BEFORE

Foamtec International
Wilshire Contamination Control Division
cleaning critical surfaces

AFTER

VACUUM CHAMBER PM TECHNIQUE
AMAT ENDURA®* PVD DEGAS CHAMBER 1ST GENERATION HEATER

OBJECTIVE:

TO EFFECTIVELY PM THE APPLIED MATERIALS®* ENDURA® PVD DEGAS CHAMBER 1ST GENERATION HEATER IN A TIMELY AND EFFECTIVE MANNER WHILE IMPROVING TOOL RECOVERY AND EXTENDING THE MEAN TIME BETWEEN CLEANS (MTBC)

Vacuum Chamber: Applied Materials® Endura® PVD
Vacuum Chamber Process Residue: Process Induced Residue
Vacuum Chamber Components: Degas Chamber Heater Assembly - 1ST Generation

Old Procedure: 2+ hours using DI water & IPA with 150+ wipes
Recovery time: 24 to 48 Hours
Interval: PM Degas Chamber every 6 days (~1200 wafers)

New Procedure: 1 hour using DI water & IPA with Diamond ScrubPAD, MiraWIPE® and MiraSWABS® **Recovery time: 24 Hours**
New Procedure Interval Example: ABLE TO EXTEND CHAMBER PM OUT 14+DAYS (3000+WAFERS)

Vacuum Chamber Products:

AMAT ENDURA® Degas Chamber PM

- (1) HT9423 CushionPAD 24" X 24" (Not Shown)
- (2) HT4536D-10 360 Grit Diamond ScrubPAD
- (1) HT4536DW-1 360 Grit Diamond ScrubBELT®
- (1) FTPEN-1 ScrubWRIGHT™ PEN
- (1) HT4754 UltraSOLV® Sponge
- (2) HT1511FC-5 MiraSWABS® (10 MiraSWABS®)
- (1) HT5790S-25 MiraWIPES® (25 MiraWIPES®)

AMAT ENDURA®* DEGAS CHAMBER PM PROCEDURE:

Step 1: Using proper procedures and **safety guidelines** prepare AMAT Endura™ Degas Chamber for wet clean

Step 2: Using proper procedures and **safety guidelines** remove Degas Heater Cool ring from heater assembly and place on top of HT9423 CushionPAD (See Fig 1, 2, 3 & 4)

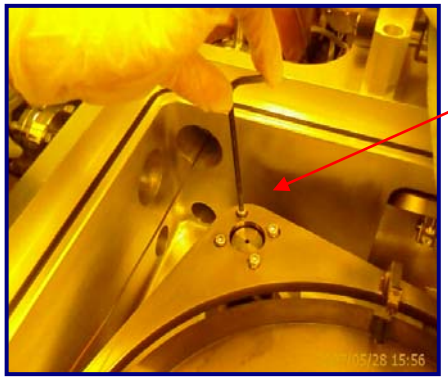


Fig 1 & 2: Removing Degas Heater cool ring

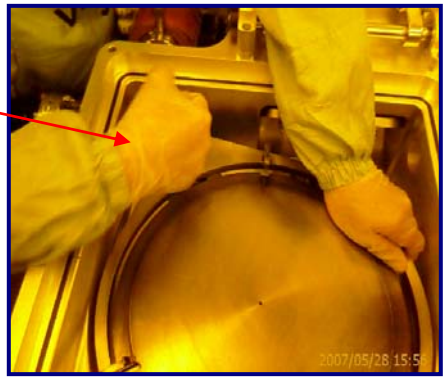
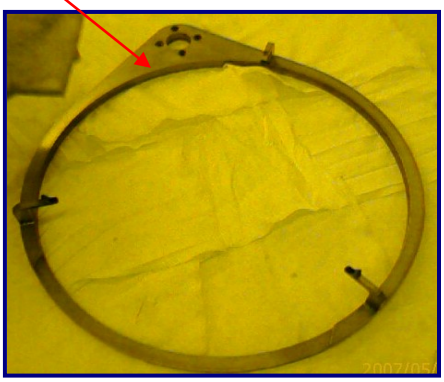


Fig 3 & 4: Degas Heater with cool ring removed and to be placed on CushionPAD, shown placed on top of fab wipes



Step 3: Carefully place (6) to (8) standard fab wipers around the bottom of the Degas Chamber underneath the Degas Heater (See Fig 5)

