

BEFORE

AFTER

VACUUM CHAMBER PM TECHNIQUE NOVELLUS CONCEPT 2 WITH HEATER BLOCK SCRUB

OBJECTIVE:

TO EFFECTIVELY PM THE NOVELLUS CONCEPT 2 CHAMBER AND HEATER BLOCK IN A TIMELY MANNER, WHILE IMPROVING TOOL RECOVERY AND PARTICLE PERFORMANCE

Vacuum Chamber:

NOVELLUS CONCEPT 2

Vacuum Chamber Process Residue:

PROCESS INDUCED RESIDUE

Vacuum Chamber Components:

HEATER BLOCK, SHOWER HEADS, CHAMBER WALL

Old Procedure:

8+ hours, DI water, Scotch-Brite®, 150+ wipers

Tool recovery: Extended recovery time out gassing and particle issues

New Procedure:

2.0 Hours DI water, Foamtec products

Tool Recovery: Reduced recovery time and NO particle issues

Vacuum Chamber Products:

PM Kit P/N: [HT4500 – NOV2-1 PM Kit](#)

- (4) [HT4518DC3](#)-1 180 Grit Diamond ScrubDISK®
- (1) [HT4518D](#)-1 180 Grit Diamond ScrubPAD
- (1) [HT4536D](#)-1 360 Grit Diamond ScrubPAD
- (1) [HT4580D](#)-1 800 Grit Diamond ScrubPAD
- (1) [HT4528DW](#)-1 280 Grit Diamond ScrubBELT®
- (1) [FT901](#) ErgoSCRUB® Handle
- (1) [FTPEN](#)-1 ScrubWRIGHT™ Pen
- (1) [HT4754](#) UltraSOLV® Sponge
- (2) [HT1500FC](#)-5 MiraSWABS® (10 Swabs)
- (2) [HT1501FC](#)-5 MiraSWABS® (10 Swabs)
- (2) [HT4790](#)-5 UltraSOLV® Foam Wipes (10 wipes)
- (1) [HT5790S](#)-25 MiraWIPES® (25 wipes)



NOVELLUS CONCEPT 2 PM PROCEDURE:

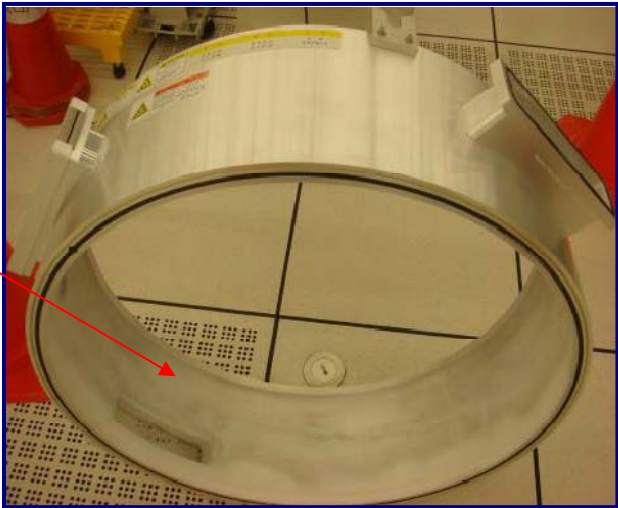
View "How to" instructional videos on <http://www.foamtecintlwcc.com/flash/>

CONCEPT 2 CHAMBER WALL CLEAN:

Step 1: Using proper procedures and **safety guidelines**, properly shutdown, vent and prep Novellus tool for PM and heater block scrub

Step 2: When chamber wall is sufficiently cooled remove from chamber and place on the floor in a pre-staged working area (See Fig 1)

Fig 1: Novellus C2 Chamber wall in pre-staged working area



Step 3: Prepare a small container of DI water next to Novellus Concept 2 Chamber in preparation to lightly dampen the Foamtec PM products

Step 4: Place [HT4536D-1](#), 360 Grit Diamond ScrubPAD and [HT4754](#), UltraSOLV[®] Sponge, into small container of DI water in preparation to scrub chamber wall (See Fig 2)

