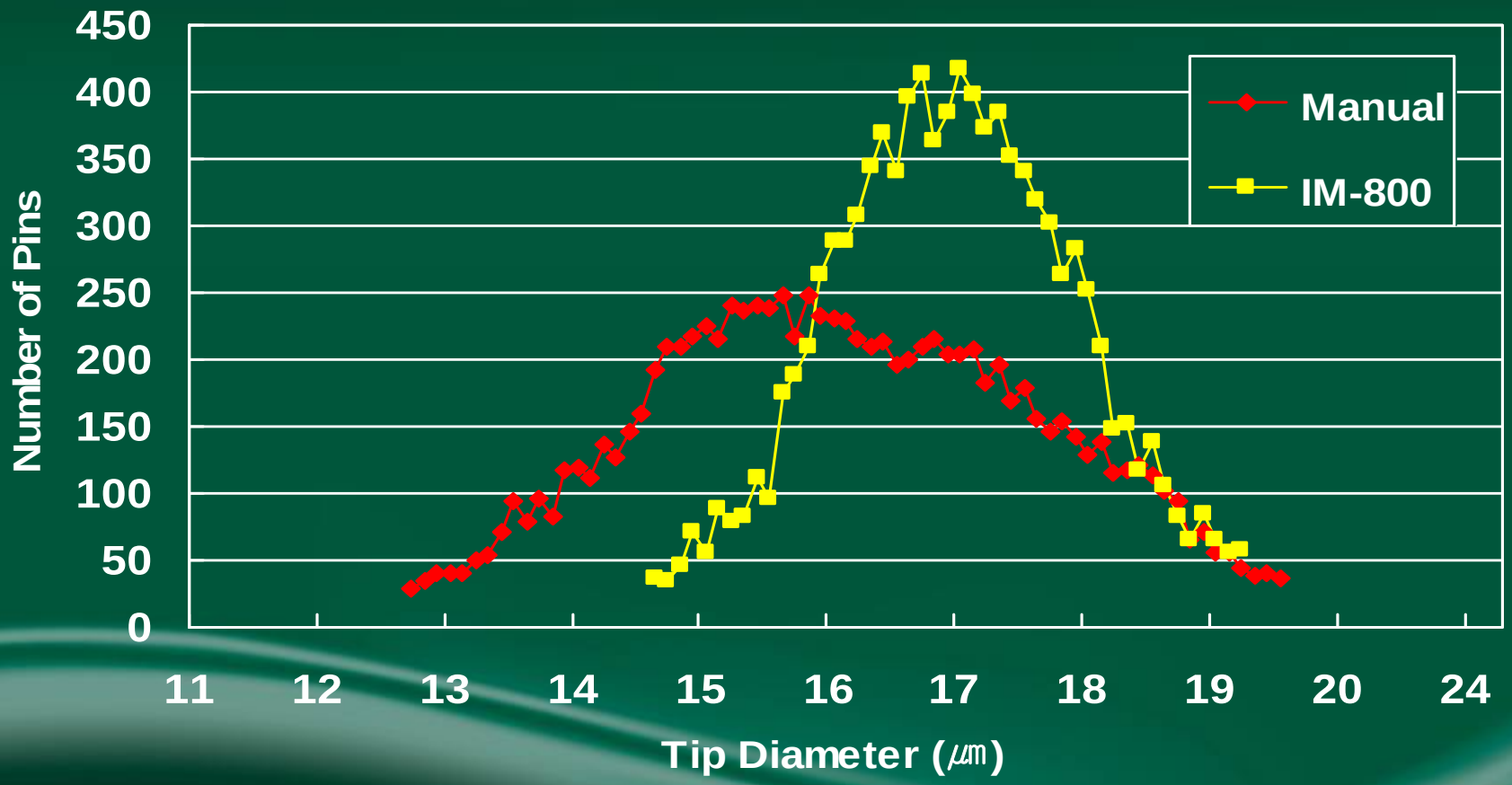
Quality Effects

- Reducing Tip Length Gap by Probe Insert Depth Uniformity



Quality Effects

- Reducing Tip Dia. Dispersion by Probe Insert Depth Uniformity



Quality Effects

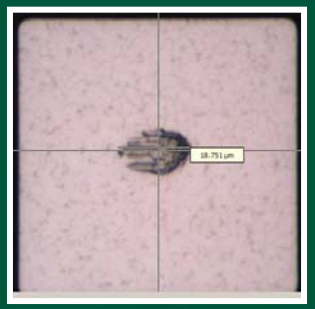
- Enhanced Scrub Marks by Full Probe Inspection

a) Before

Max. Size

X : 29.0㎛

Y : 13.6㎛



Min. Size

X : 18.8㎛

Y : 12.7㎛

GAP

X : 10.2㎛

Y : 0.9㎛

b) After

Max. Size

X : 22.2㎛

Y : 12.0㎛

Min. Size

X : 17.9㎛

Y : 11.3㎛

GAP

X : 4.3㎛

Y : 0.7㎛

Summary

- Got Rid of the Manual Drawbacks by Automation

- Improved the Reliability & Accuracy by Q.C & Q.A
  - Automatic Full Inspection
  - Reduce Tolerance of Tip Length and Bending Angle
  - Enhance Scrub Marks Quality

- Shorten the Delivery
  - One Week Faster

Future Action Items

- Reduce TAT (Total Acting Time)
  - 15sec → 12sec
- Enhance the Uniformity
  - Tip Length & Probe Bending Angle
  - Tip Diameter & Scrub Mark
- Increase Automation

Thank You for Kind Attention!

Question?