SWTEST

PROBE TODAY, FOR TOMORROW

2022 CONFERENCE

Control System for Enhancing the Life and Capability of Legacy, Modern and Mixed-Floor Probe Systems

SOTO TECHNOLOGIES
INTERNATIONAL

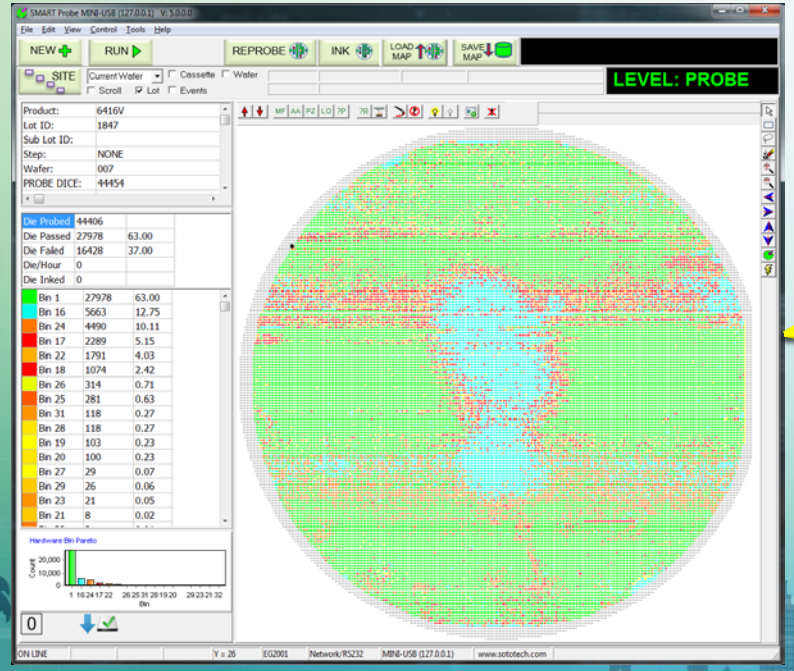
Albert Soto
President

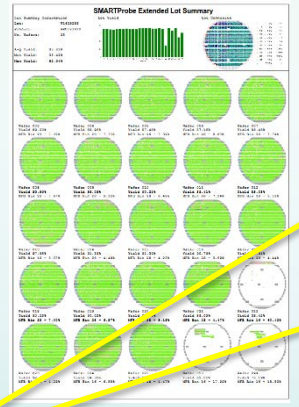
June 5 - 8, 2022

Legacy Equipment & Mixed Equipment Floors

ISSUES:

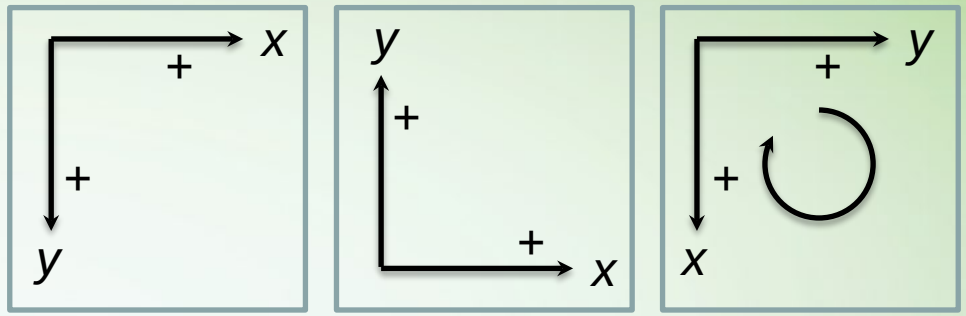
- **Lacking Modern Features**
  - SINF Merge, Re-Probe specific Bins, Alerts, change setup, Lasso etc.
- **Cannot Duplicate Setups Across Probers**
- **No Single/Common Interface**
- **Different Prober GPIB Protocols**





No Standards

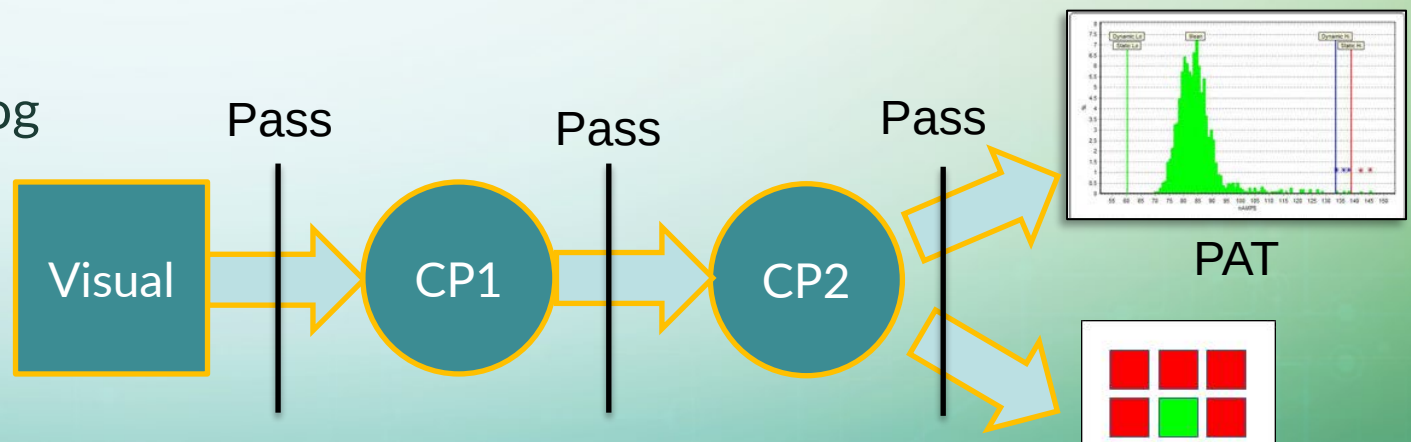
- **Coordinate Frames**
  - Convert Product Setup between Probers
- **Process Steps**
  - Merge Visual Inspection. AOI SINF
  - Multi-Pass for Temp, Bake, etc.
    SINF->CP1->CP2->PAT/GDBN
  - Only Test Passing per Process Step
- **Tester Program**
  - Different Syntax per Prober
  - Die X,Y Coordinates for Tester Data-log
- **Prober Steps Scaling**
  - Prober are inherently single-site steps

