



# BS Poly Removal Defect Reduction

---

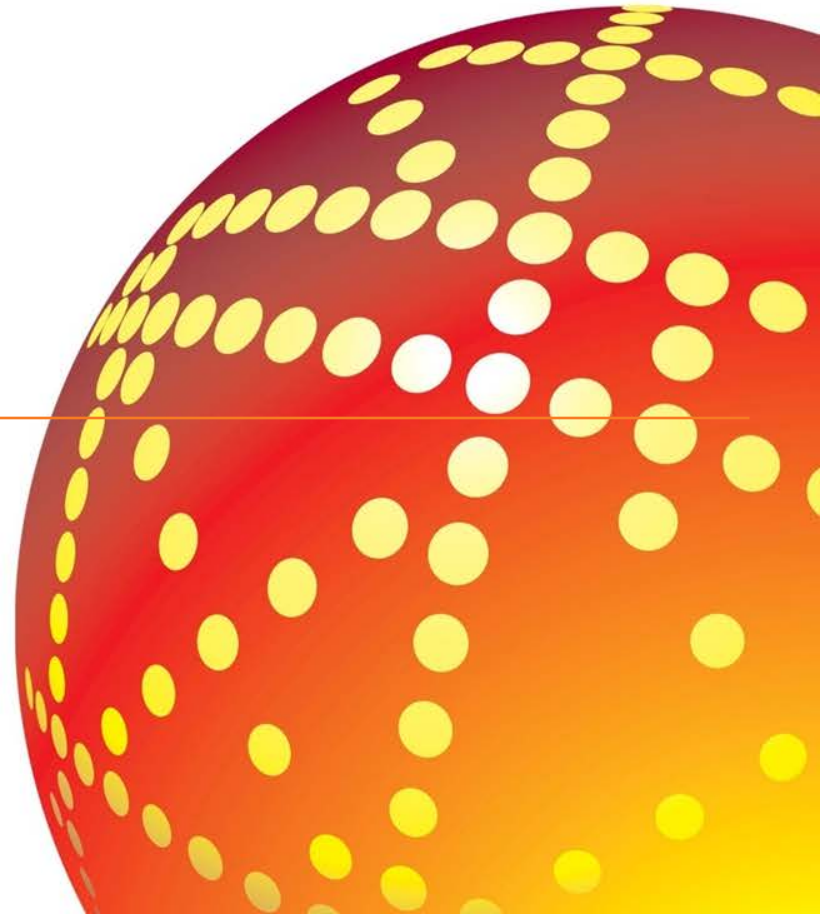
Hong Zhai, Colin Weidner, Dhiman Bhattacharyya, Norberto DeOliveria, and Vincent Sih



**GLOBALFOUNDRIES**  
Malta, NY

---

Removal of edge cluster defects by improving recipe and hardware  
for backside polysilicon wet etch process





# TOC

---

Table of contents:

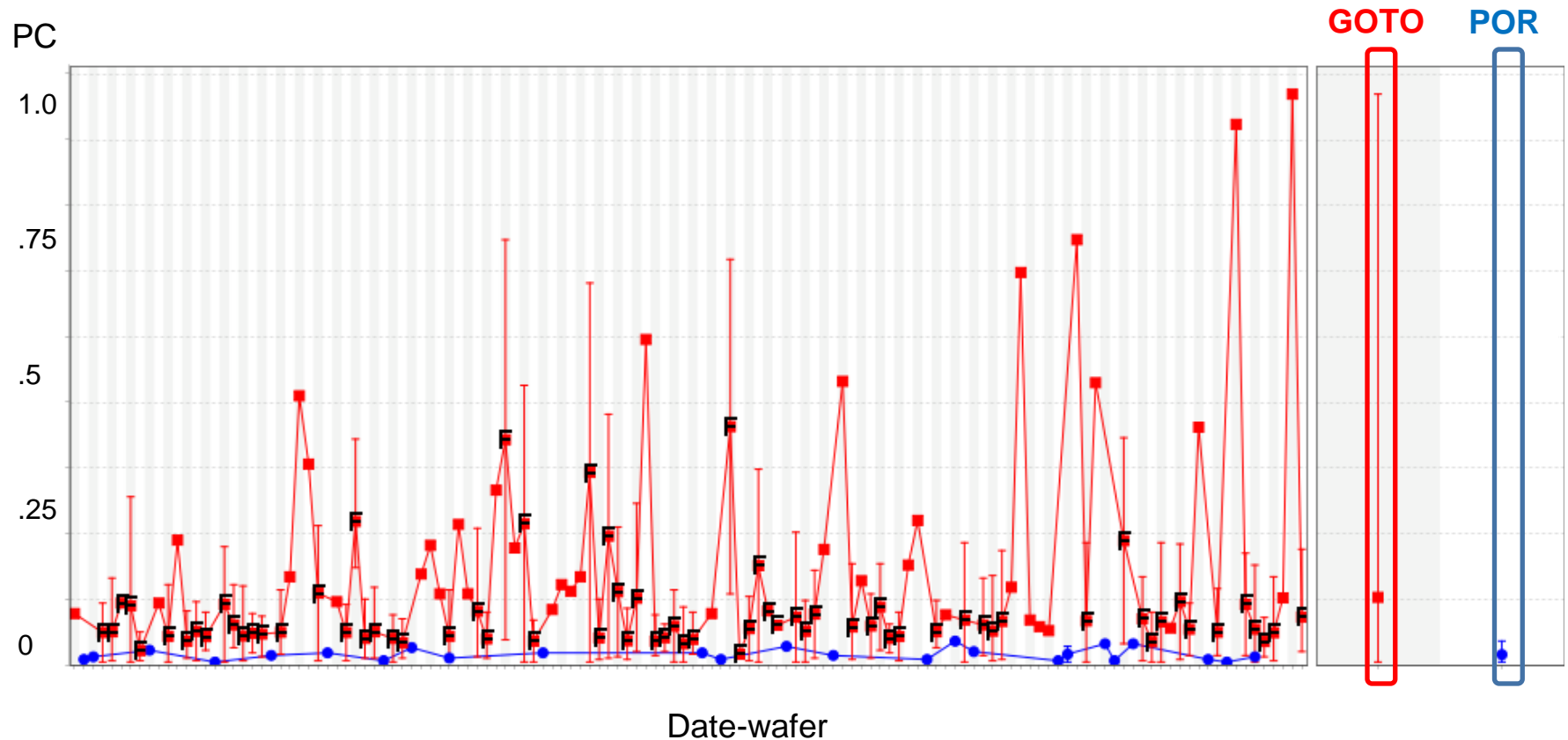
- 1) Mission: repurposing an existing tool
- 2) Challenge: gap and performance
- 3) Approach and methodology
- 4) Current Result & status
- 5) Concluding remarks

