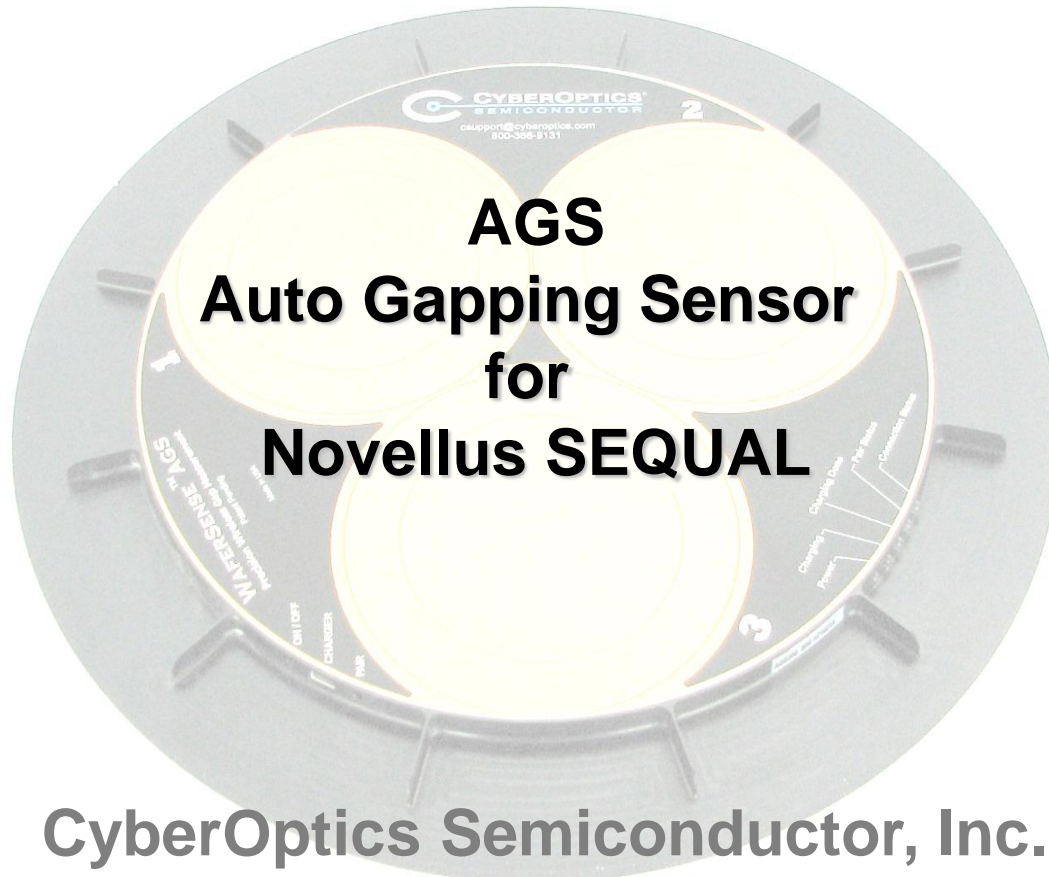


WaferSense®



AGS Auto Gapping Sensor for Novellus SEQUAL

CyberOptics Semiconductor, Inc.