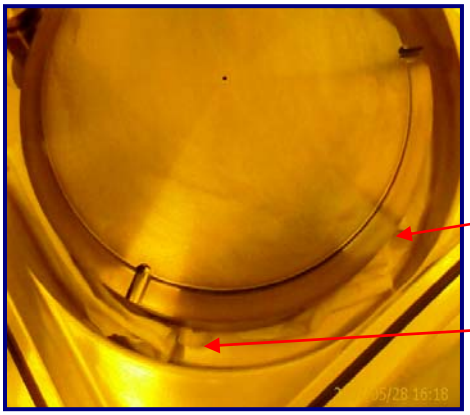


Fig 5: Standard fab wipers placed underneath Degas Heater

AMAT ENDURA®* DEGAS CHAMBER PM PROCEDURE (CONT'D):

Step 4: Stage a hazardous waste bag next to chamber allowing easy access for rinsing out HT4754 UltraSOLV® Sponge and Diamond ScrubPAD with DI water

Step 5: Using DI water, **lightly dampen** UltraSOLV® Sponge and HT4536D 360 Grit Diamond ScrubPAD, ensuring items are only lightly dampened and not dripping with DI water (See Fig 6)

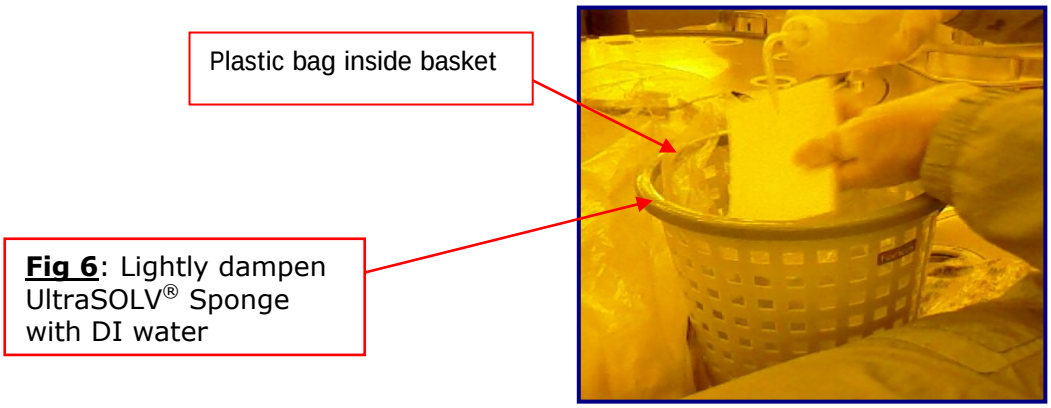


Fig 6: Lightly dampen UltraSOLV® Sponge with DI water

Step 6: Using lightly dampened UltraSOLV® Sponge, wipe Degas Heater (See Fig 7)

Fig 7: UltraSOLV® Sponge wiping Degas Heater

AMAT ENDURA®* DEGAS CHAMBER PM PROCEDURE (CONT'D):

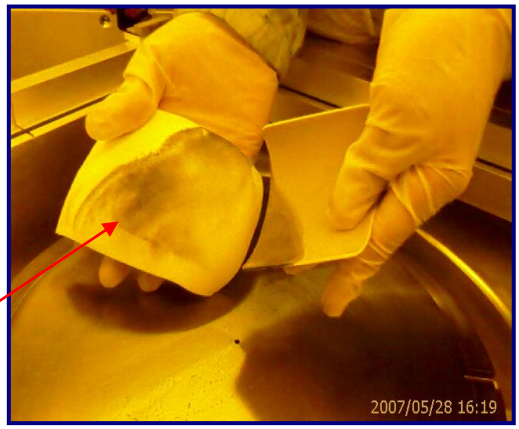
Step 7: Using lightly dampened 360 Grit Diamond ScrubPAD, scrub an approximate 4" x 4" portion of Degas Heater (See Fig 8)

Fig 8: Diamond ScrubPAD scrubbing a small portion of Degas Heater

Step 8: As loosened deposition begins to build up on Degas Heater, take lightly dampened HT4754 UltraSOLV® Sponge and wipe the Degas Heater free of residue (See Fig 9 & 10)

Fig 9: UltraSOLV® Sponge wiping loose residue on surface of Degas Heater

Fig 10: Residue pulled off of surface of Degas Heater



AMAT ENDURA®* DEGAS CHAMBER PM (CONT'D):

Step 9: As ScrubPAD loads up with deposition, pull across the dampened UltraSOLV® Sponge to unload ScrubPAD (See Fig 11, 12 & 13)