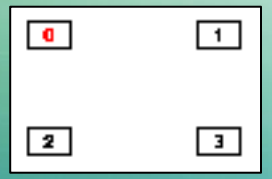


TEL,EG

TSK

Rotated Probe-Card





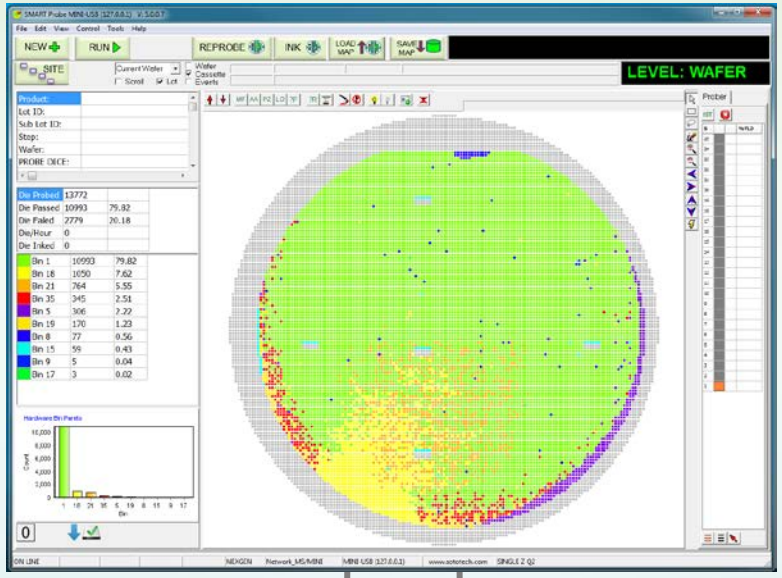
Solution

Tester Verse

TERADYNE

ADVANTEST

SMART Probe



USB

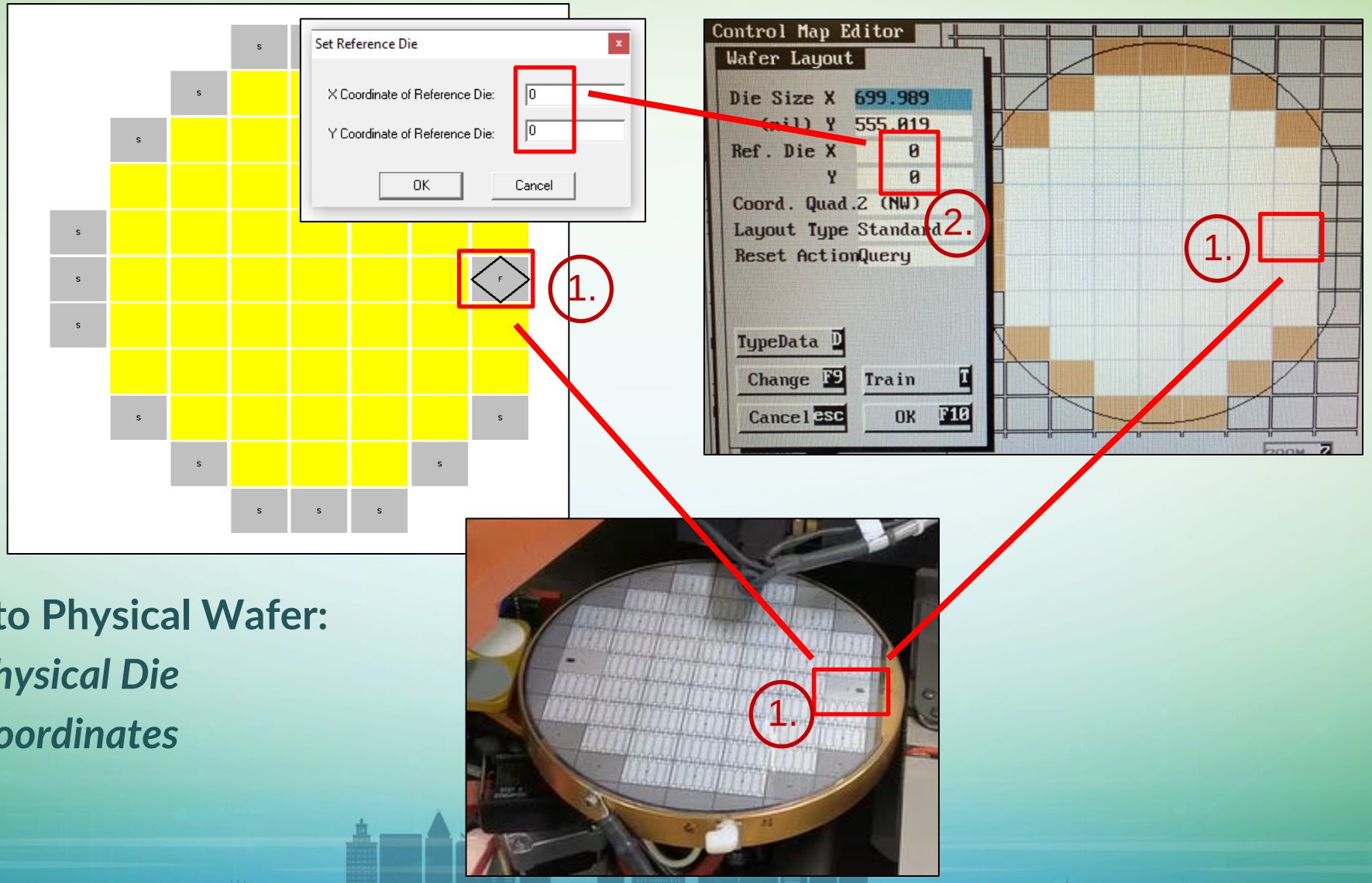
NI GPIB

Supported:
TTL
Network
RS232

NI GPIB

Prober Verse

Standardized Control Maps



Match Map to Physical Wafer:

