



SWTEST

PROBE TODAY, FOR TOMORROW

Study on Thermal Stability of Probe Mark



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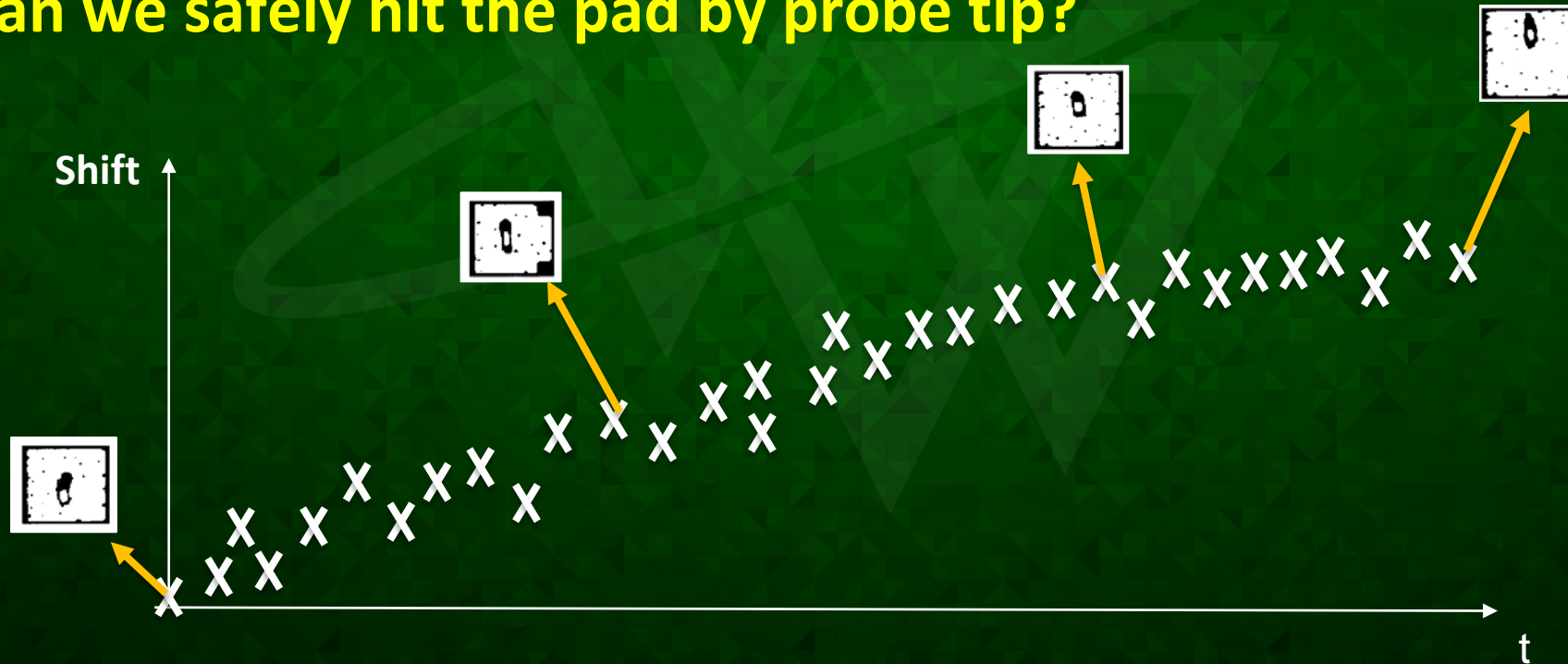
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Background

- While hot temperature testing, we can see obvious probe mark shift.
- Sometimes probe marks touch edge of pad if proper alignment didn't performed.
- How can we safely hit the pad by probe tip?