Wireless Wafer-like Measurement Devices

9/11/2015

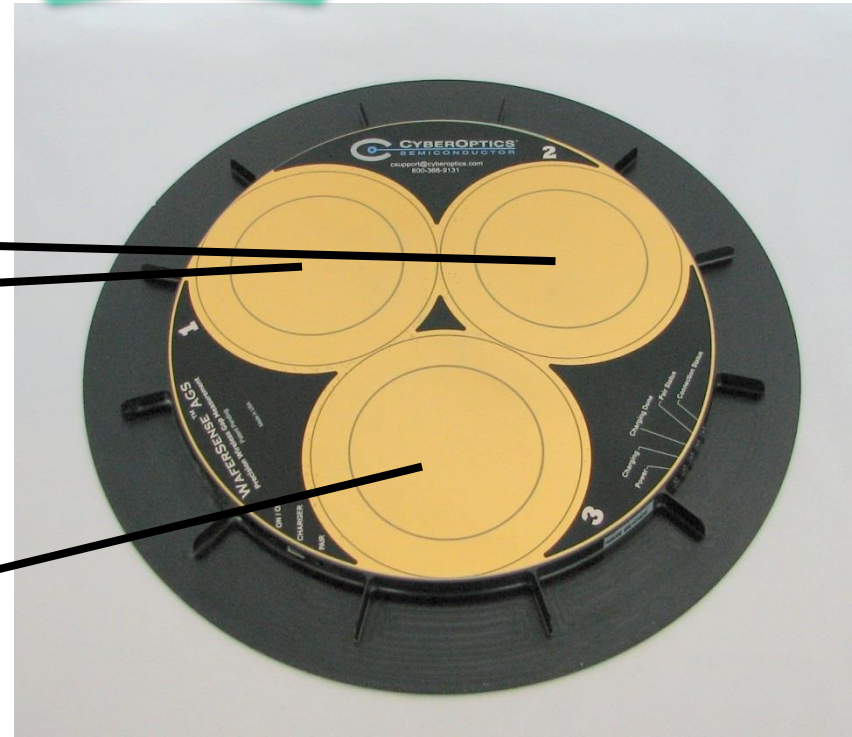
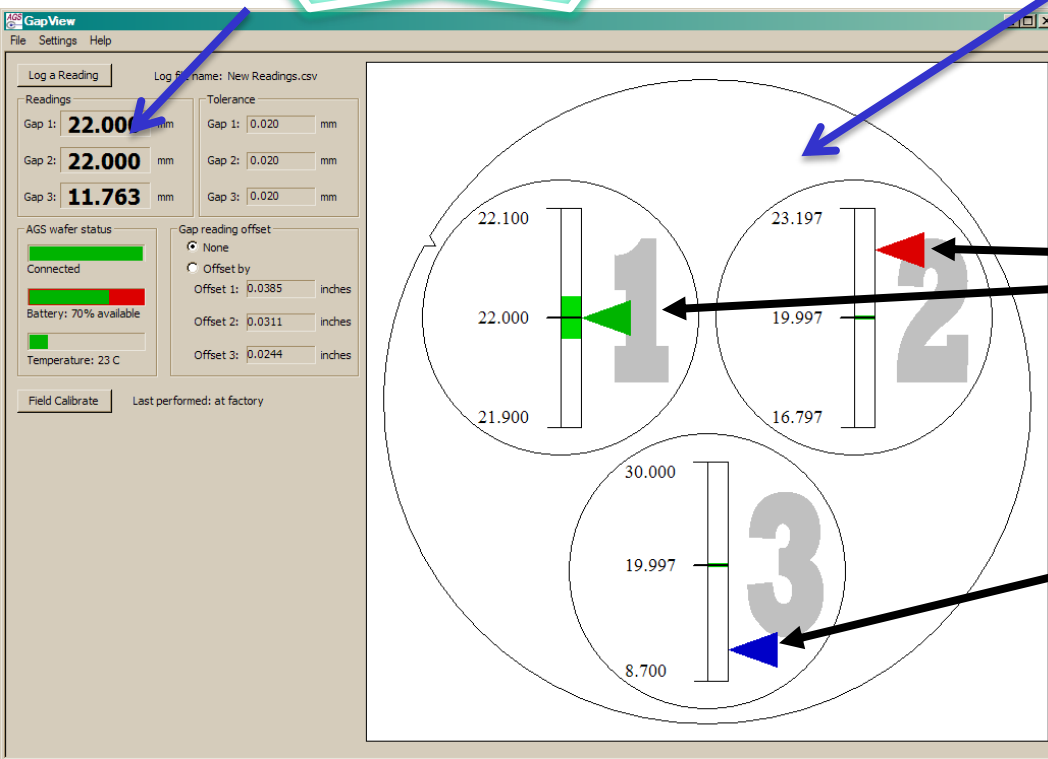
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Automatic Gapping System (AGS)

Numerical

Real Time



9/11/2015

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Why is Gapping Important & What Does AGS Do?