1. *Match Physical Die*
2. *Match Coordinates*

Convert Existing Prober Maps

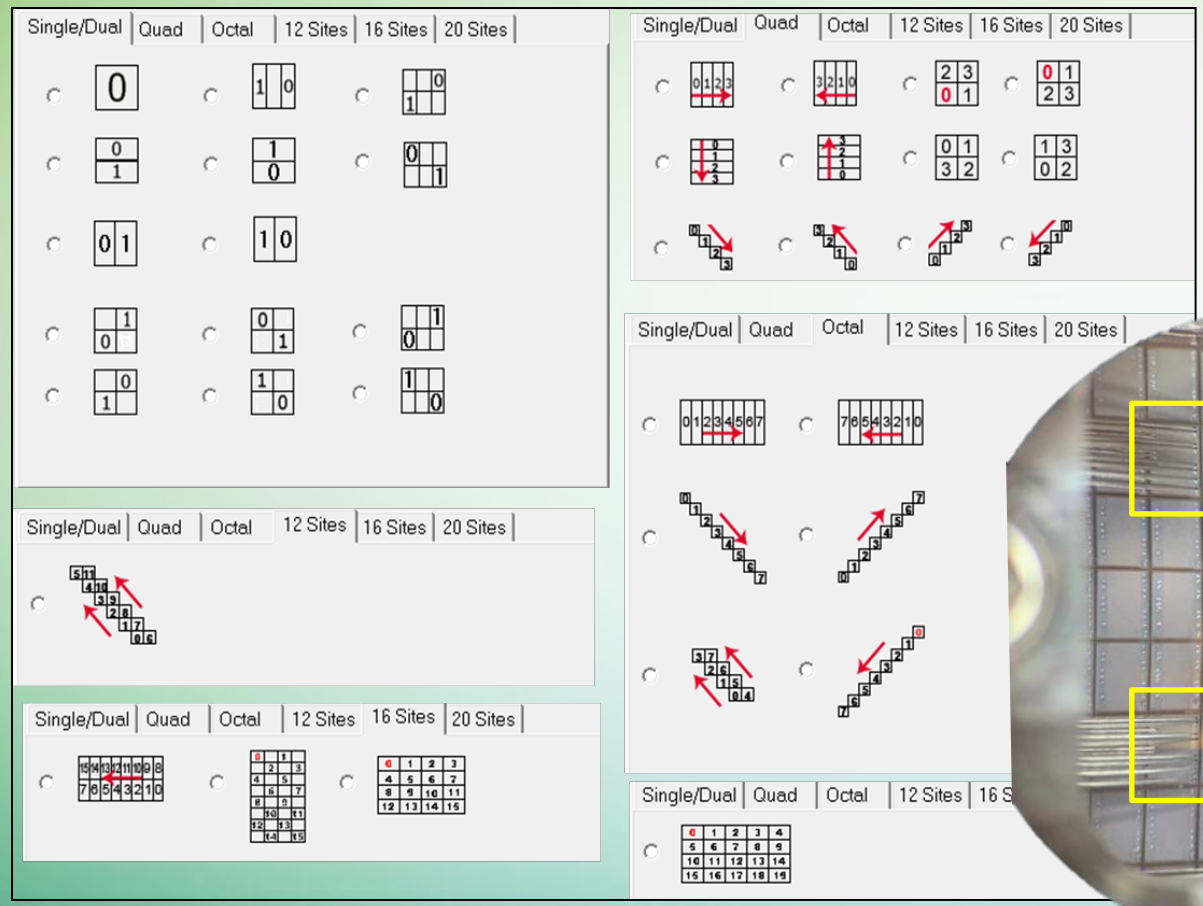
TOKYO ELECTRON

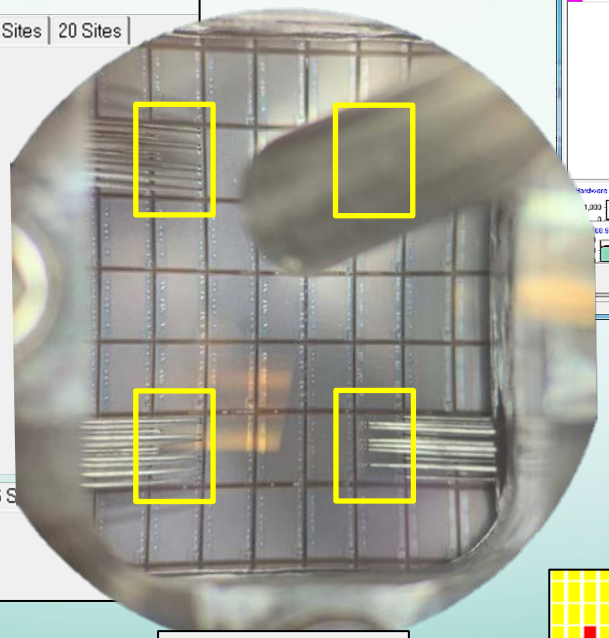
ACCRETECH

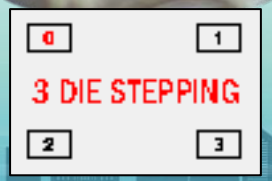
Prober Binary File

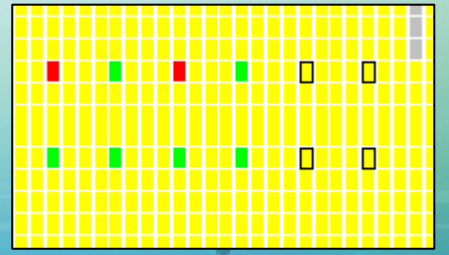
```
 1  464d 4e20 2020 2020 2020 2020 2020 2020
 2  2020 2020 5754 3334 3730 2020 2020 2020
 3  2020 2020 0078 0000 001f d957 0020 1b84
 4  0000 0000 000d 000d 0000 0000 3642 3039
 5  4c32 3130 534f 4634 2020 2020 2020 2020
 6  2001 3832 4b43 5430 3930 3030 2020 2020
 7  2020 2020 0001 0004 0202 0100 0000 0000
 8  0000 0000 0080 0080 0102 0000 0000 0016
 9  ffff efb9 0000 0080 0000 0080 0000 007a
10  0000 0086 3230 3031 3234 3136 3139 0000
11  3230 3031 3234 3136 3139 0000 3230 3031
```