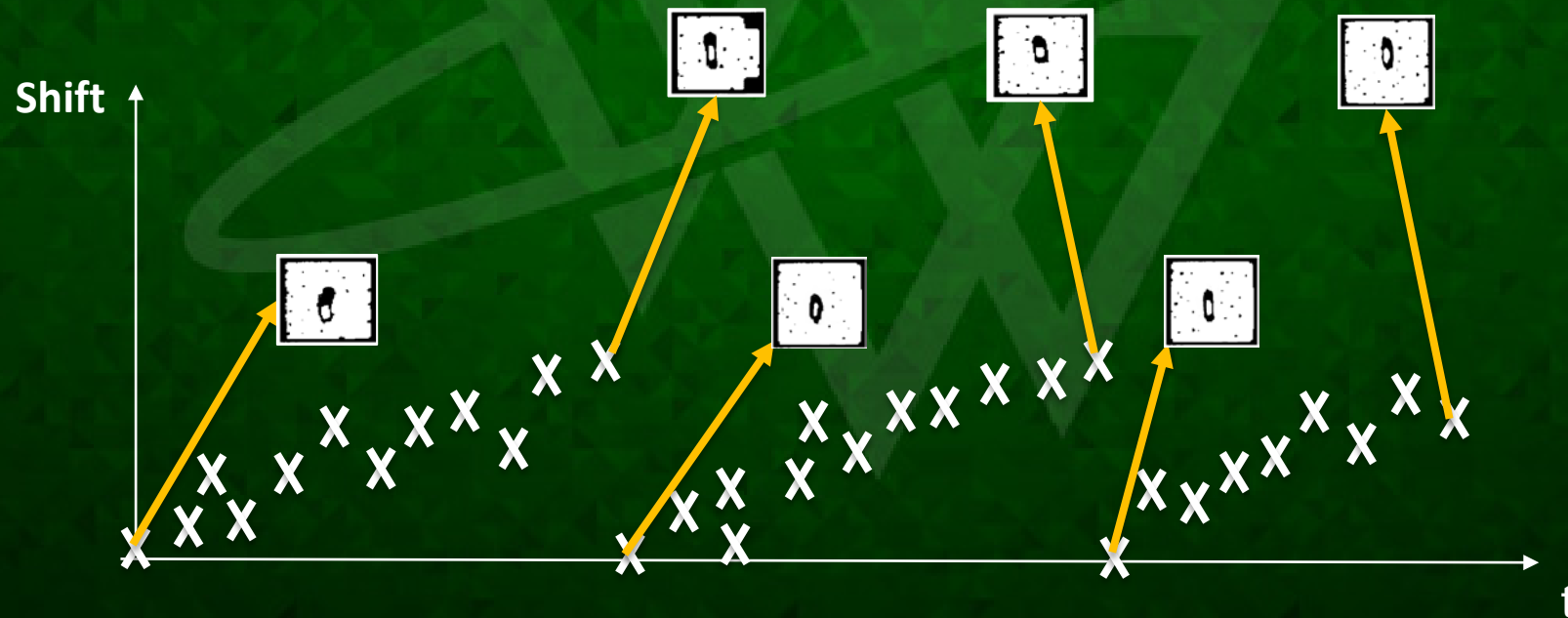


Goals

- **We want to have a well centered probe mark on the pad upon high temperature testing environment.**
- **After alignment, probe mark shift has to be always back to “Zero”.**

Minimizing probing shift against temperature

- At 150'C, since start probing, probe mark start to shift.
- Whatever it is, after alignment, the probe mark shift is "Zero".
- After alignment, continue to probe remain dies, then shift start to appear again.
- After alignment, the shift back to "Zero" again.