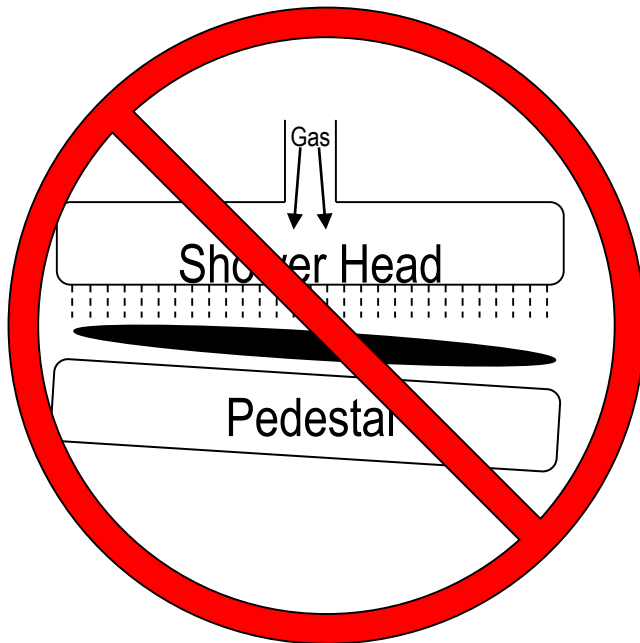


PROCEDURE CHANGE ORDER

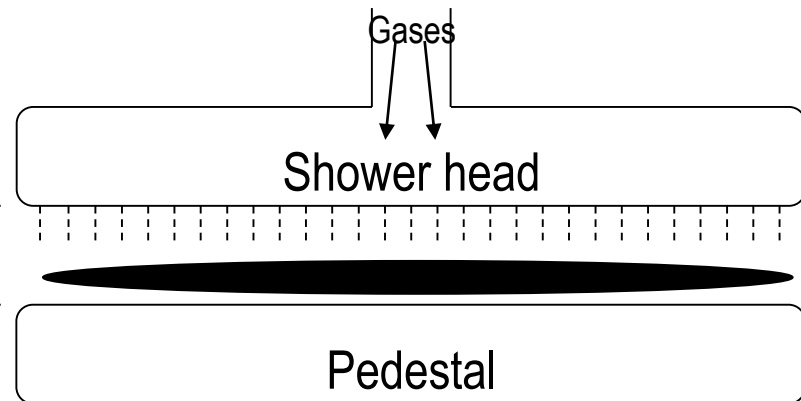


PARTS DAMAGE - CAUTION!

Insufficient gap between showerhead and pedestal will cause serious damage to showerhead, transfer plate, pedestal and AGS wafers.



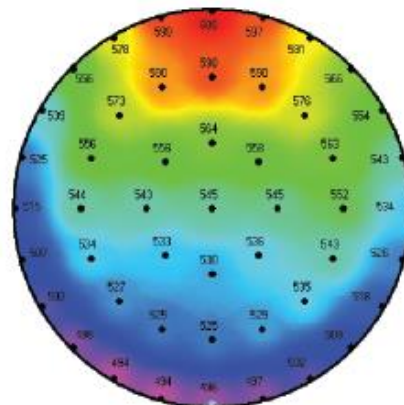
Parallel



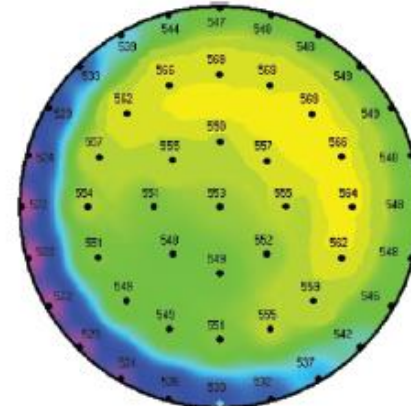
Gap

Why Precision Gapping is Critical on CVD and PECVD

1. The gap between the wafer and the showerhead plays a critical role in film deposition uniformity
2. Newer Dielectrics require tighter tolerances that are typically not reliably achieved with the legacy “puck” method
3. Depending on the application, non-uniform depositions can lead to reduced yields
4. An incorrect setup of gapping can cause severe damage or process problems