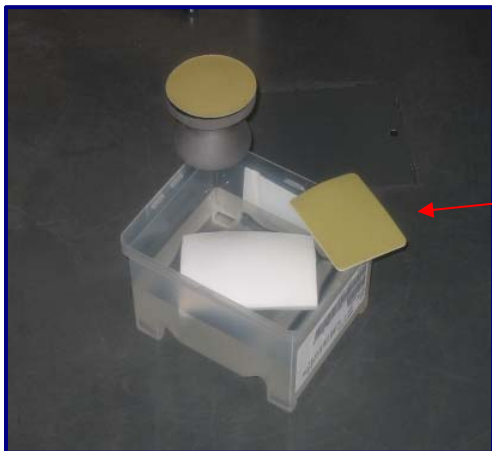


Fig 2: Small container of DI water with Diamond ScrubPAD and UltraSOLV[®] Sponge next to Novellus C2 Chamber

NOVELLUS CONCEPT 2 PM PROCEDURE (CONT'D):

Step 5: Take the lightly dampened UltraSOLV[®] Sponge and wipe the inside of the chamber wall (See Fig 3)



Fig 3: UltraSOLV[®] Sponge wiping inside of chamber wall

Step 6: Take the lightly dampened 360 Grit Diamond ScrubPAD and proceed to scrub a small area of the chamber wall (See Fig 4)



Fig 4: 360 Grit Diamond ScrubPAD scrubbing a small area of chamber wall

NOVELLUS CONCEPT 2 PM PROCEDURE (CONT'D):

Step 7: Take the lightly dampened UltraSOLV[®] Sponge and wipe the scrubbed area on the chamber wall to remove the accumulated deposition (See Fig 5, 6 & 7)

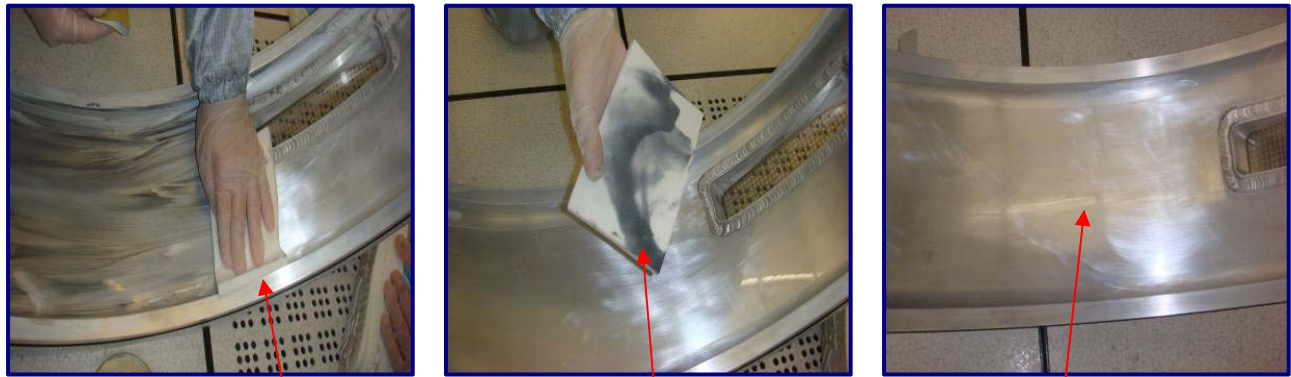


Fig 5, 6 & 7: Lightly dampened UltraSOLV[®] Sponge wiping off deposition from scrubbed portion of chamber wall

Step 8: As Diamond ScrubPAD loads up with deposition, pull ScrubPAD across dampened UltraSOLV[®] Sponge to properly unload (See Fig 8, 9 & 10)