# PC: Particle Count

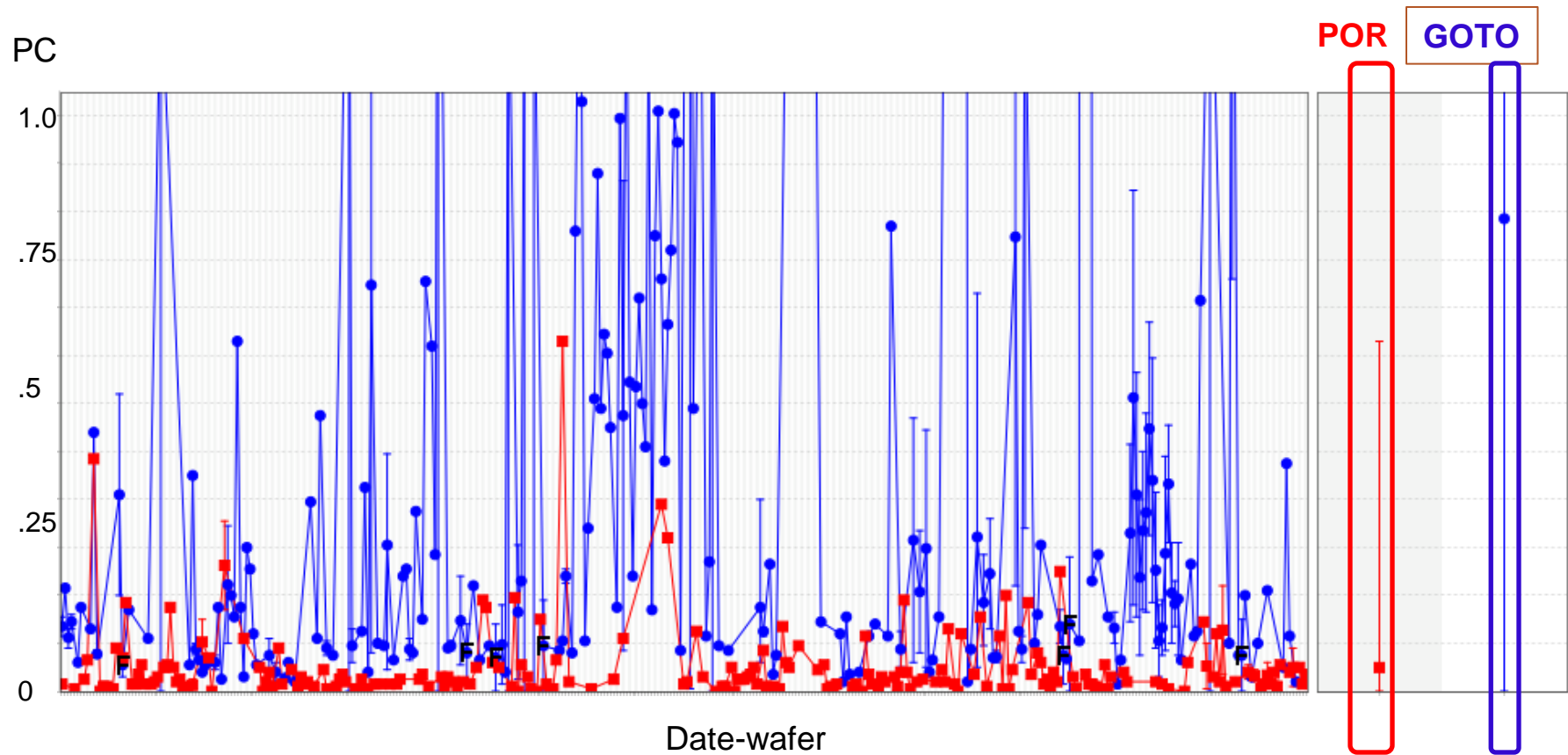
ER: Etch Rate



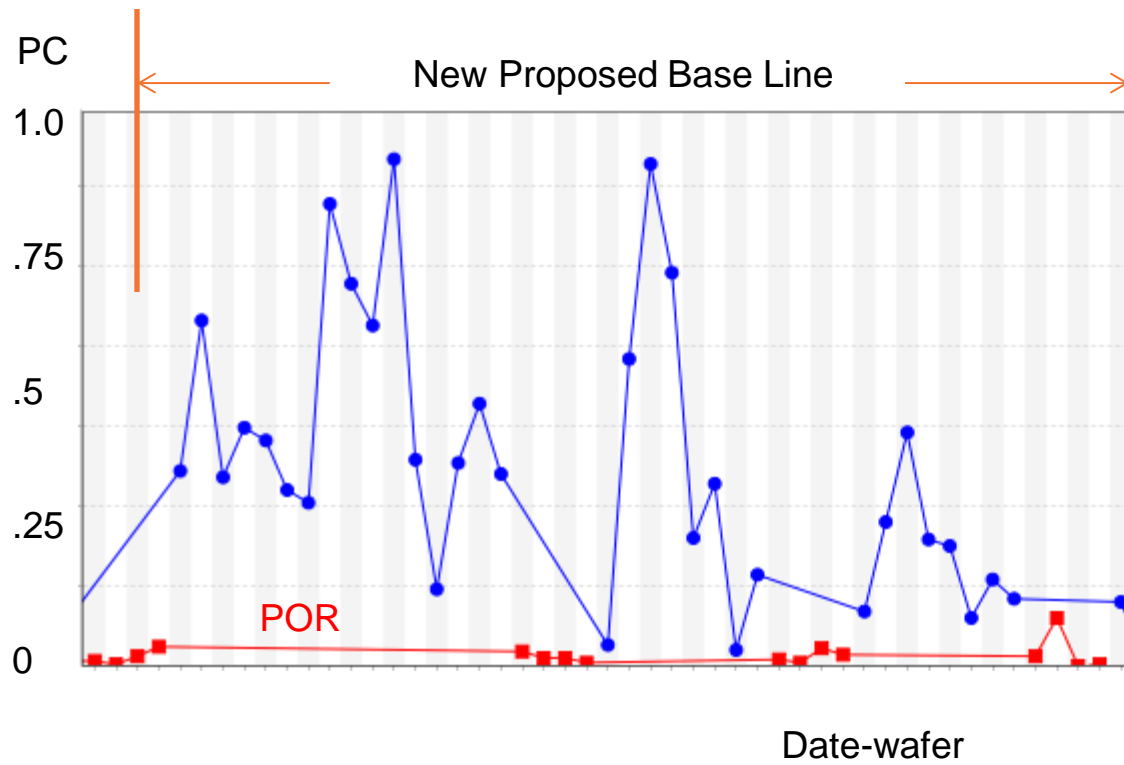
# PC performance GOTO vs POR



# Half Year Later ...



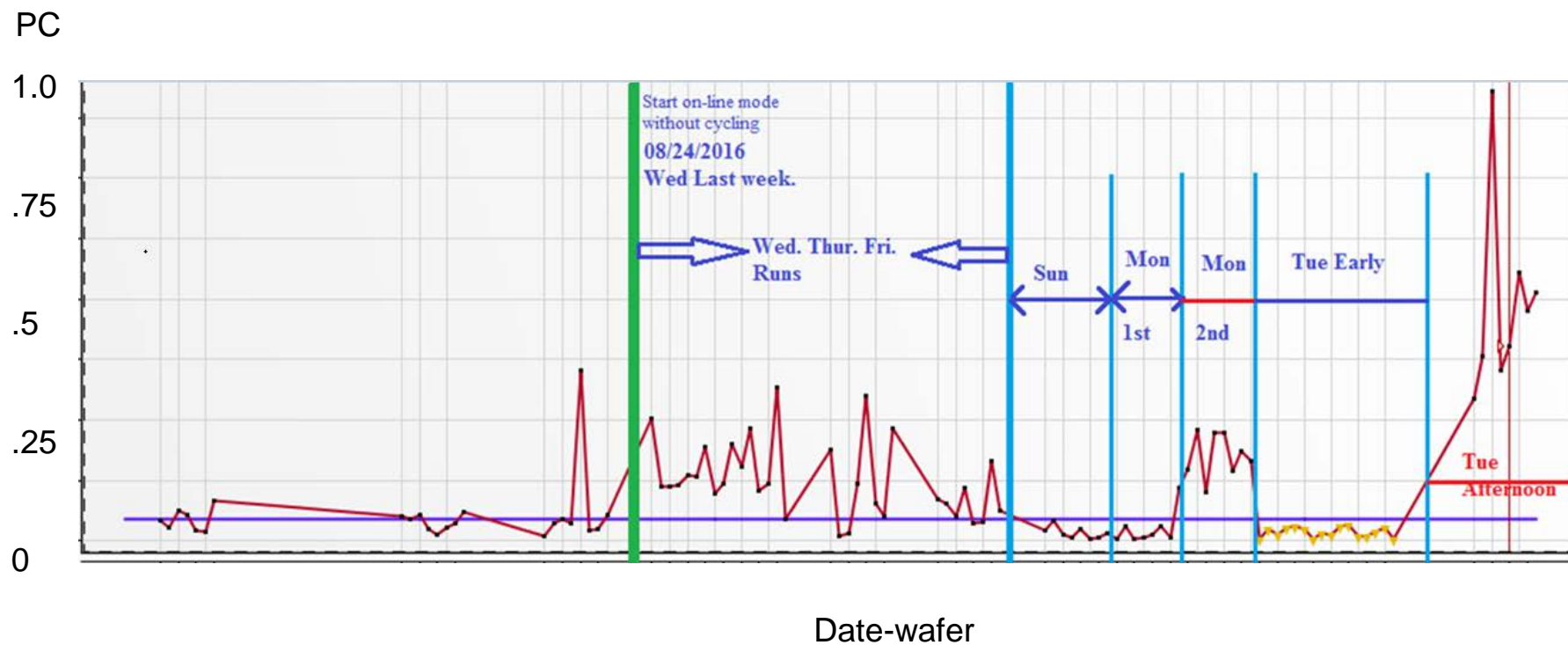