Multi-Site Testing

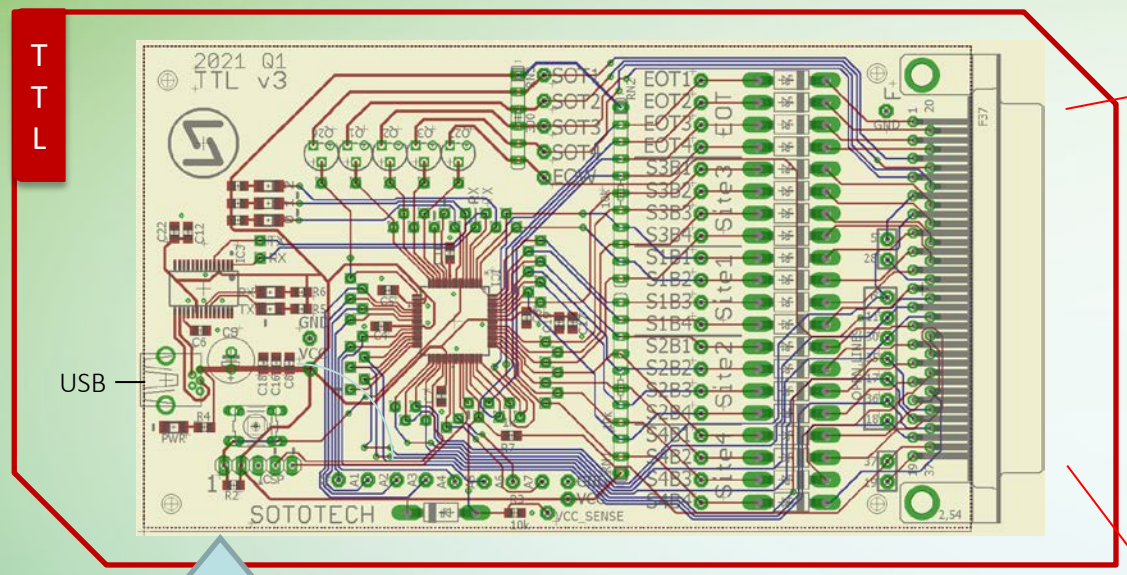


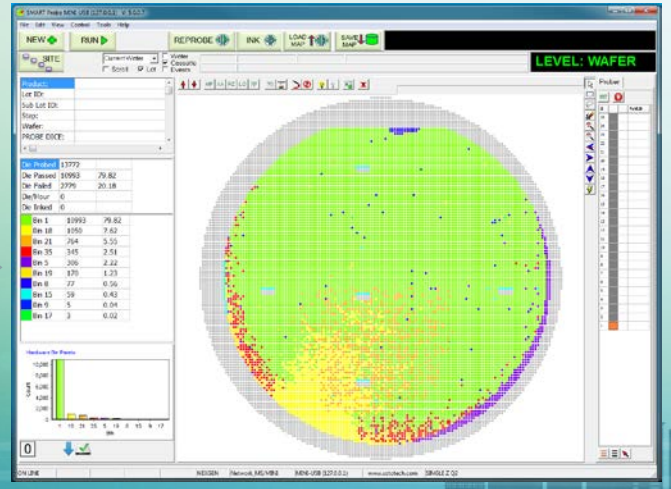






Multi-Site Testing



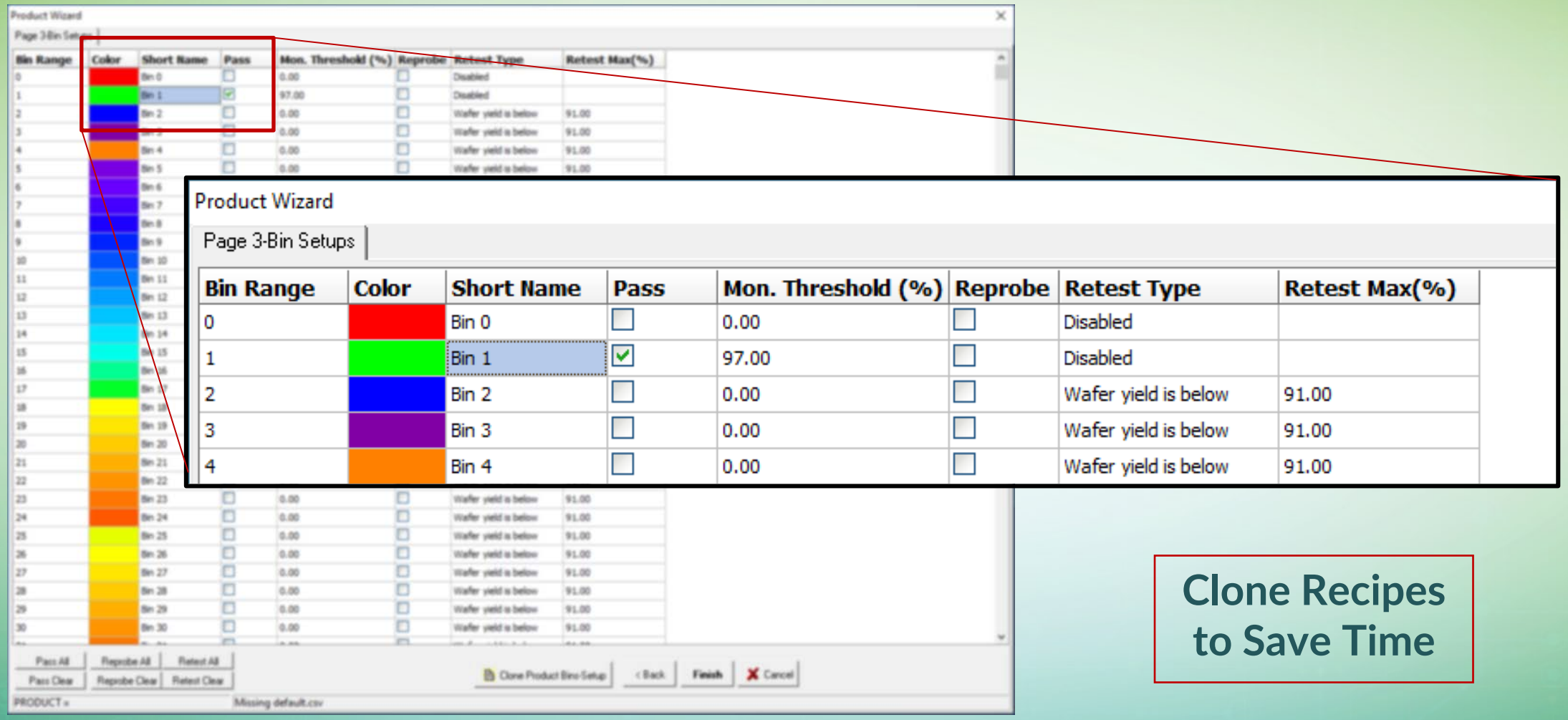


DB37F

EOT 1	1	20	EOT 2
EOT 3	2	21	EOT 4
SOT 1	3	22	SOT 2
SOT 3	4	23	SOT 4
	5	24	Site 1
	6	25	Site 2
Bin 1	7	26	Site 3
Bin 2	8	27	Site 4
Bin 3	9	28	
Bin 4	10	29	EOW
	11	30	
Bin 1	12	31	Bin 1
Bin 2	13	32	Bin 2
Bin 3	14	33	Bin 3
Bin 4	15	34	Bin 4
GND	16	35	
	17	36	
	18	37	VCC sense
	19		

EOT (EOT 2, EOT 4) **SOT** (SOT 2, SOT 4) **SITE 3** (Site 1–4) **SITE 1** (Bin 1–4) **SITE 2** (Bin 1–4) **SITE 4** (Bin 1–4)