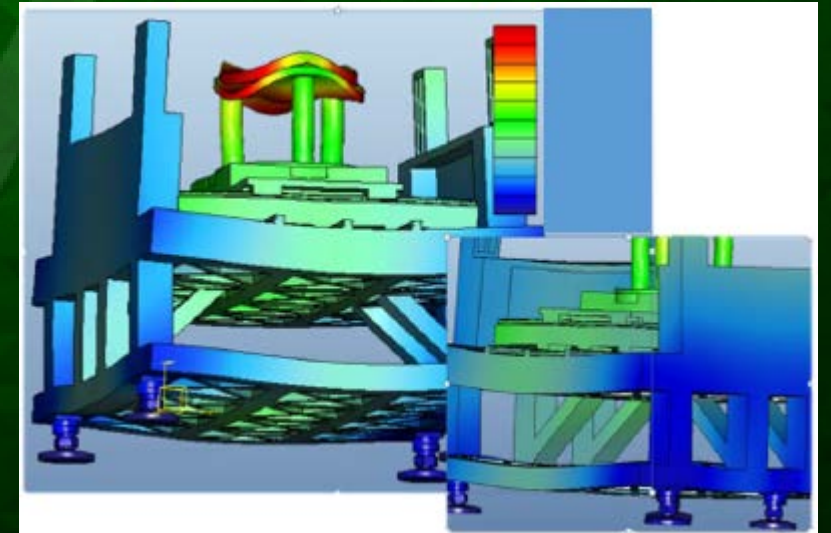
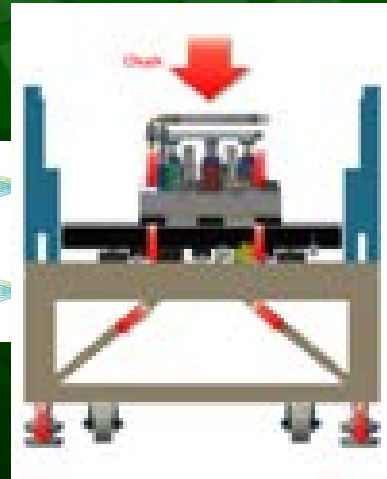
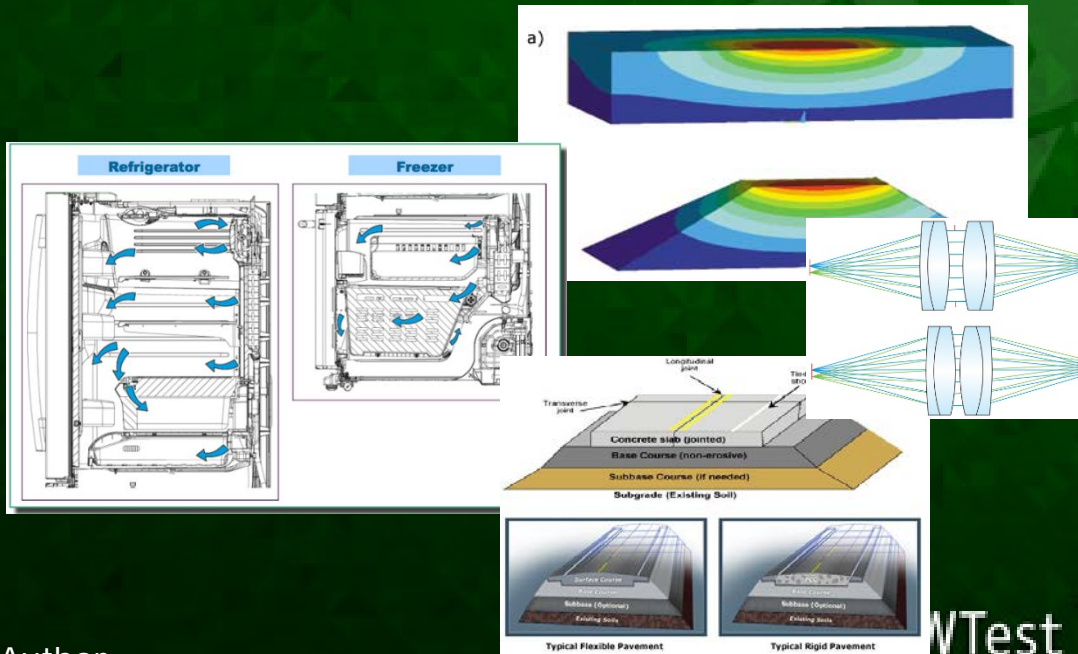
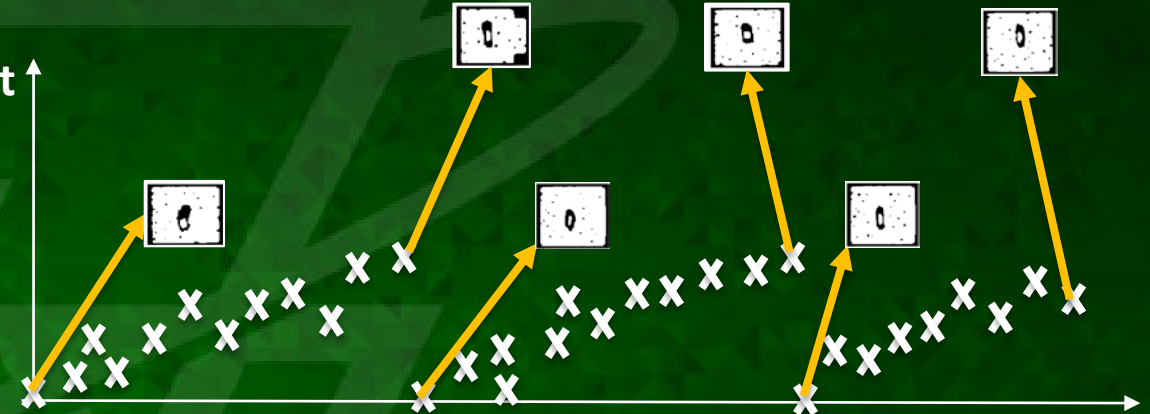