Fig 8: ScrubPAD loaded with deposition

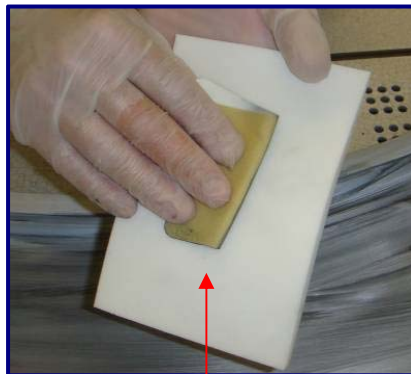


Fig 9: Pull ScrubPAD across UltraSOLV[®] Sponge

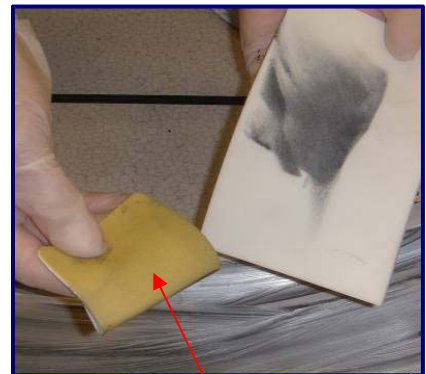


Fig 10: Unloaded ScrubPAD

NOVELLUS CONCEPT 2 PM PROCEDURE (CONT'D):

Step 9: As UltraSOLV® Sponge begins to load up with deposition, return to container of DI water to rinse (See Fig 11 & 12)

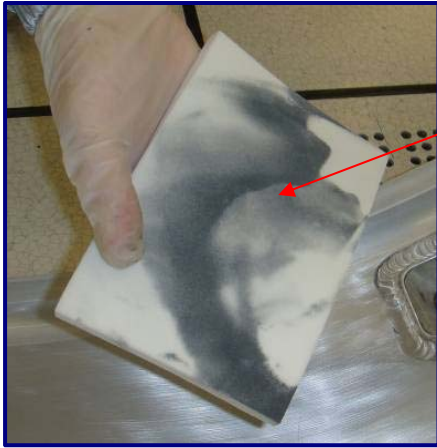


Fig 11: UltraSOLV® Sponge loaded with deposition

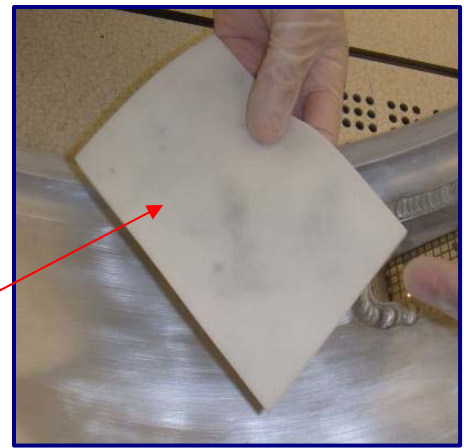


Fig 12: Unloaded UltraSOLV® Sponge

Step 10: Continue to repeat steps 5 – 9 to scrub off and remove deposition from the inside of Novellus Chamber wall

IMPORTANT NOTE

THE USE OF HT5790S MiraWIPES® DURING FINAL WIPE PROCEDURE IS A CRITICAL STEP TO EFFECTIVELY REMOVING PARTICLE DEFECTS FROM THE NOVELLUS CONCEPT 2

NOTE: Figure below shows how much more deposition the Foamtec International MiraWIPE® can remove from a critical surface compared to the standard fab wiper, making the MiraWIPE® Final Wipe the most **CRITICAL STEP** of the PM procedure (See Fig 13a & 13b)

Fig 13a: Current fab wiper after completely wiping Novellus Concept 2



Fig 13b: Particles picked up using HT5790S MiraWIPES® after completely wiping with current fab wiper

MiraWIPES® are the KEY STEP for DEFECT REDUCTION and IMPROVED TOOL RECOVERY

NOVELLUS CONCEPT 2 PM PROCEDURE (CONT'D):

- Step 11:** Dampen the [HT5790S](#) MiraWIPES® with IPA and perform a Final Wipe Procedure on the Novellus Concept 2 Chamber wall