Fig 11: ScrubPAD loaded with deposition

Fig 12: Pull ScrubPAD across UltraSOLV® Sponge

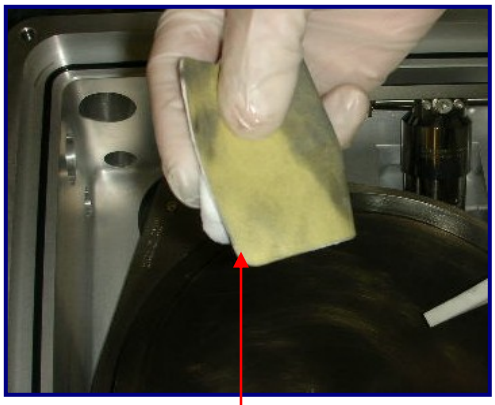


Fig 13: Unloaded ScrubPAD

Step 10: Continue to rinse UltraSOLV® Sponge with DI water as sponge begins to load up with deposition (See Fig 14 & 15)

Fig 14: UltraSOLV® Sponge loaded with deposition

Fig 15: UltraSOLV® Sponge free of deposition after rinse in DI water

AMAT ENDURA®* DEGAS CHAMBER PM PROCEDURE (CONT'D):

NOTE: **ENSURE TO RING AS MUCH MOISTURE AS POSSIBLE OUT OF SPONGE BEFORE CONTINUING TO WIPE DEGAS HEATER**

Step 11: Repeat steps 5 – 10, scrubbing the remaining areas of the Degas Heater, ensuring to rinse UltraSOLV® Sponge and unload 360 Grit Diamond ScrubPAD as necessary

NOTE: **ENSURE TO CONCENTRATE ON REMOVING THE HEAVY BUILD UP ALONG THE EDGES OF THE DEGAS HEATER (See Fig 16)**

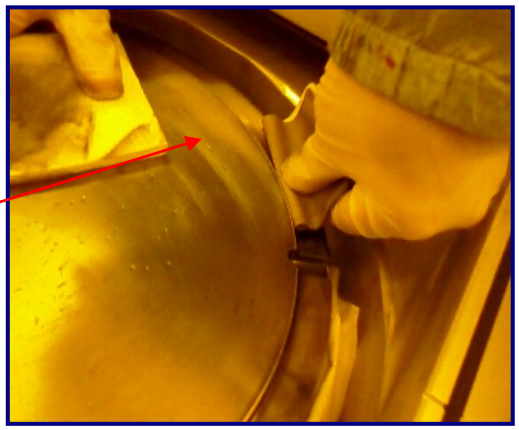


Fig 16: Scrubbing heavy build up along edges of degas Heater

Step 12: When cleaning of the Degas Heater is complete, move on to scrubbing the **upper region** of the Degas Chamber walls using the same technique described above; WIPE – SCRUB – WIPE (See Fig 17, 18 & 19)

Fig 17: Wiping Degas chamber wall

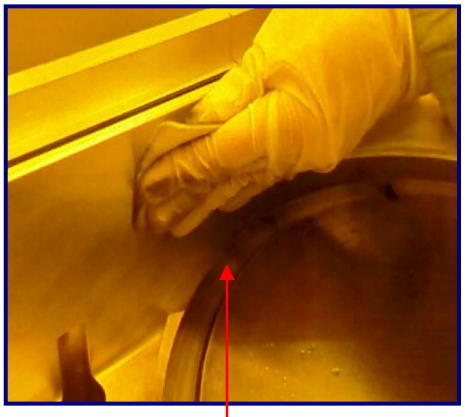


Fig 18: Scrubbing top portion of chamber walls

Fig 19: Wiping Degas chamber wall clean

AMAT ENDURA®* DEGAS CHAMBER PM PROCEDURE (CONT'D):

NOTE: **CONCENTRATE ON SCRUBBING ONLY THE TOP PORTION OF CHAMBER WALLS (THE AREAS ABOVE HEATER) AND DO NOT ALLOW DI WATER TO RUN BELOW HEATER**

Step 13: Ensure to target all areas within chamber above heater assembly (See Fig 20 & 21)

Fig 20 & 21: Scrubbing areas throughout Degas chamber

Step 14: Ensure to reach into the slit valve and scrub the top and bottom areas of this region (See Fig 22 & 23)