# GOTO PC Qual



# Stage of starting manufacture Qualification



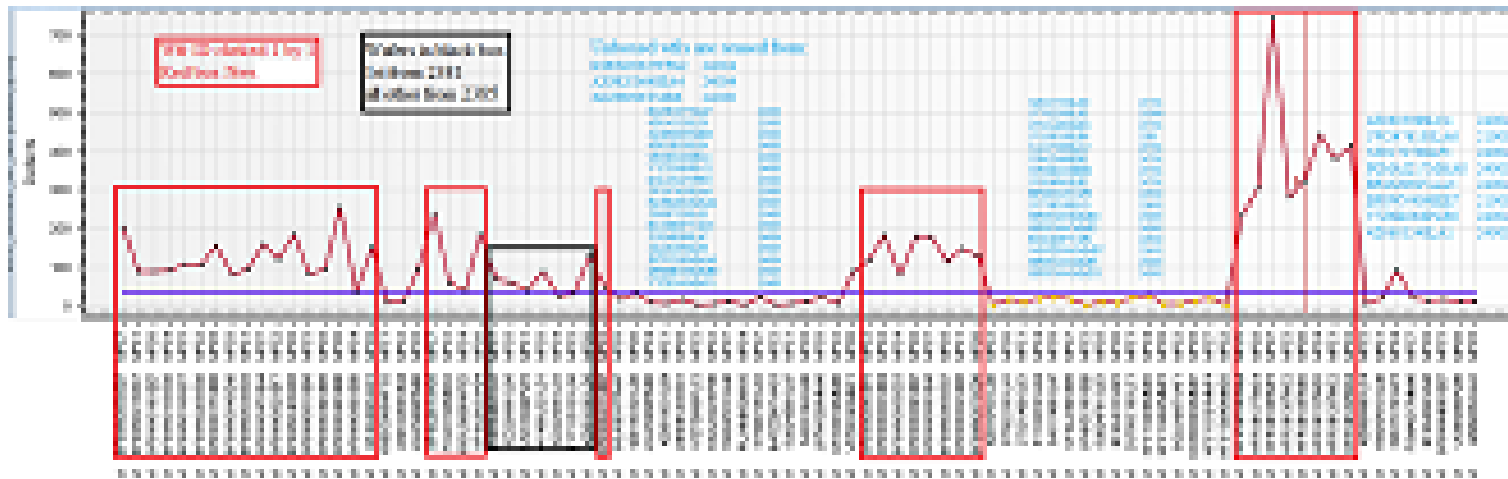
# Deep dive



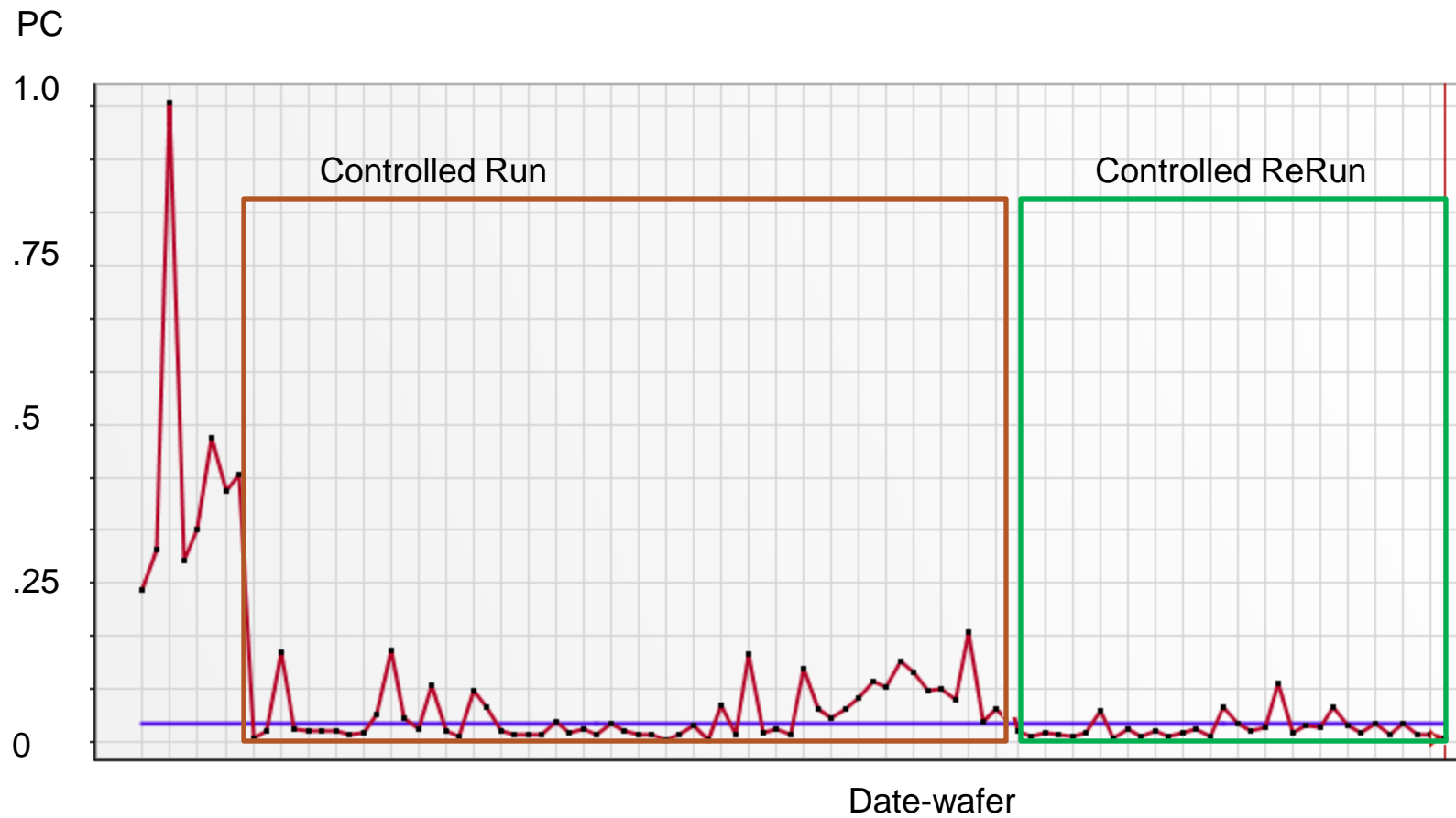