- Step 12:** Dampen (5) of the [HT1501FC](#) MiraSWABS® with IPA and wipe out the hard to reach areas and o-ring grooves with MiraSWABS®

- Step 13:** Place clean chamber wall off to the side and prepare for Novellus Concept 2 Chamber PM

CONCEPT 2 TOP CHAMBER PM:

- Step 14:** Ensure Novellus Concept 2 heater block has cooled down to a sufficient PM temperature

- Step 15:** Working from the top – down, take the lightly dampened [HT4754](#) UltraSOLV® Sponge and completely wipe the top portion of the Concept 2 Top Chamber (See Fig 14 & 15)

NOTE: BE SURE NOT TO WIPE THE FACE OF THE SHOWER HEADS WITH THE UltraSOLV® SPONGE



Fig 14 & 15:
UltraSOLV® Sponge
wiping top portion of
Concept 2 Chamber



NOVELLUS CONCEPT 2 PM PROCEDURE (CONT'D):

Step 16: After wiping the top of the chamber, inspect the surface and determine if chamber ceiling needs to be gently scrubbed with 800 Grit Diamond ScrubPAD using same scrubbing technique described in **Chamber Wall Clean** (See Fig 16 & 17)



Fig 16 & 17: Scrubbing top of Concept 2 Chamber using same scrubbing technique described above on **Chamber Wall Clean**

Step 17: Dampen the [HT5790S](#) MiraWIPES[®] and perform a Final Wipe on top portion of Concept 2 Chamber

NOTE: **BE SURE NOT TO WIPE THE FACE OF THE SHOWER HEADS WITH THE [HT5790S](#) MiraWIPES[®]**

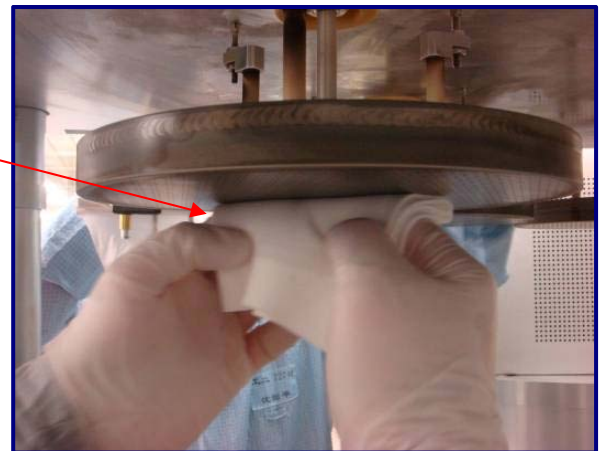
Step 18: Next, fold the [HT4790](#) UltraSOLV[®] Foam Wipes into quarters and lightly dampen with IPA

Step 19: Take the IPA dampened folded UltraSOLV[®] Foam Wiper and pull across the face of the shower heads in one direction from back to front (See Fig 18)

NOVELLUS CONCEPT 2 PM PROCEDURE (CONT'D):

NOTE: AFTER ONE WIPE, BACK TO FRONT, TURN FOAM WIPER OVER AND WIPE NEXT PORTION OF SHOWER HEAD. CONTINUE TO TURN OVER AND REFOLD FOAM WIPE AS NECESSARY TO USE A FRESH PORTION OF THE UltraSOLV® FOAM WIPER FOR EVERY WIPE

Fig 18: Lightly dampened UltraSOLV® Foam Wiper w/IPA being pulled across face of shower head from back to front



CONCEPT 2 HEATER BLOCK SCRUB:

Step 20: Ensure the Concept 2 heater block has cooled to a sufficient temperature; remove the wafer pick from the heater block (See Fig 19 & 20)