Managing Device Profiles

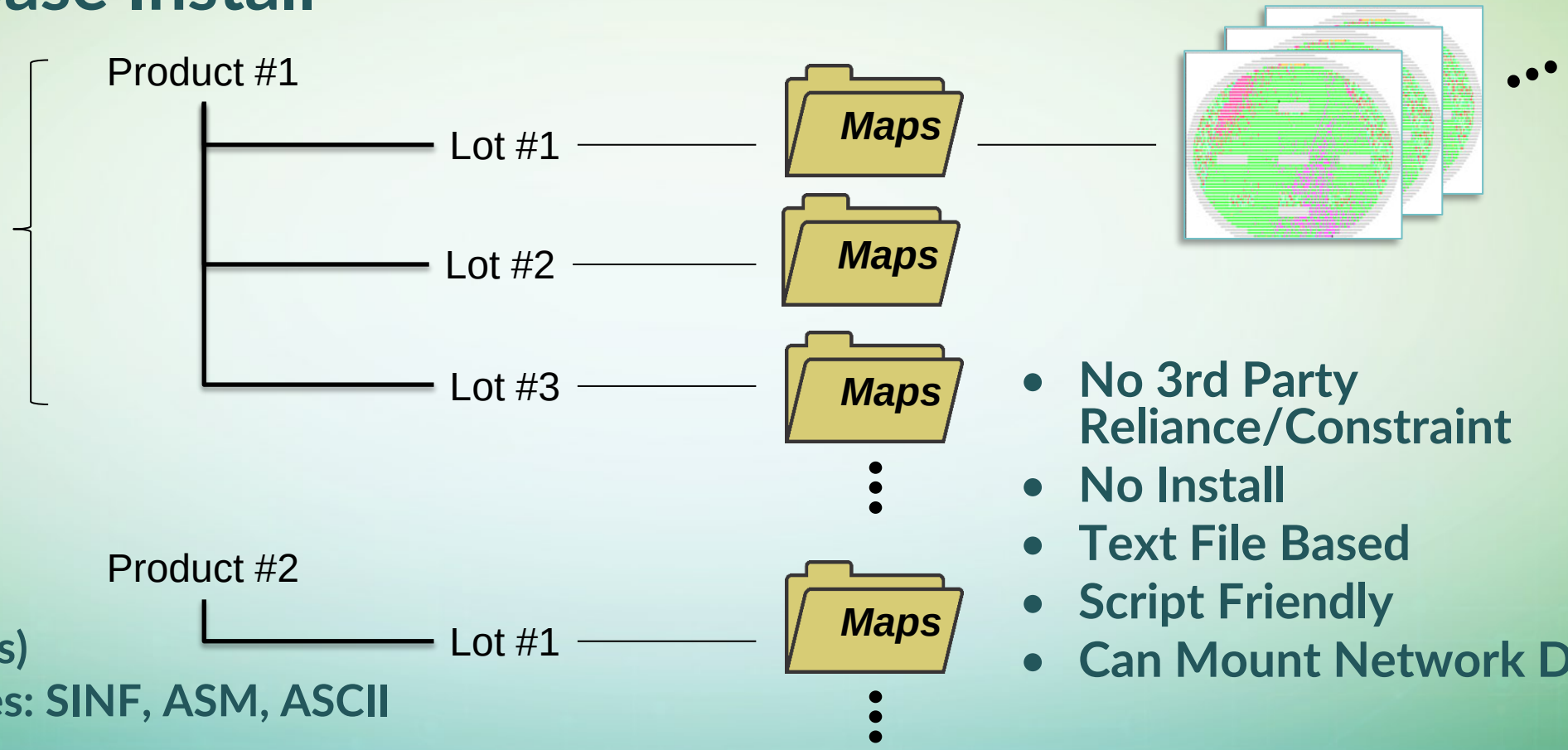


Clone Recipes to Save Time

NoSQL Database Approach

No Database Install

File-based Structure



Includes:

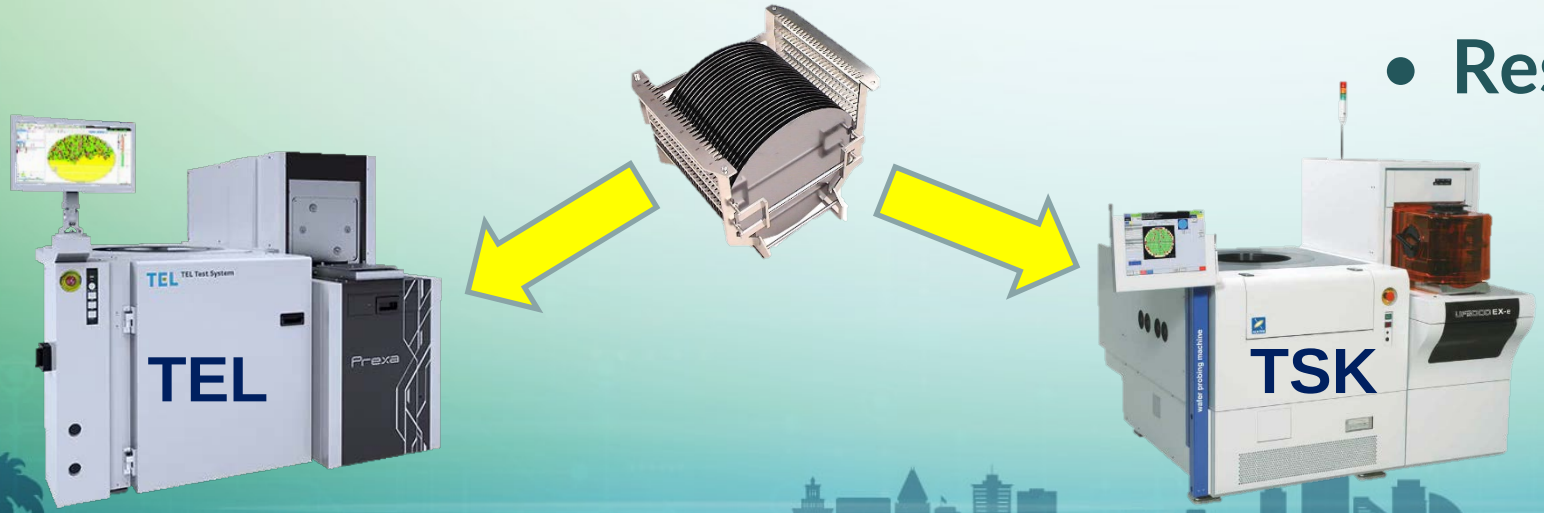
- Wafer Maps
- Reports (PDFs)
- Assembly Files: SINF, ASM, ASCII

- No 3rd Party Reliance/Constraint
- No Install
- Text File Based
- Script Friendly
- Can Mount Network Drive