## Re-Categorize the previous busy chart:

- (1) All wafer check one by one for history: 88 past runs wfrs.
- (2) Red boxed: all new Bare Si wfr.
- (3) Black box from one tool family.
- (4) Non-boxed from any other tools in chart.



# A few runs with controlled parameters



## New Step

(1) Addition Pre Step.

(2) Pre Defect measurement.

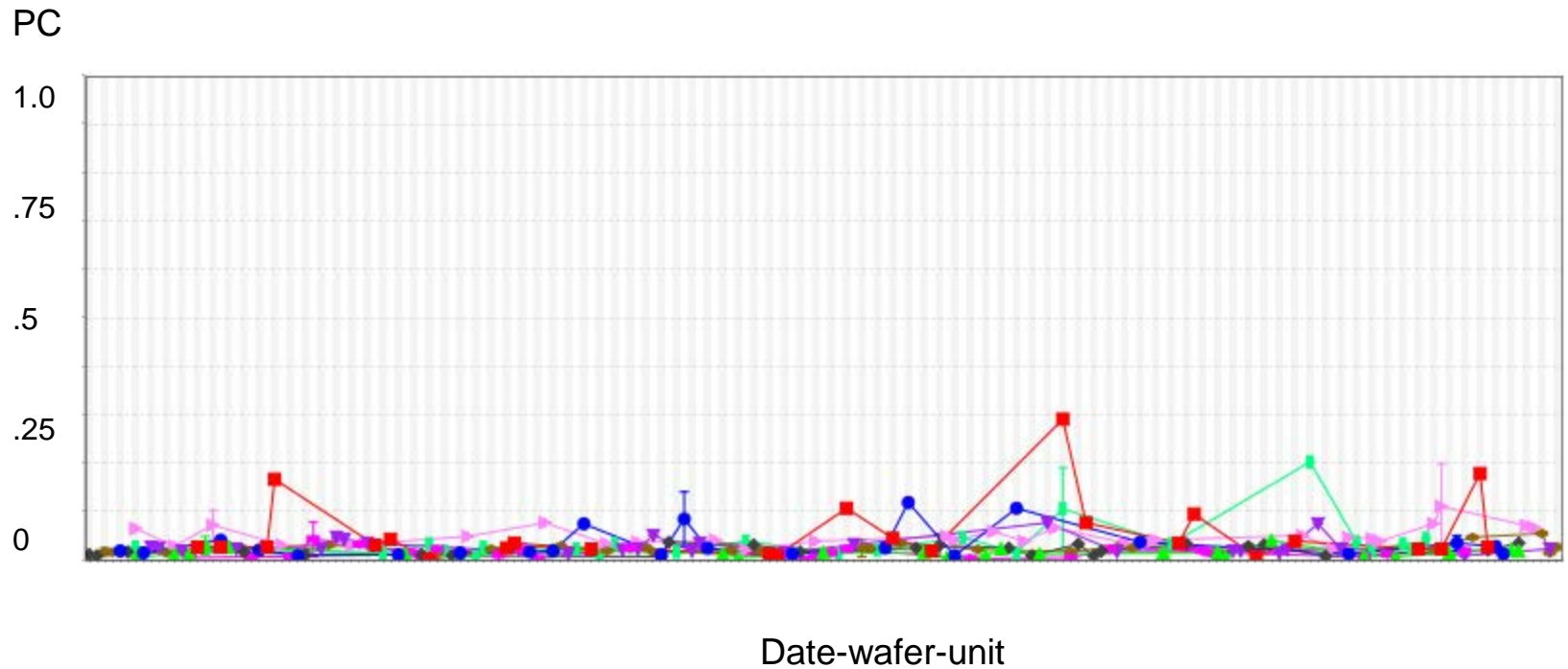
(3) Process Step.