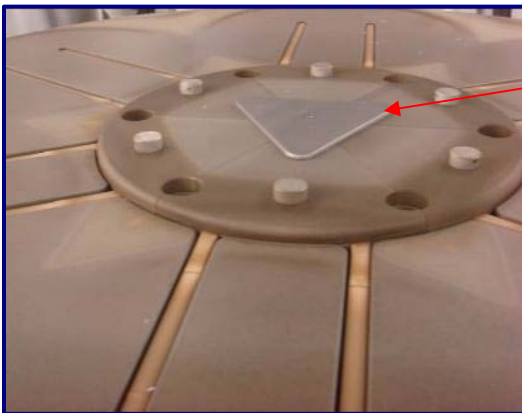
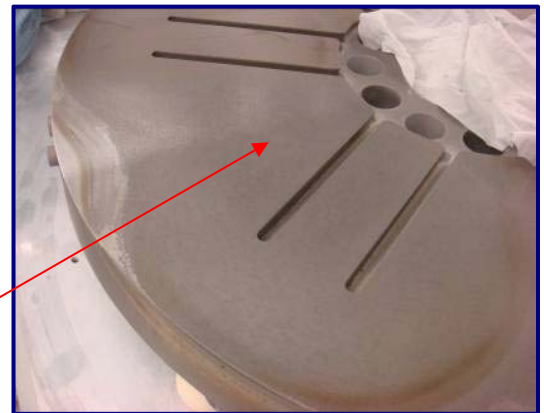


Fig 19: Novellus Concept 2 wafer pick

Fig 20: Novellus Concept 2 wafer pick - REMOVED



Step 21: Attach [HT4518DC3-1](#), 180 Grit Diamond ScrubDISK® onto [FT901](#) ErgoSCRUB® and place in container of DI water

NOVELLUS CONCEPT 2 PM PROCEDURE (CONT'D):

Step 22: Using the same scrubbing technique described above (Chamber Wall PM) take lightly dampened 180 Grit Diamond ScrubDISK[®] attached to ErgoSCRUB[®] and proceed to scrub the surface of the Concept 2 Heater Block in a front-to-back and back-to-front motion (See Fig 21, 22 & 23)

NOTE: AS UNIFORMITY IS AN IMPORTANT RECOVERY PARAMETER FOR THE NOVELLUS CONCEPT 2, IT IS IMPORTANT TO SCRUB IN A UNIFORM MOTION FROM FRONT-TO-BACK AND BACK-TO-FRONT MOTION ACROSS HEATER BLOCK

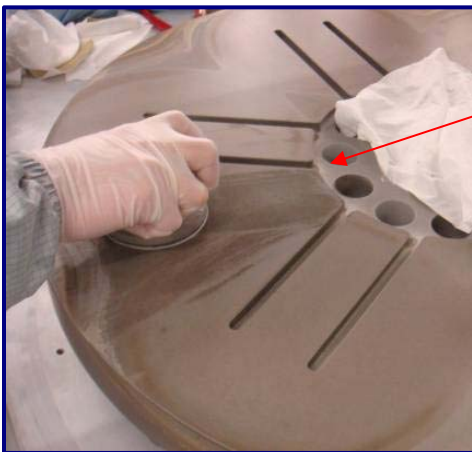


Fig 21 & 22: Scrubbing heater block in front-to-back and back-to-front motion

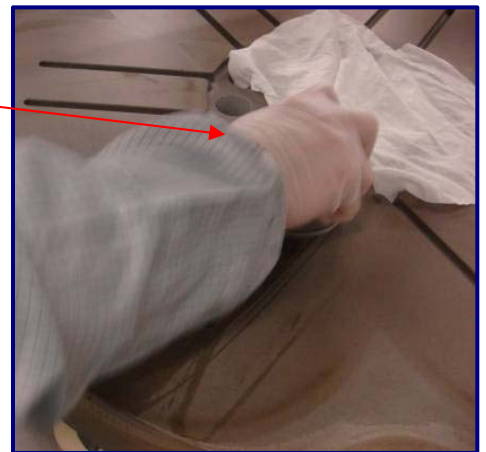


Fig 23: Scrubbed portion of heater block



Step 23: Scrub the remaining areas on the surface of the heater block using the 180 Grit Diamond ScrubDISK[®], remembering to unload the ScrubDISK[®] onto the UltraSOLV[®] Sponge as necessary