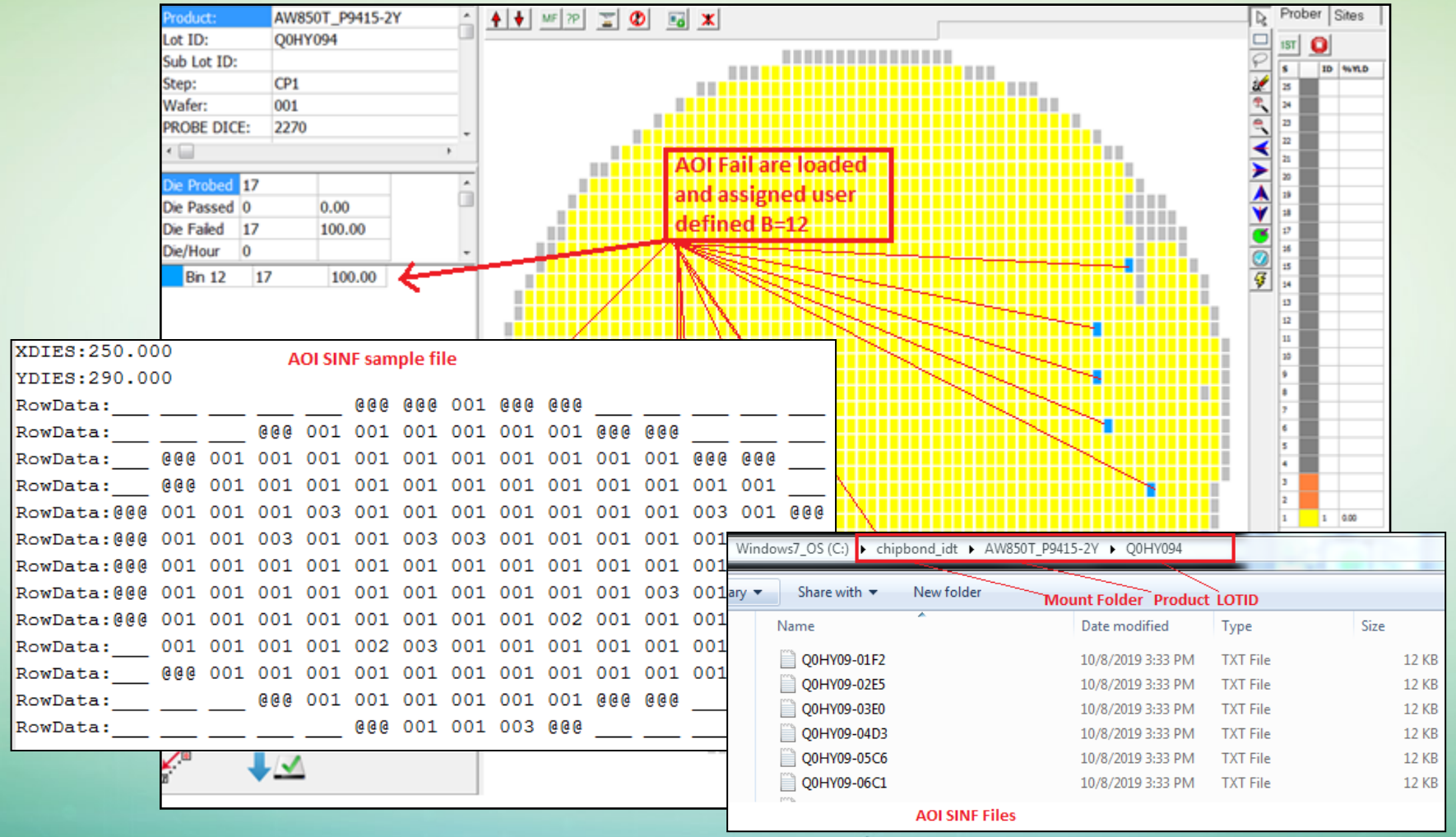
Sort Sessions

Single Lot

- Sort Across Many Probers
- Restart After Crash
- Restart on Different Prober



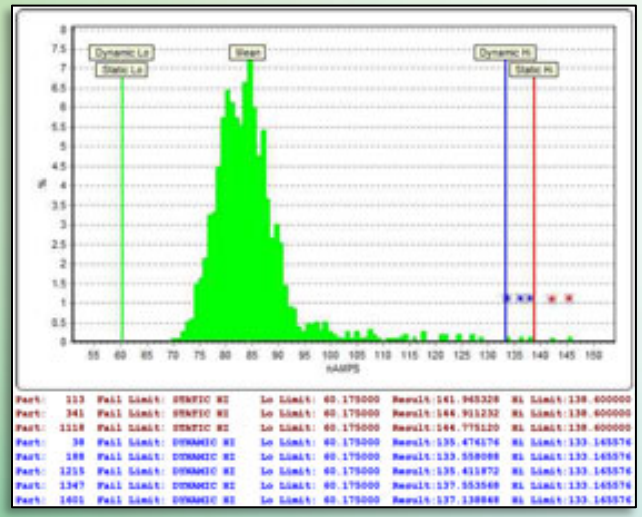
Pre-Sort Map Merge



Post-Sort Analysis

Part Average Testing (PAT)

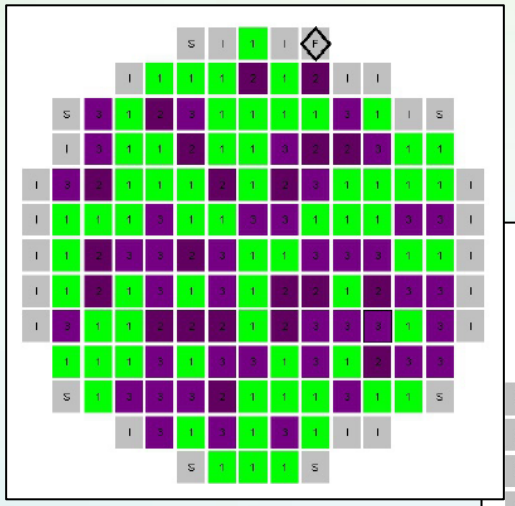
Statistical



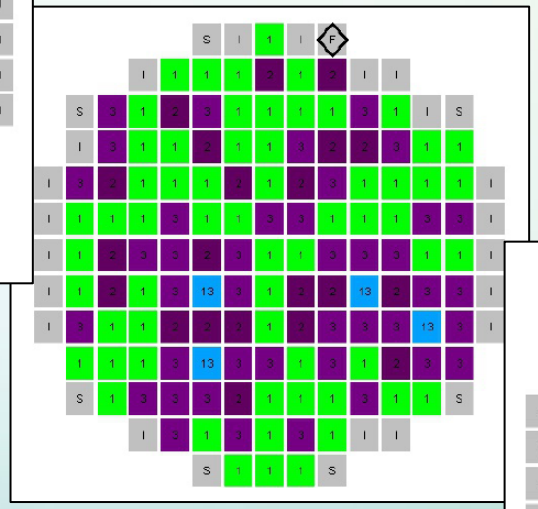
PAT

Good Die Bad Neighborhood (GDBN)