(4) POST Defect measurement.

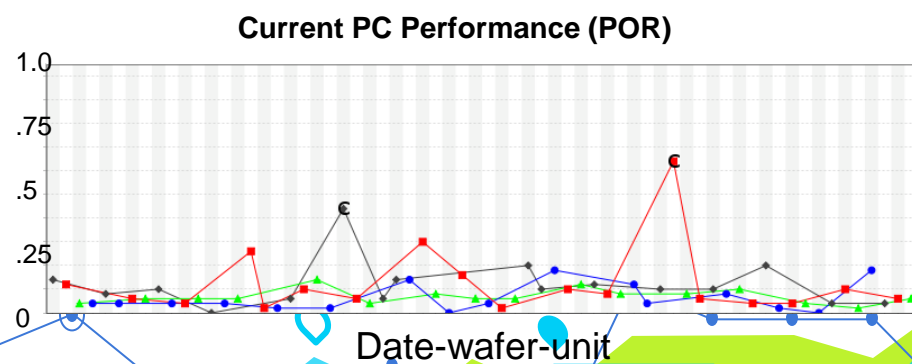
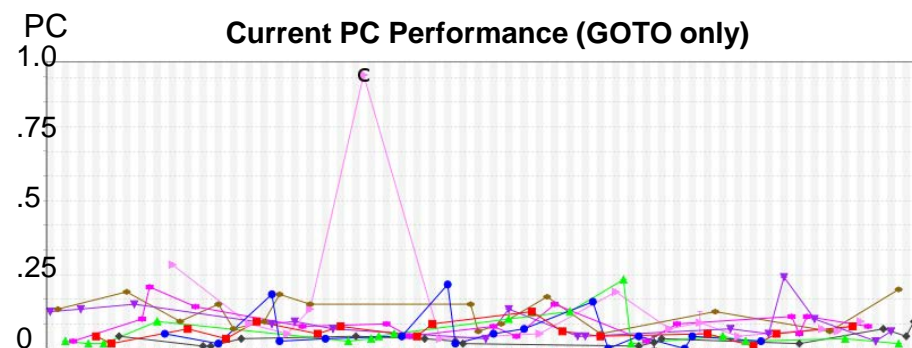
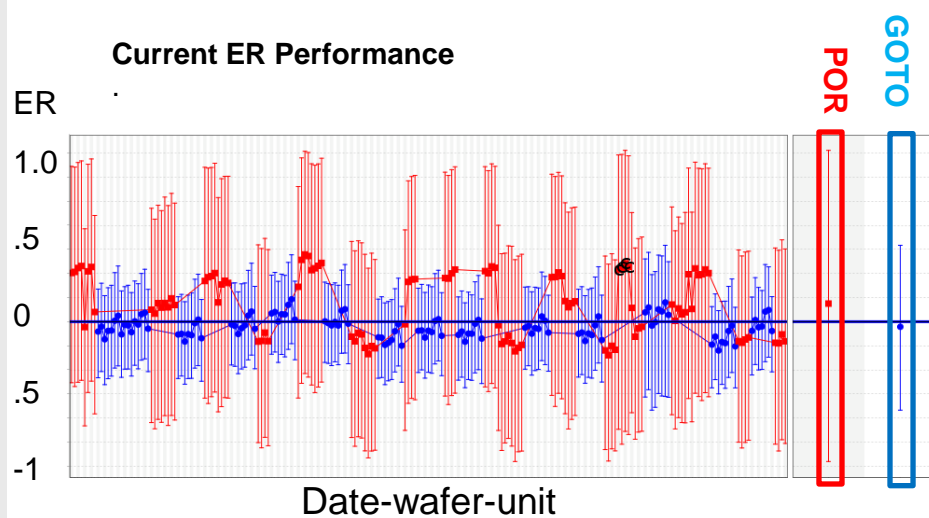
(5) Additional Steps, like SEM etc