Property of us



- Specially designed system calibration mark system.
- All symmetric design
- Heat blocking & spreading
- Right air circulation
- Making the needed spot rigid

Shift



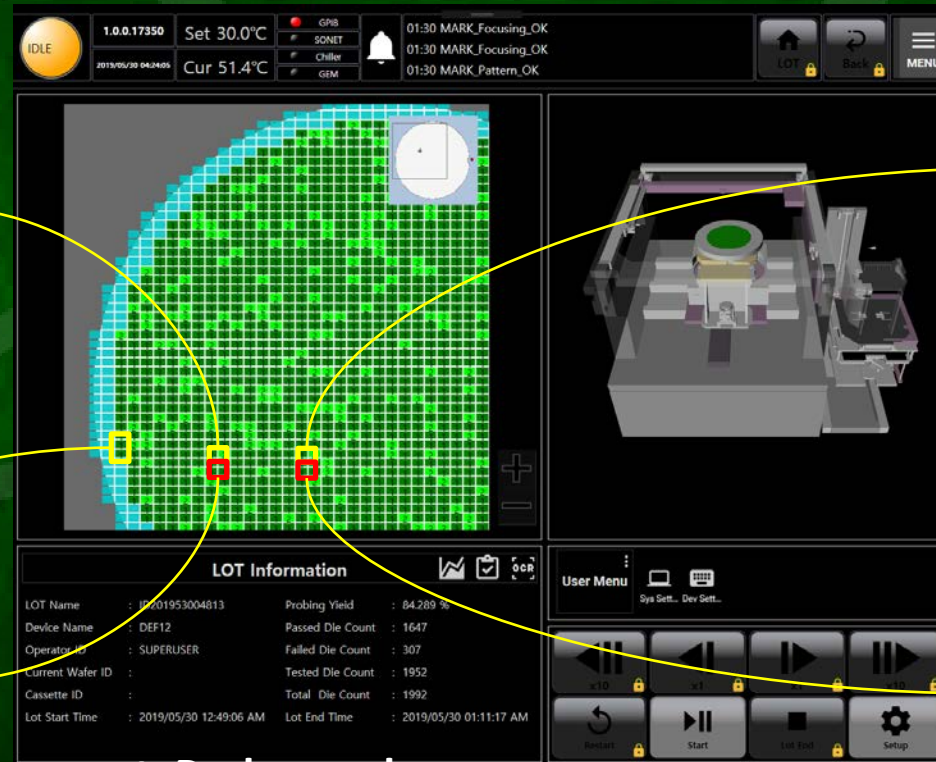
Result

- Hitting the very same spot after alignment

Probe mark after 380 dies contact around (-2um ,+5um)