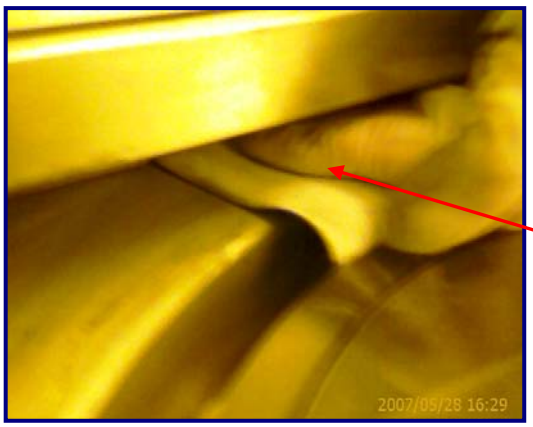


Fig 22 & 23: Scrubbing top and bottom portion of slit valve area

AMAT ENDURA®* DEGAS CHAMBER PM PROCEDURE (CONT'D):

Step 15: Rinse out the UltraSOLV® Sponge with DI water and wipe the entire chamber in preparation for inspection step

NOTE: THE MICROFIBER CHARACTERISTICS OF THE MiraWIPE® WILL APPEAR NOT TO ABSORB DI WATER. THE DI WATER MUST BE WORKED INTO THE TIGHT MICROFIBER IN ORDER TO SATURATE WITH DI WATER. THIS CHARACTERISTIC MAKES THE MiraWIPE® MORE EFFECTIVE IN REMOVING PARTICLES

Step 16: When entire Degas Chamber has been scrubbed, saturate a single HT5790S MiraWIPE® with DI water and wipe throughout the entire Degas Chamber (See Fig 24, 25, 26 & 27)

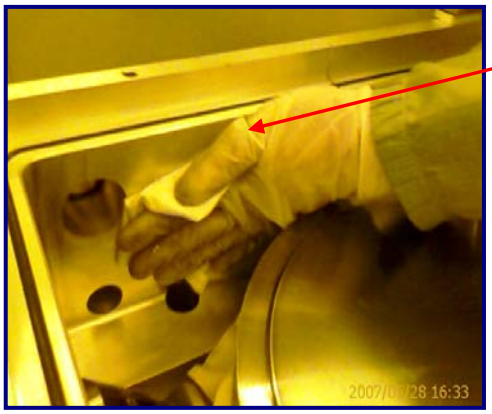


Fig 24, 25 & 26: Wiping throughout entire Degas Chamber with MiraWIPE® using DI water

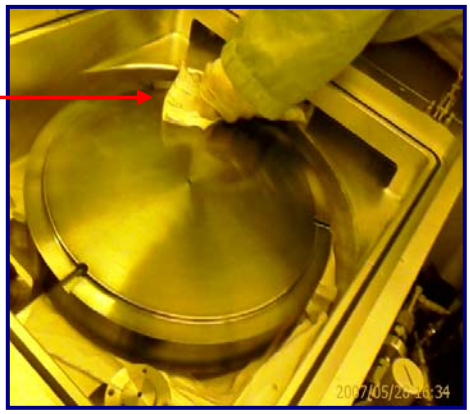
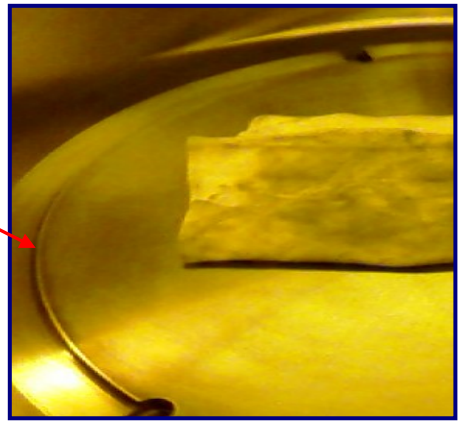


Fig 27: Single MiraWIPE® after wiping entire Degas chamber with DI water

AMAT ENDURA®* DEGAS CHAMBER PM PROCEDURE (CONT'D):

Step 17: After wiping the entire chamber with a MiraWIPE® and DI water, do a **thorough inspection** of the entire Degas Chamber, looking for areas containing process buildup that may have been missed during initial scrub (See Fig 28)

Fig 28: Process buildup on the edge of heater missed during initial scrub of Degas Chamber



Step 18: Moisten second HT4536D 360 Grit Diamond ScrubPAD with DI water and proceed to scrub off the process residue that was missed during the initial scrub of Degas Chamber (See Fig 29 & 30)