# Two weeks watch after new plan implementation



# SUMMARY REVIEW



# Check out this slide again!

## Two weeks watch after new plan implementation

### Edge cluster as Pin signature observed!

PC

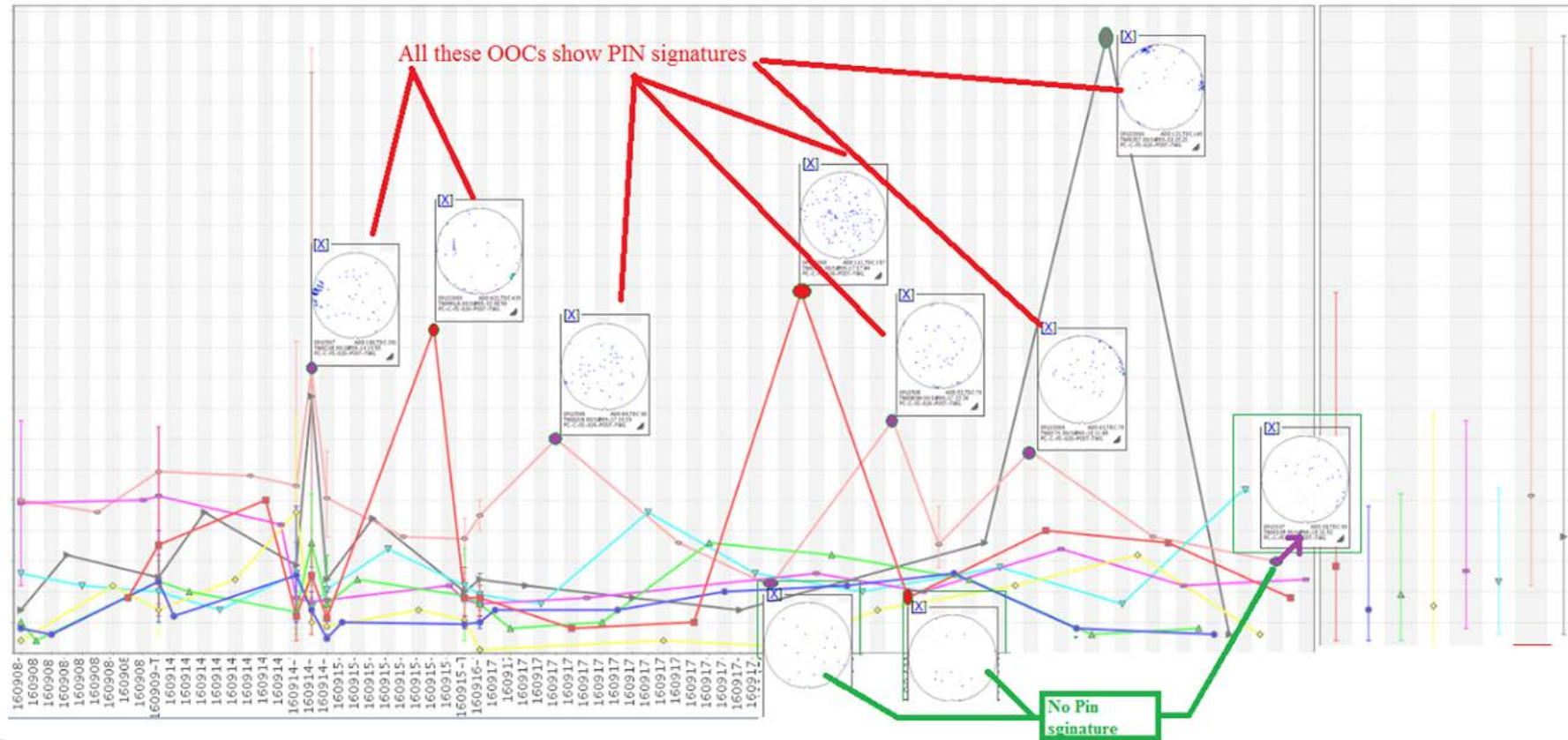
1.0

.75

.5

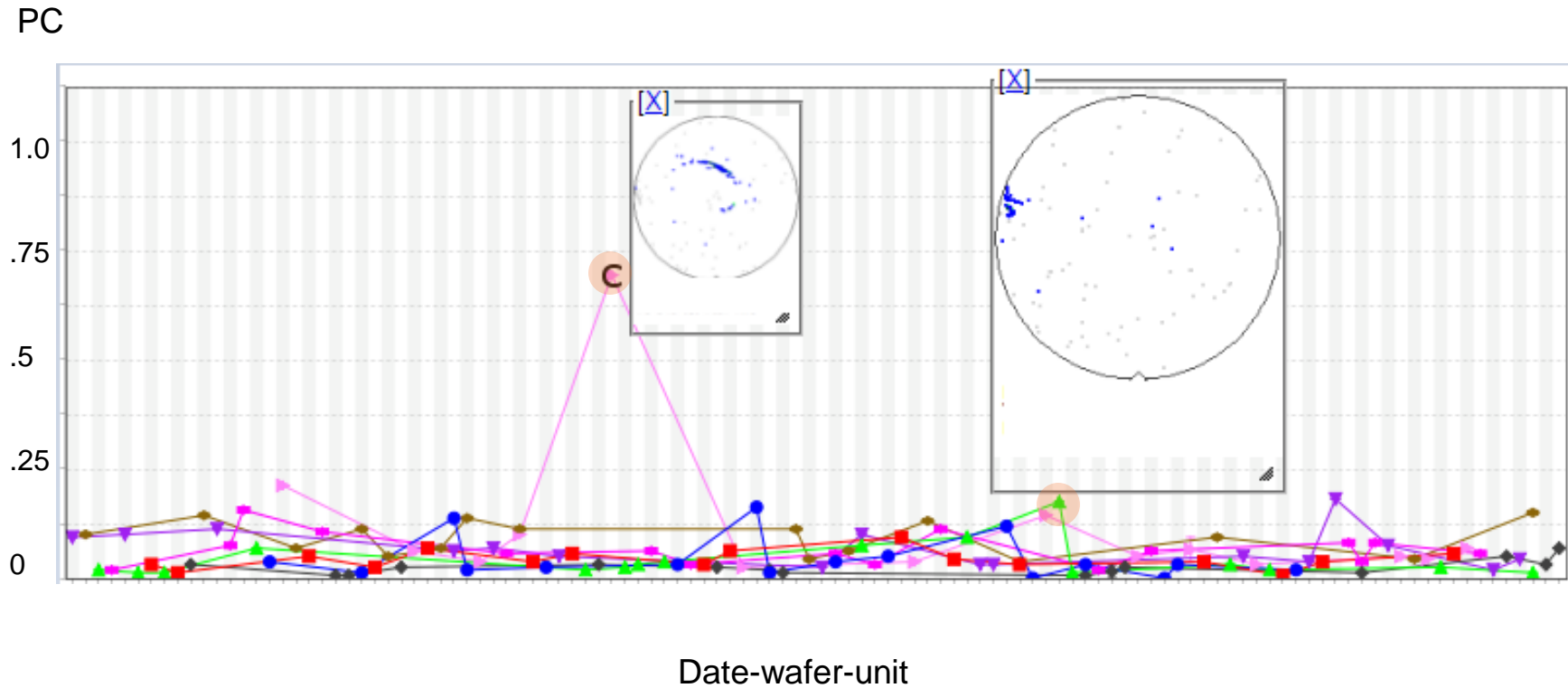
.25

0



Date-wafer-unit

# An typical example



# Actions taken and still continue...

## Process

- Spin speed.
- Optimizing opening/closing the A and B chuck pins.
  - 1) Exploring possible water droplets
  - 2) Pins rubbing the wafer?
- A few different things:
  - Tool family sequence compare.
  - Adjust open/close sequences.
  - Perform rinse segmentation.

## Hardware

- Handling and pocket size.