NOVELLUS CONCEPT 2 PM PROCEDURE (CONT'D):

Step 24: When 180 Grit Diamond ScrubDISK[®] becomes worn down, replace with new ScrubDISK[®]. Should be able to clean entire surface of heater block using (4) 180 Grit Diamond ScrubDISKS[®]

Step 25: Dampen the 180 Grit Diamond ScrubPAD and using the same technique, scrub the side of the Concept 2 heater block (See Fig 24 & 25)



Fig 24 & 25: 180 Grit Diamond ScrubPAD w/UltraSOLV[®] Sponge cleaning the side of heater block

Step 26: Configure the [HT4528DW-1](#) 280 Grit Diamond ScrubBELT[®] onto the [FTPEN-1](#) and lightly dampen with DI water

NOVELLUS CONCEPT 2 PM PROCEDURE (CONT'D):

Step 27: Using the same scrubbing technique proceed to scrub the wafer pick fork grooves with the [FTPEN-1](#), ensuring to rotate the 280 Grit Diamond ScrubBELT[®] along the [FTPEN](#) as the belt becomes worn at the focal scrub point (See Fig 26 & 27)

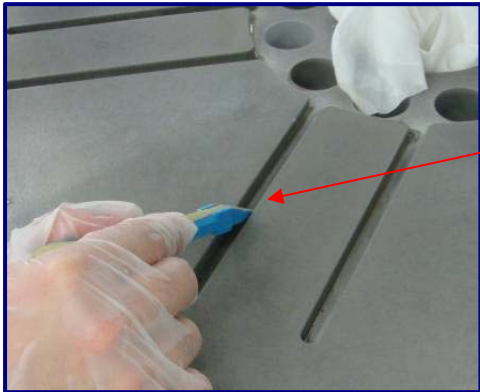
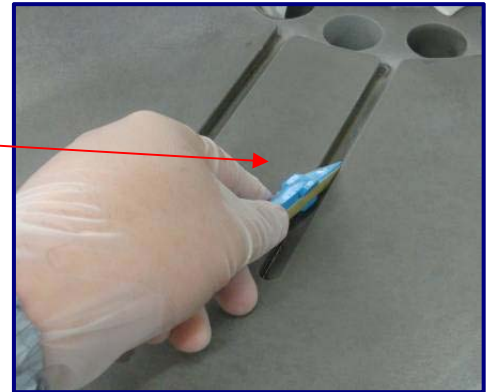


Fig 26 & 27: 280 Grit Diamond ScrubBELT[®] on [FTPEN](#) scrubbing fork grooves on heater block



Step 28: When heater block scrub is complete proceed to dampen the area under the heater block with DI water and wipe off the flaky deposition with DI water saturated MiraWIPES[®] (See Fig 28 & 29)

NOTE: WILL BE ABLE TO RINSE OFF SATURATED MIRAWIPES[®] IN CONTAINER OF DI WATER AND REUSE TO EFFECTIVELY REMOVE LOOSE FLAKES BENEATH HEATER BLOCK

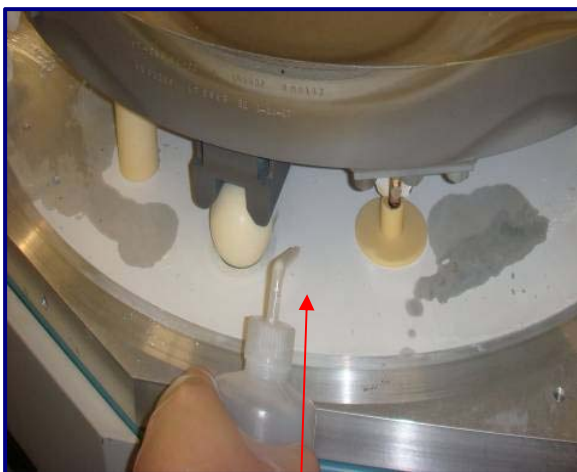


Fig 28: Saturating area below heater block with DI water



Fig 29: Wiping area below heater block with DI water saturated MiraWIPE[®]