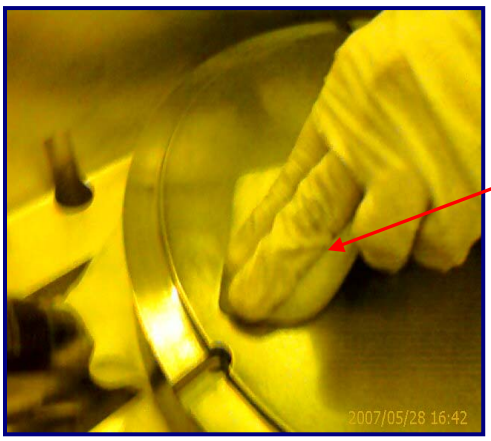


Fig 29 & 30: Second 360 Grit Diamond ScrubPAD scrubbing buildup missed on initial scrub of Degas Chamber

AMAT ENDURA®* DEGAS CHAMBER PM PROCEDURE (CONT'D):

Step 19: Put HT4536D-1 360 Grit Diamond ScrubBELT® onto the FTPEN-1 ScrubWRIGHT™ pen and proceed to scrub the edges and tight corners throughout the Degas Chamber (See Fig 31, 32 & 33)

Fig 31, 32 & 33: ScrubWRIGHT™ pen scrubbing edges and tight areas throughout Degas Chamber

NOTE: ENSURE TO ROTATE THE 360 GRIT DIAMOND ScrubBELT® AROUND THE ScrubWRIGHT™ PEN AS YOU SCRUB TO PREVENT STRAINING A SINGLE AREA ON THE ScrubBELT® CAUSING IT TO BREAK

AMAT ENDURA®* DEGAS CHAMBER PM PROCEDURE (CONT'D):

FINAL WIPE PROCEDURE:

IMPORTANT NOTE

MUST USE HT5790S MiraWIPES® DURING FINAL WIPE PORTION OF PROCEDURE TO EFFECTIVELY REMOVE PARTICLE DEFECTS FROM DEGAS CHAMBER

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 PROCEDURE the most **CRITICAL STEP** of the PM procedure (See Fig 34a & 34b)

Fig 34a: Current fab wiper after completely wiping Degas Chamber

Fig 34b: 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

AMAT ENDURA®* DEGAS CHAMBER PM PROCEDURE (CONT'D):

Step 20: Once scrubbing all the process buildup throughout Degas Chamber is complete, saturate the HT5790S MiraWIPE® with IPA and perform a complete chamber wipe down (See Fig 35, 36 & 37)

Fig 35, 36 & 37: IPA saturated MiraWIPE® wiping out entire Degas Chamber

Step 21: Replace MiraWIPE® with a fresh MiraWIPE® as necessary, and continue wiping Degas Chamber until MiraWIPE® no longer is able to remove process film from chamber

DEGAS CHAMBER HEATER COOL RING CLEANING PROCEDURE:

Step 22: Place HT9423 CushionPAD on top of protective workstation and place cool ring on top of CushionPAD (See Fig 38)

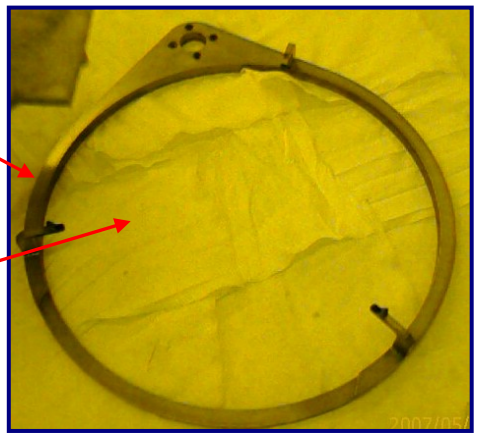


Fig 38: Degas Heater cool ring placed onto protective workstation

NOTE: CushionPAD will replace excess use of wipers as shown here

AMAT ENDURA®* DEGAS CHAMBER PM PROCEDURE (CONT'D):

Step 23: Using the same technique as described above, scrub entire cool ring with the exception of the wafer picks (See Fig 39, 40, 41 & 42)