Before
% NU = 5.67%
Range NU = 10.52%



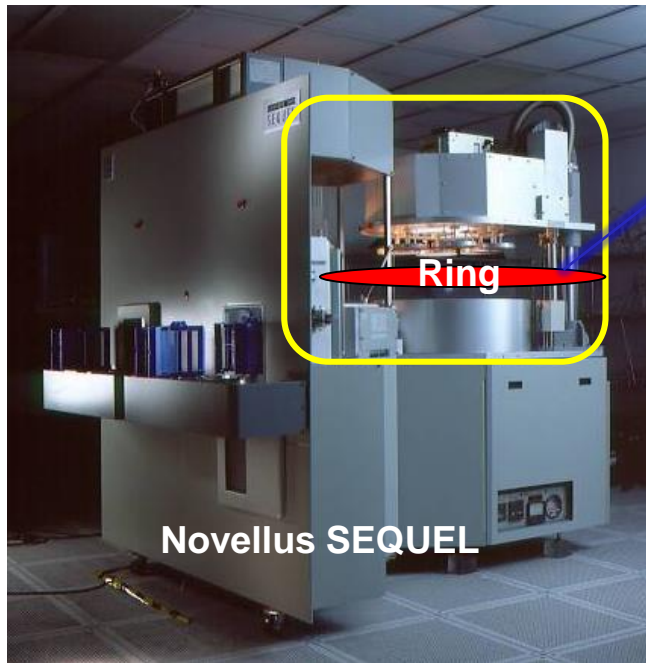
After
% NU = 2.48%
Range NU = 4.30%

Before/After Static Wafer Uniformity

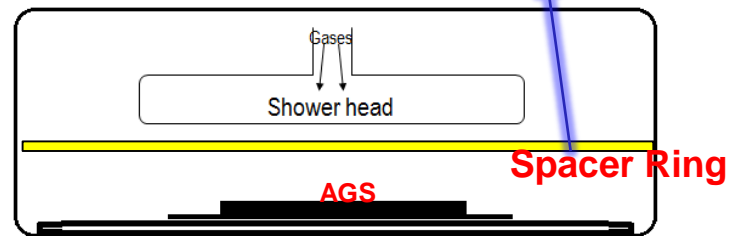
ROPTICS
ONDUCTOR

innovating measurement technology™

Feature of Use AGS200 on SEQUEL

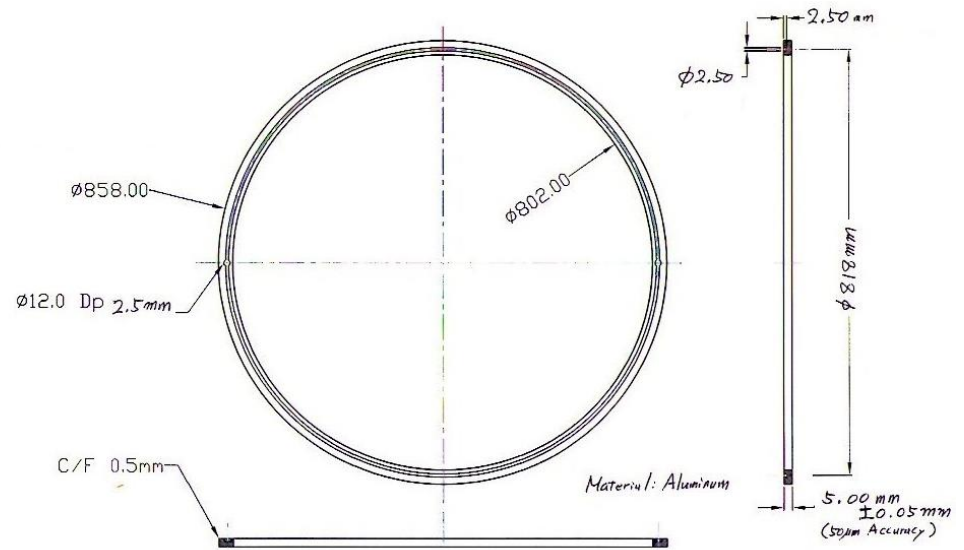
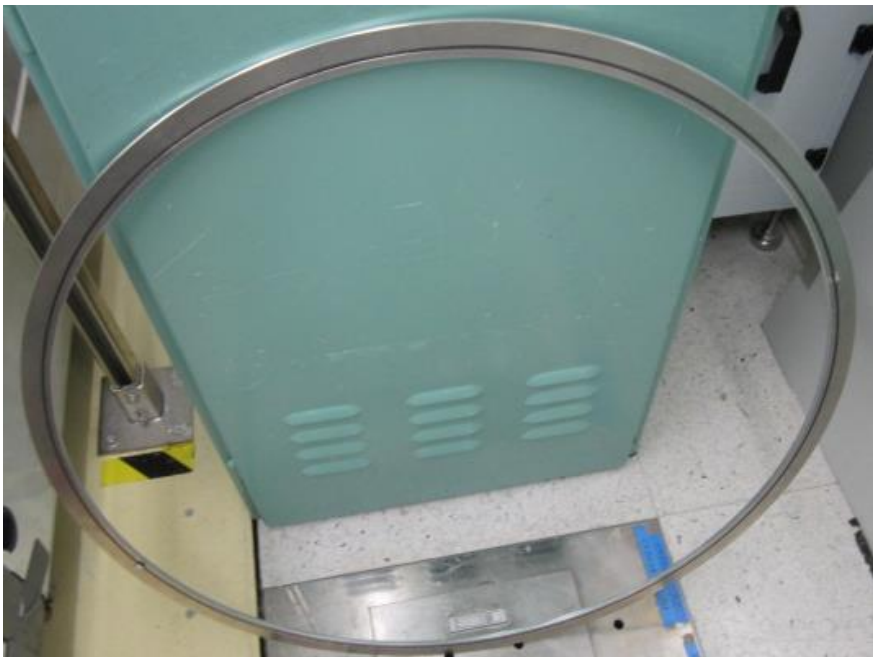