NOVELLUS CONCEPT 2 PM PROCEDURE (CONT'D):

FINAL WIPE PROCEDURE:

IMPORTANT NOTE

THE USE OF HT5790S MiraWIPES[®] DURING FINAL WIPE PORTION OF PROCEDURE IS A CRITICAL STEP TO EFFECTIVELY REMOVING PARTICLE DEFECTS FROM NOVELLUS CONCEPT 2

NOTE: Figure below shows how much more deposition the Foamtec International MiraWIPE[®] can remove from a critical surface compared to the standard fab wiper, making the MiraWIPE[®] Final IPA Wipe the most **CRITICAL STEP** of the PM procedure (See Fig 30a & 30b)

Fig 30a: Current fab wiper after completely wiping Novellus



Fig 30b: Particles picked up using HT5790S MiraWIPES[®] after completely wiping with current fab wiper

MiraWIPES[®] are the KEY STEP for DEFECT REDUCTION and IMPROVED TOOL RECOVERY

Step 29: Fold the HT5790S MiraWIPES[®] into quarters and dampen with IPA

NOVELLUS CONCEPT 2 PM PROCEDURE (CONT'D):

Step 30: With the IPA dampened MiraWIPE[®], proceed to wipe down the heater block and all the areas beneath the heater block (See Fig 31 & 32)

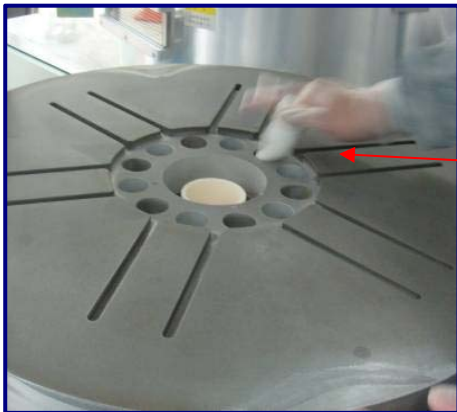
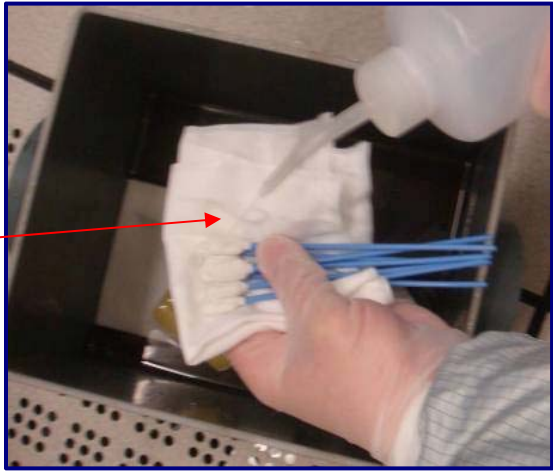


Fig 31 & 32: IPA saturated MiraWIPE[®] wiping all areas of heater block and beneath heater block



Step 31: Place the [HT1500FC](#) MiraSWAB[®] Swabs in the [HT5790S](#) MiraWIPE[®] and saturate with IPA (See Fig 33)

Fig 33: Saturating the [HT1500FC](#) MiraSWABS[®] with IPA



NOVELLUS CONCEPT 2 PM PROCEDURE (CONT'D):

Step 32: Using the IPA saturated MiraSWABS® wipe all the hard to reach areas throughout the heater block (See Fig 34 & 35)