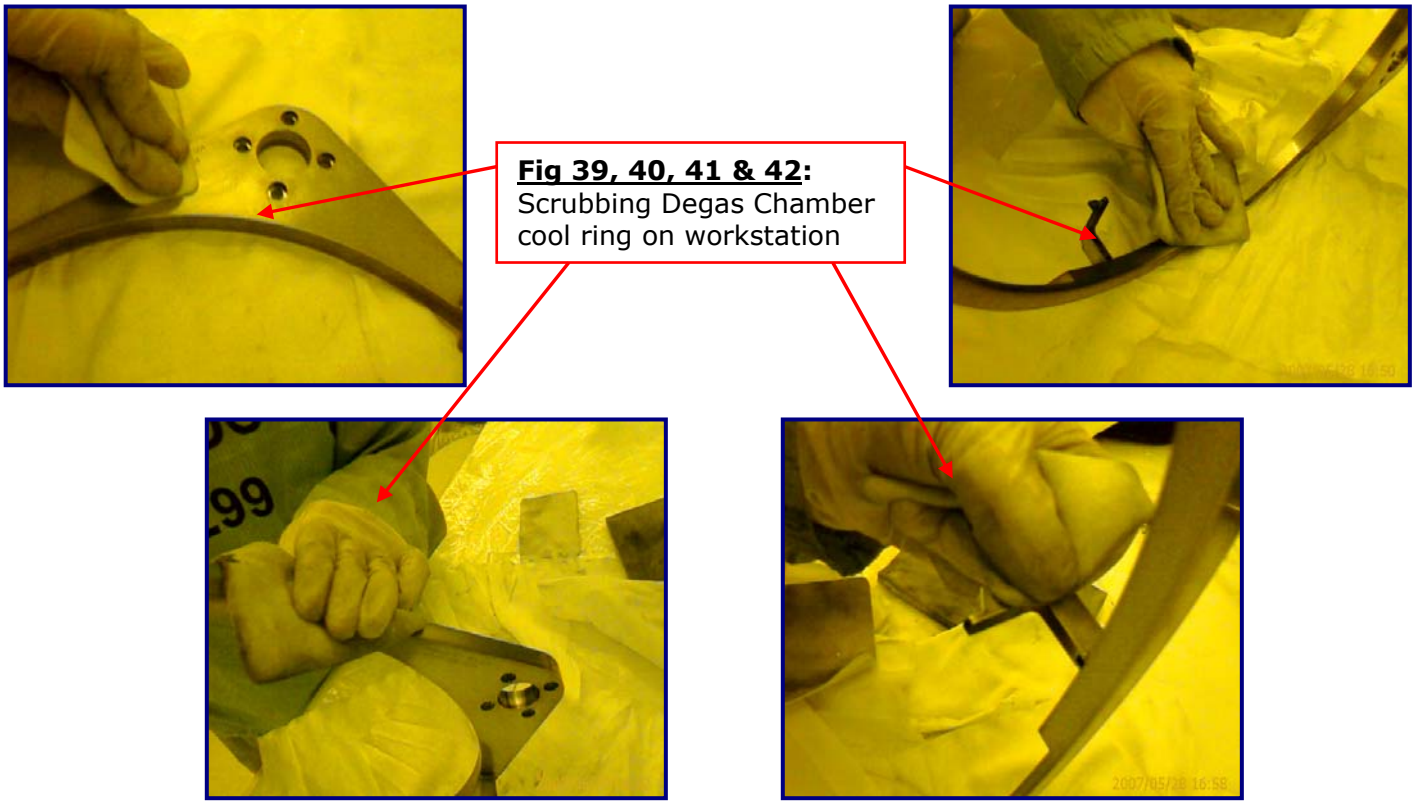


Fig 39, 40, 41 & 42: Scrubbing Degas Chamber cool ring on workstation

AMAT ENDURA®* DEGAS CHAMBER PM PROCEDURE(CONT'D):

NOTE: IF COOL RING HAS NOT BEEN REMOVED AND CLEANED BEFORE, THEN IT WILL REQUIRE AN ADDITIONAL 360 GRIT DIAMOND ScrubPAD TO EFFECTIVELY REMOVE THE PROCESS BUILDUP (See Fig 43)

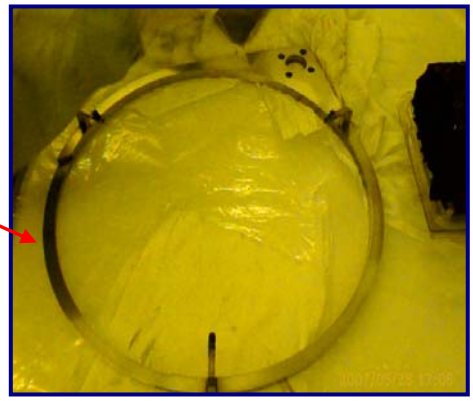


Fig 43: (2+) years of process buildup on cool ring

Step 24: When scrub of cool ring is complete, saturate HT5790S MiraWIPE® with IPA and perform a complete cool ring wipe down (See Fig 44 & 45)