Setup Spacer Ring before Chamber close



	Thickness
(A) AGS200	0.335 inch(2.5mm)
(B) Spindle Fork UP-distance	0.310 inch(7.27mm)~0.197 inch(5mm)
(C) Teaching Target	0.470 inch(11.9mm)~0.525 inch(13.3mm)
<p>The GAP between AGS top Plate \leftrightarrow Showerhead</p> <p>when Spindle Up</p> <p>$((C+R)-(A+B)) =$ Remain GAP is 1.53mm ~ 5.2 mm</p>	
(R) Use Adaptor Ring	6mm

Spacer Ring



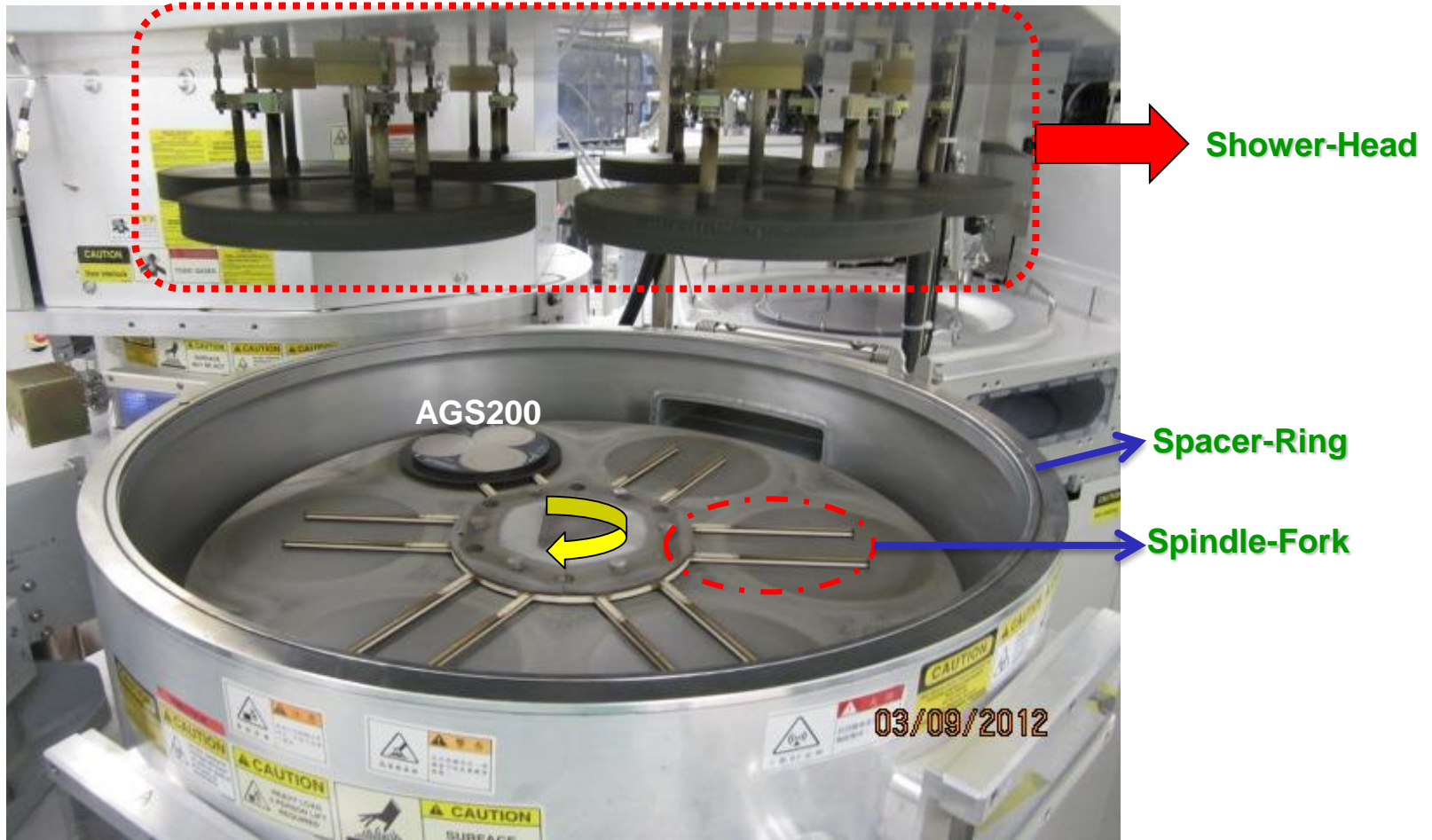
Set "Spacer-Ring" on Chamber-Wall



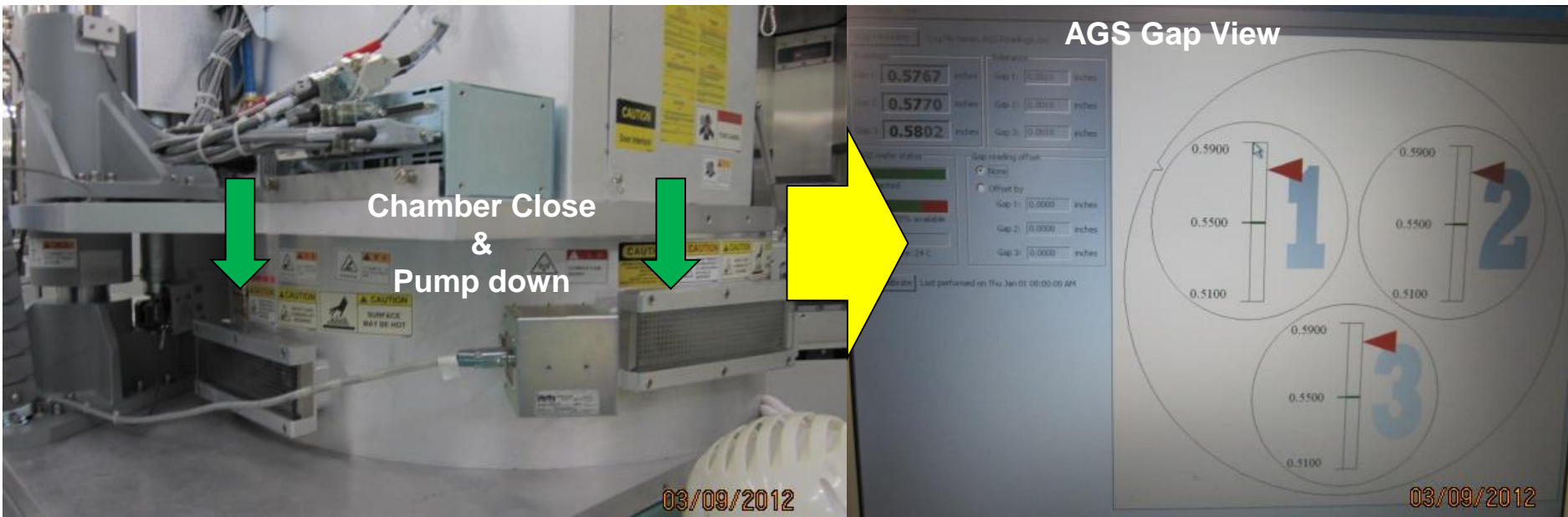
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Place AGS200 on Spindle-Fork