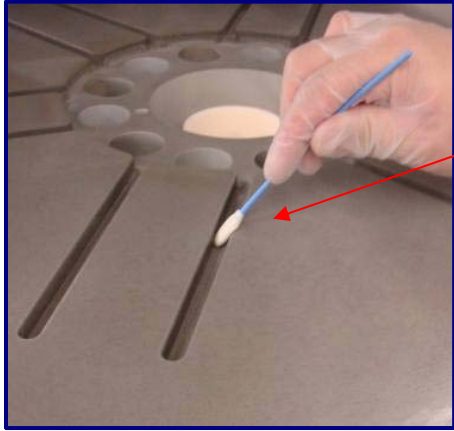
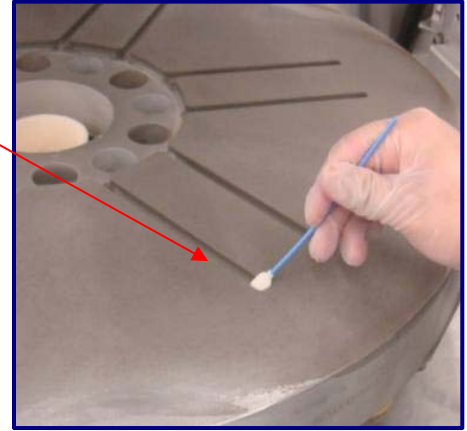


Fig 34 & 35:
Saturated MiraSWAB® wiping hard to reach areas throughout heater block



Step 33: Take remaining MiraWIPES® and saturate with IPA and proceed to wipe down all remaining areas of Novellus Concept 2 Chamber, concentrating on o-ring grooves and vacuum sealing surfaces (See Fig 36, 37 & 38)

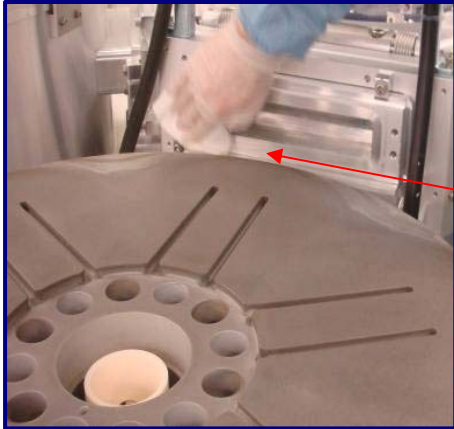


Fig 36, 37 & 38:
Wiping all remaining areas of Concept 2 Chamber



NOVELLUS CONCEPT 2 PM PROCEDURE (CONT'D):

Step 34: Ensure to wipe the wafer pick and pick arms with IPA saturated MiraWIPES® prior to placing back into Concept 2 Chamber (See Fig 39 & 40)

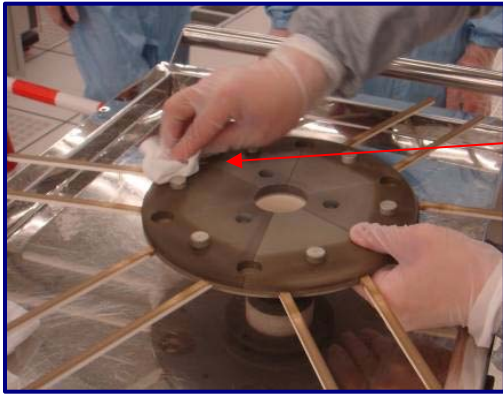
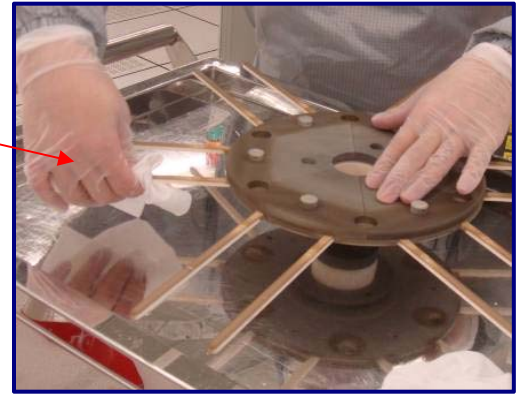


Fig 39 & 40: IPA saturated MiraWIPES® wiping wafer pick and pick arms



Step 35: Replace all parts back into Concept 2 Chamber and using proper procedures and **safety guidelines**, return Novellus Concept 2 Chamber back to production

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