Probe mark after 380 dies contact around (+2um ,+7um)



After alignment, Probe mark shift is around (0um ,0um)




Probe mark at start of wafer(0um ,0um)

After alignment, Probe mark shift is around (0um ,0um)



Findings: Be smart?

- Seeking smart way to perform alignment interval or coordinate.



Wow, it is very nice.
Do I need to set
those coordinate
always?

- Device(Wafer and probe card) is different always.
- Increasing number of alignment will increase accuracy and control. But it will decrease throughput and overall system efficiency.

Key data

- All symmetric design concept, heat blocking, making needed spot rigid, but it will be NEVER perfect.
- By our own reference mark optical calibration system, as long as alignment performed, all the shift will be “Zero”.
- Then, how often should we perform it?

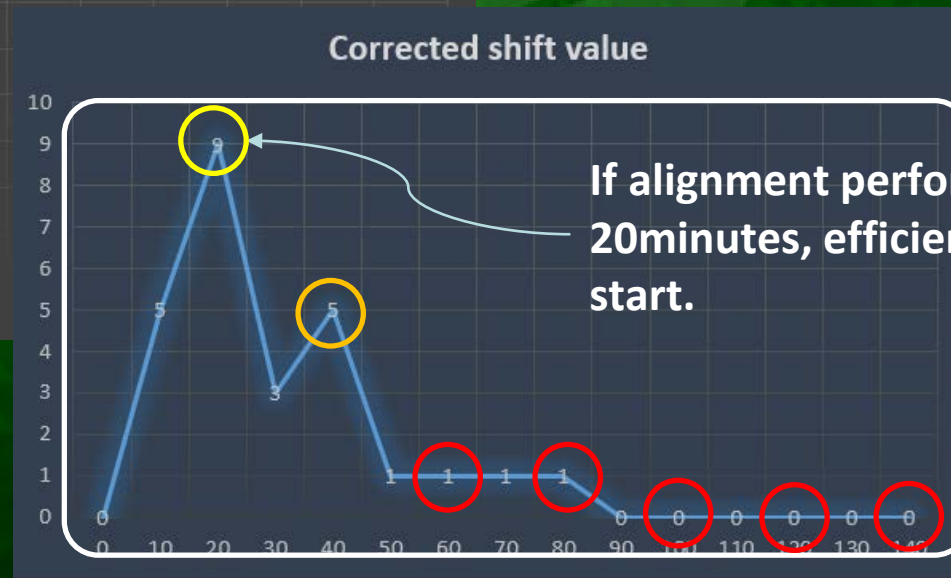
Without knowing, perform alignment every 20minutes, Shift will be controlled within 9um maximum.



Since 30minutes later, shift correction by every 20minutes alignment will be small number.

Key data 2

- We want to control shift efficient way.



7x of alignment!

Key data 3

- We control shift by time bases alignment.



Alignment performed 20 minutes. When shift is less than first correction, and within the target shift to control, next alignment will be performed 40 minutes later.



3x of alignment

Conclusion

- **Our system's key value (Optic system) is once we perform alignment, any probe mark at any condition will get back to it's original position.**
- **To avoid often alignment time consuming, smart way of doing alignment by time + tolerance base is available.**

Follow-On Work

- **“Zero” system aging time for device change over especially temperature testing product.**
 - Start probing immediately once prober reached target temperature.
 - To get rid of aging time.
 - To get fastest device change over time.



Thank you.