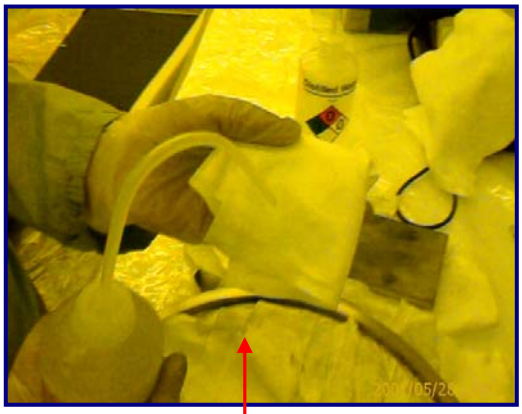


Fig 44: Saturating MiraWIPE® with IPA

Fig 45: Wiping down entire cool ring

AMAT ENDURA®* DEGAS CHAMBER PM PROCEDURE (CONT'D):

Step 25: Prior to replacing the clean cool ring back into the Degas Chamber, vacuum out the Degas Chamber using a certified fab vacuum (See Fig 46 & 47)

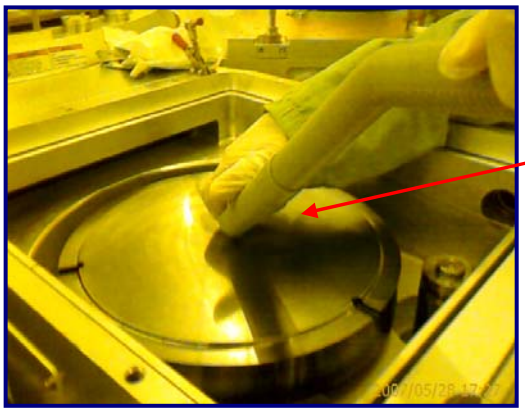
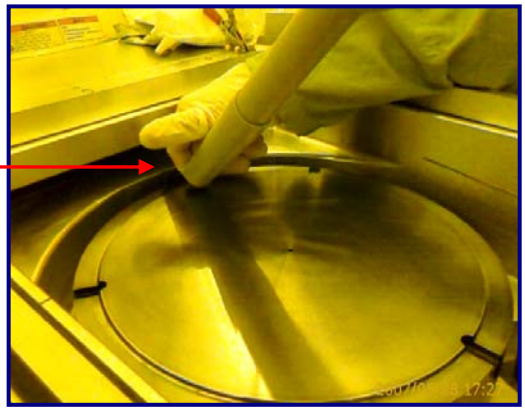


Fig 46 & 47: Vacuuming Degas Chamber with certified fab vacuum



NOTE: **NEVER ALLOW THE TIP OF THE VACUUM TO RUB ANY PORTION OF THE CHAMBER**

Step 26: After vacuuming Degas Chamber, perform a complete wipe of the chamber using additional IPA saturated MiraWIPES® (See Fig 48, 49 & 50)

Fig 48, 49 & 50: IPA saturated MiraWIPES® wiping down Degas Chamber

AMAT ENDURA®* DEGAS CHAMBER PM PROCEDURE (CONT'D):

Step 27: Place an IPA saturated MiraWIPE® underneath the heater, then remove the HT4536DW-1 ScrubBELT® from the FTPEN-1 and using the FTPEN-1 as a tool on top of the MiraWIPE®, wipe underneath the Degas Heater the best you can (See Fig 51 & 52)