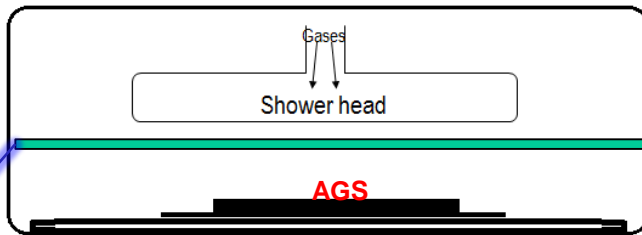
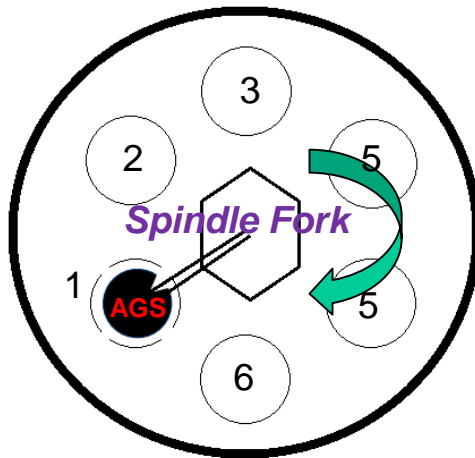
Measure GAP for all 6 Shower-Head



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The Usage on SEQUAL



Setup Adaptor before Chamber close



- Hand Place AGS200 on wafer position-1
- Setup Spacer Ring on Chamber Wall
- Close Chamber
- Pump Down to 0.12~0.07 torr
- Collect Gap data for 1~6 position by AGS

~~~~~ **Before Adjustment** ~~~~~  
 ~~~~~ Taking 10~15 Min ~~~~~

- Venting to ATM
- Open Chamber
- Adjust Shower-Head
- Close Chamber
- Pump Down to 0.12~0.07 torr
- Collect Gap data for 1~6 position by AGS

~~~~~ Taking 10 ~15 Min ~~~~~

~~~~~ **After Adjustment** ~~~~~

Gapping Adjustment Results

Target → 0.52 inch

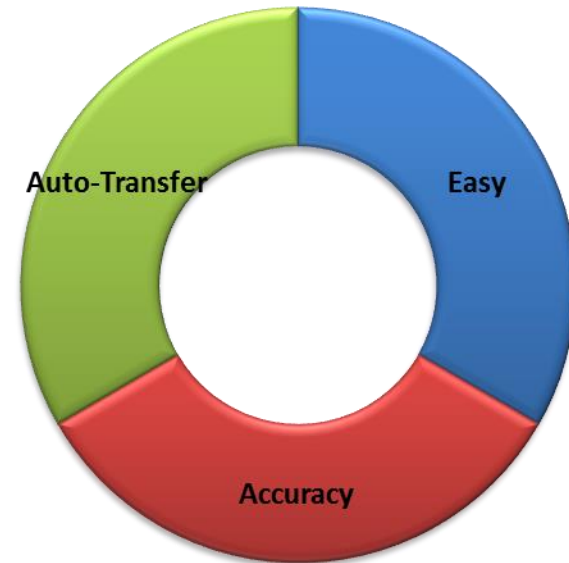
| | Before Adjustment | | |
|--------|-------------------|--------|--------|
| | Gap 1 | Gap 2 | Gap 3 |
| CH-B-1 | 0.5491 | 0.5457 | 0.5483 |
| CH-B-2 | 0.5472 | 0.5473 | 0.5475 |
| CH-B-3 | 0.5457 | 0.5491 | 0.5495 |
| CH-B-5 | 0.5492 | 0.5482 | 0.542 |
| CH-B-5 | 0.5293 | 0.545 | 0.5413 |
| CH-B-6 | 0.512 | 0.5463 | 0.5421 |



| | After 1 st Adjustment | | |
|--------|----------------------------------|--------|--------|
| | Gap 1 | Gap 2 | Gap 3 |
| CH-B-1 | 0.5235 | 0.5296 | 0.5352 |
| CH-B-2 | 0.5292 | 0.5227 | 0.5272 |
| CH-B-3 | 0.5261 | 0.5215 | 0.5265 |
| CH-B-5 | 0.5251 | 0.5212 | 0.5225 |
| CH-B-5 | 0.5256 | 0.525 | 0.5232 |
| CH-B-6 | 0.5223 | 0.5256 | 0.5215 |