  - To try:
    - Adjusting pocket size.
    - Perform Chuck A/B sequence

## Recipe

- Current (Rev 12) vs Rev 14 (150% increase spin speed) vs Rev 15 (A-B Dry) options.

## Pocket size:

- Water is pooling?
- 150% increased spin speed test.

## Chuck Pin Open/Close

- Chuck Pin Open/Close vs A/B switching times.
- Two chambers showed promising data (reduced pin signature) with the pocket size at optimizing counts.
- Change another set of MPCs to different pocket size.
- Data that we gathered from these two pocket size.



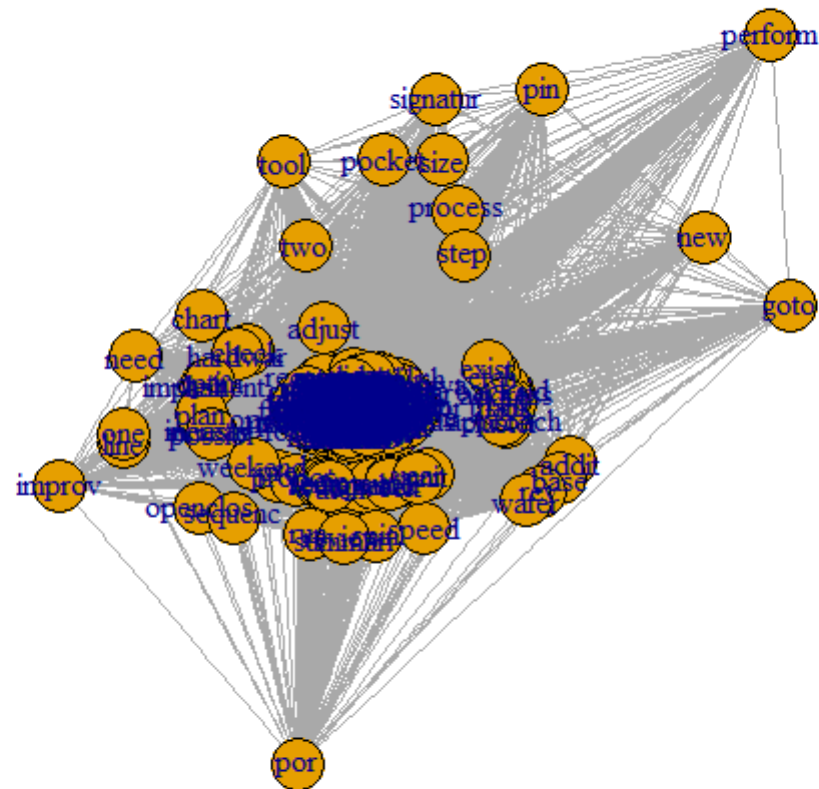


# Path forward:

- (1) Pin Signature. GAP to close.
- (2) Correlation Pin signature with Prod.
- (3) Yield gain?



# summary



Thank you!