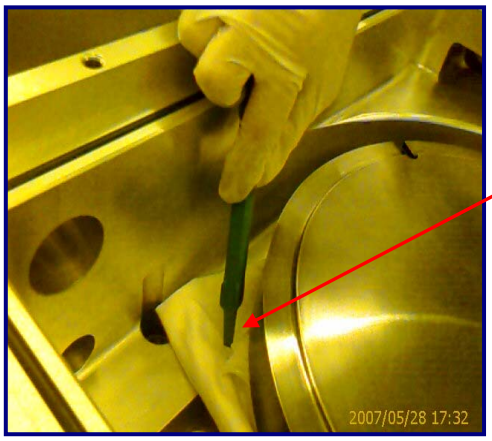
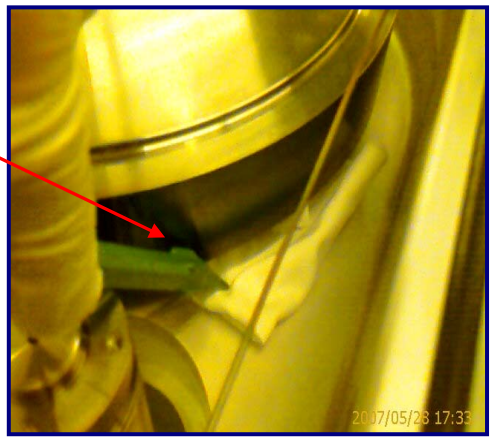


Fig 51 & 52: FTPEN-1 guiding a saturated MiraWIPE® beneath the Degas Heater



Step 28: Replace the Degas Chamber cool ring by following AMAT's recommended cool ring replacement procedure (See Fig 53)

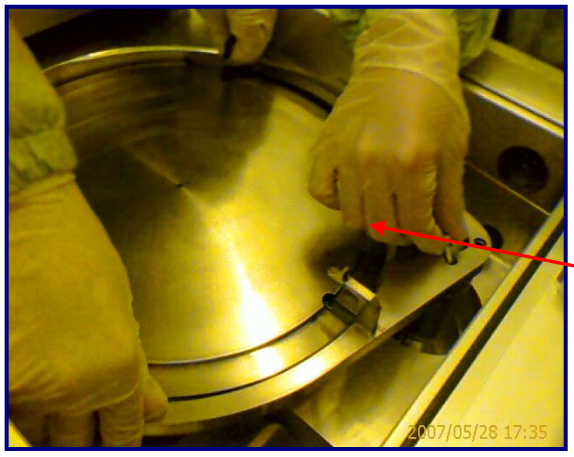


Fig 53: Replacing cool ring in Degas Chamber

AMAT ENDURA®* DEGAS CHAMBER PM PROCEDURE(CONT'D):

Step 29: Ensure to align the cool ring in accordance with AMAT's recommendation, using the Degas Chamber cool ring alignment fixture (See Fig 54 & 55)

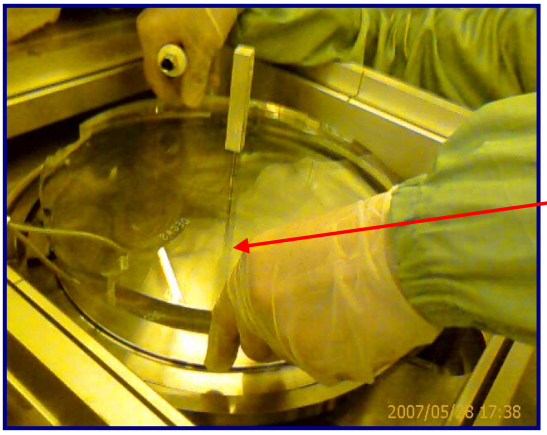
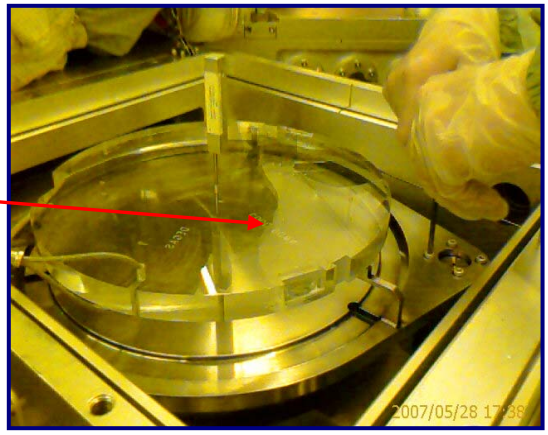


Fig 54 & 55: Aligning cool ring to Degas Heater using AMAT's alignment fixture



Step 30: When the cool ring has been properly reinstalled in the Degas Chamber, perform a final wipe using an IPA saturated MiraWIPE®

1. Make sure to wipe all pump ports, slit valves and o-rings surfaces
2. Wipe the top Reflector Plate with a fresh IPA saturated MiraWIPE®

Step 31: Close Degas Chamber and bring it back to production using AMAT's recommended recovery procedure

COMPLETED DEGAS CHAMBER SCRUB