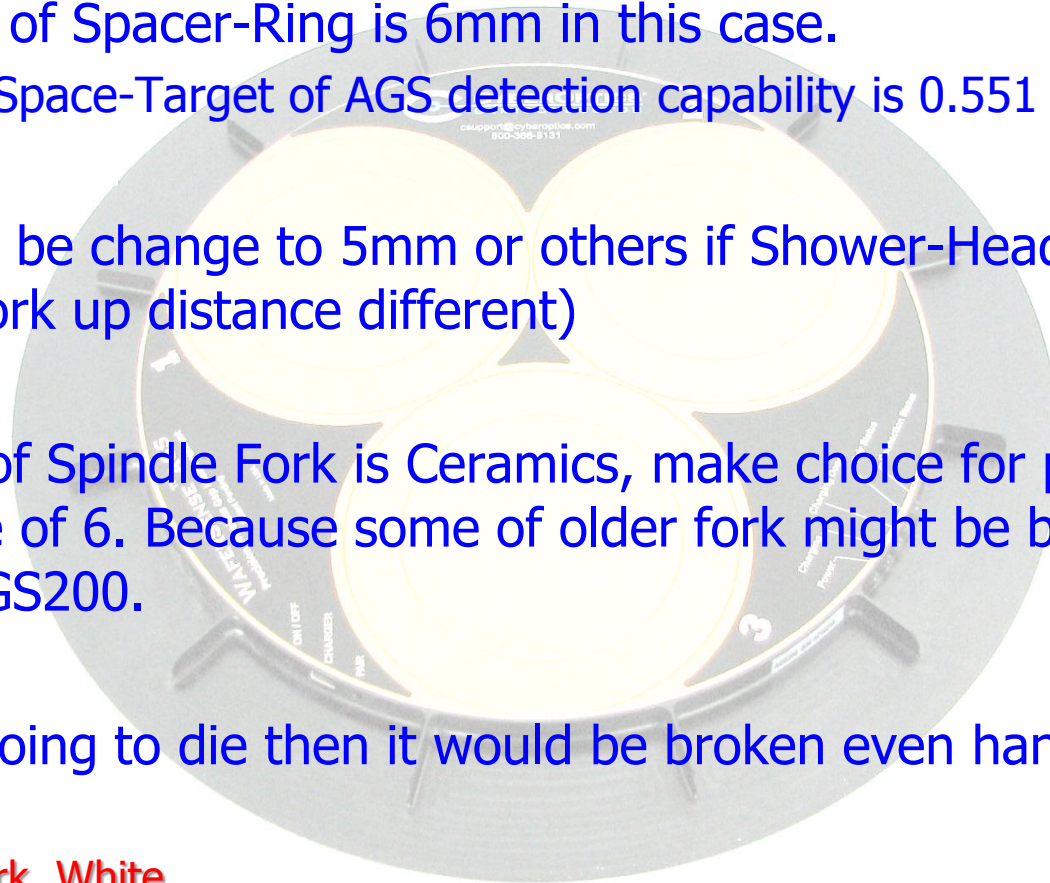


Mission Complete



Summary

- The thickness of Spacer-Ring is 6mm in this case.
(The Maximum Space-Target of AGS detection capability is 0.551 inch in this case)
- Thickness can be change to 5mm or others if Shower-Head target different.
(Or Spindle Fork up distance different)
- The material of Spindle Fork is Ceramics, make choice for place AGS on one newer Spindle of 6. Because some of older fork might be broke when rise up within load AGS200.
- If older fork going to die then it would be broken even handle real-wafer not only AGS.



P.S> - Brand new Fork, White
- Older Fork, Looks almost black

WaferSense Sales & Support Resources

Visit the web at: <http://www.cyberopticssemi.com>

Technical Support: (503) 495-2200 ex: 4

WaferSense Sales: (503) 495-2200 ex: 1

Tool Free: (800) 366-9131

Email technically related questions to:

CSSupport@CyberOptics.Com

Email WaferSense sales related questions to:

CSSales@CyberOptics.Com

Asia

CyberOptics Semiconductor Customer Support Office

Representative: Mr. Yukinobu Hayashi

Mobile Phone: +81.80.3974.0253

Email: yhayashi@cyberoptics.com

Representative: Terry Huang

Mobile Phone: +886.920.366999

Email: thuang@cyberoptics.com

Ferris Chen 陳振隆

Asian Sales Director

Mobile: +886.912.543323

Email: fchen@cyberoptics.com