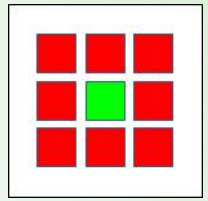
Spatial



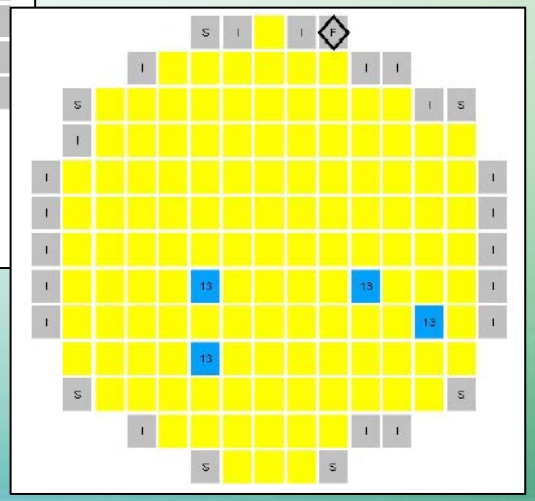
Original Map



GDBN Failures



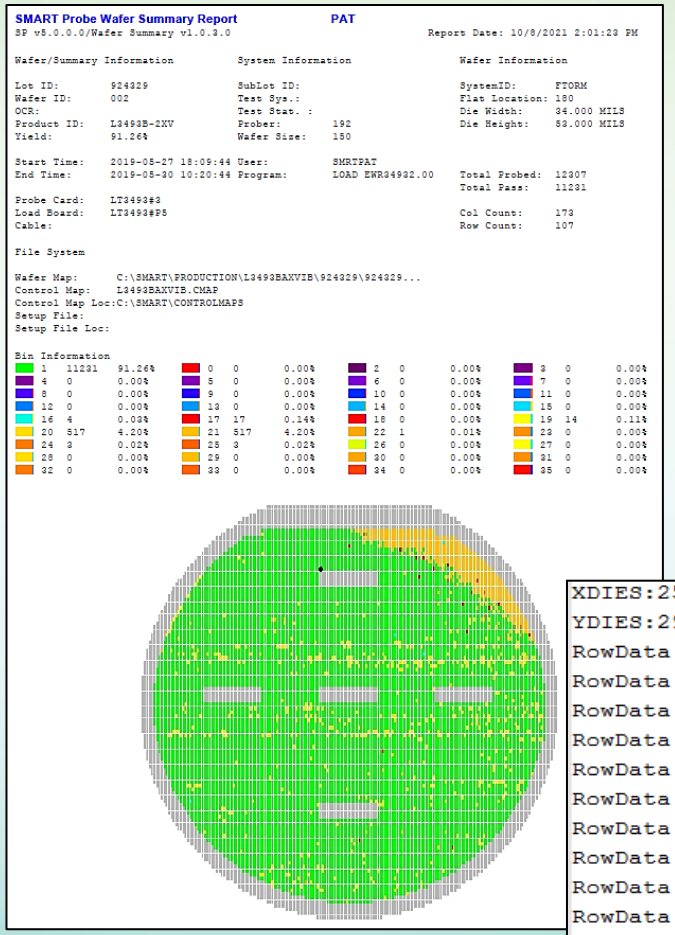
GDBN 8-Die Pattern

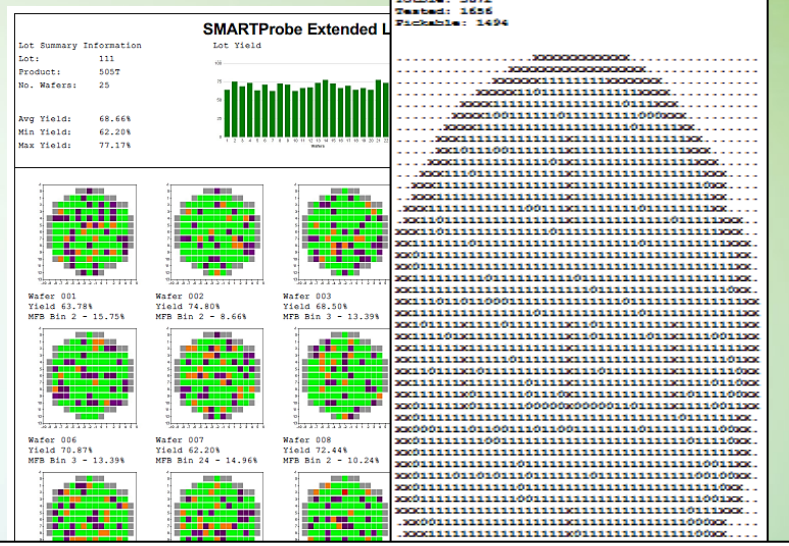


GDBN Difference Map

Remove Outliers

Reports






```
XDIES:250.000
YDIES:290.000
RowData:___ ___ ___ ___ ___ @@@ @@@ 001 @@@ @@@ ___ ___ ___ ___ ___
RowData:___ ___ ___ @@@ 001 001 001 001 001 001 @@@ @@@ ___ ___ ___
RowData:___ @@@ 001 001 001 001 001 001 001 001 001 001 @@@ @@@ ___
RowData:___ @@@ 001 001 001 001 001 001 001 001 001 001 001 001 ___
RowData:@@@ 001 001 001 003 001 001 001 001 001 001 001 003 001 @@@
RowData:@@@ 001 001 003 001 001 003 003 001 001 001 001 001 001 @@@
RowData:@@@ 001 001 001 001 001 001 001 001 001 001 001 001 001 @@@
RowData:@@@ 001 001 001 001 001 001 001 001 001 001 003 001 003 @@@
RowData:@@@ 001 001 001 001 001 001 001 001 002 001 001 001 001 @@@
RowData:___ 001 001 001 001 002 003 001 001 001 001 001 001 001 ___
RowData:___ @@@ 001 001 001 001 001 001 001 001 001 001 001 @@@ ___
RowData:___ ___ ___ @@@ 001 001 001 001 001 001 @@@ @@@ ___ ___ ___
RowData:___ ___ ___ ___ ___ @@@ 001 001 003 @@@ ___ ___ ___ ___ ___
```

Closing

- Perfection is the Enemy of Good!

  William Donovan OSS WW2

- “Hit’ em where they ain’t”, “Leap-frogging” and “Bypassing”

  Douglas MacArthur WW2