

VACUUM CHAMBER PM TECHNIQUE

AMAT ENDURA®* PVD DEGAS

CHAMBER 3RD GENERATION HEATER

OBJECTIVE:

TO EFFECTIVELY PM THE APPLIED MATERIALS®* ENDURA® PVD DEGAS CHAMBER 3RD GENERATION HEATER IN A TIMELY MANNER WHILE IMPROVING TOOL RECOVERY AND EXTENDING THE MEAN TIME BETWEEN CLEANS (MTBC)

Vacuum Chamber:

Vacuum Chamber Process Residue:

Vacuum Chamber Components:

APPLIED MATERIALS® ENDURA® PVD

PROCESS INDUCED RESIDUE

DEGAS CHAMBER HEATER ASSEMBLY – 3RD GENERATION

Old Procedure:

2+ hours using DI water & IPA with 150+ wipes

Recovery time: 24 to 48 hours

Interval: PM Degas Chamber every 2 to 4 weeks

New Procedure:

1 hour using Diamond ScrubPAD, ScrubWRIGHT™ Pen, MiraWIPE® and MiraSWABS®

Recovery time: 24 hours

Interval: **ABLE TO EXTEND CHAMBER PM OUT 1.5X to 2X CURRENT INTERVAL**

Vacuum Chamber Products:

AMAT ENDURA® Degas Chamber PM Kit

PM Kit P/N: [HT4500-DGAS4](#)

- (1) [HT9423](#) CushionPAD 24" X 24"
- (2) [HT4536D](#)-10-1 360 Grit Diamond ScrubPAD
- (1) [HT4536DW](#)-1 360 Grit Diamond ScrubBELT®
- (1) [FTPEN](#)-1 ScrubWRIGHT™ PEN
- (1) [HT4754](#) UltraSOLV® Sponge
- (1) [HT1732](#)-5 UltraSOLV® Swabs
- (2) [HT1511FC](#)-5 MiraSWABS® (10 MiraSWABS®)
- (1) [HT5790S](#)-25 MiraWIPES® (25 MiraWIPES®)
- (1) [HT4790](#)-5 UltraSOLV® Wipers (5 wipers)



AMAT ENDURA®* DEGAS CHAMBER PM PROCEDURE:

NOTE: FOR AN ACCURATE EXPLANATION, THIS PROCEDURE REFERS TO BOTH 1ST & 3RD GENERATION DEGAS HEATER ASSEMBLYS

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 lift ring from heater assembly (See Fig 1 & 2)



Fig 1 & 2: Removing Degas Heater lift ring



Step 3: Properly stage [HT9423](#) CushionPAD on flat workstation and place lift ring on top of CushionPAD (See Fig 3)

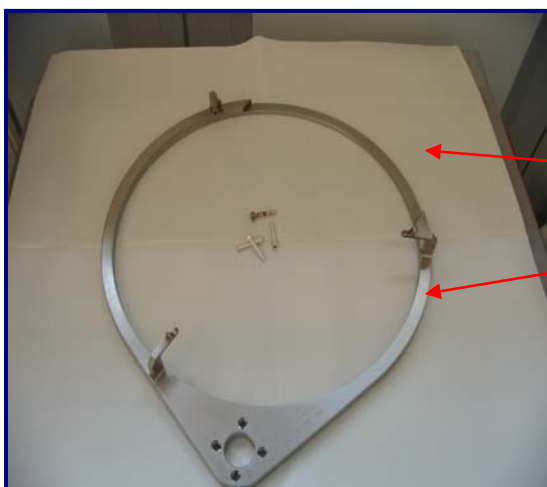


Fig 3: [HT9423](#) CushionPAD and Degas Heater lift ring

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

- Step 4:** Carefully place (6) to (8) standard fab wipers underneath the Degas Heater Assembly to capture any excess moisture (See Fig 4)

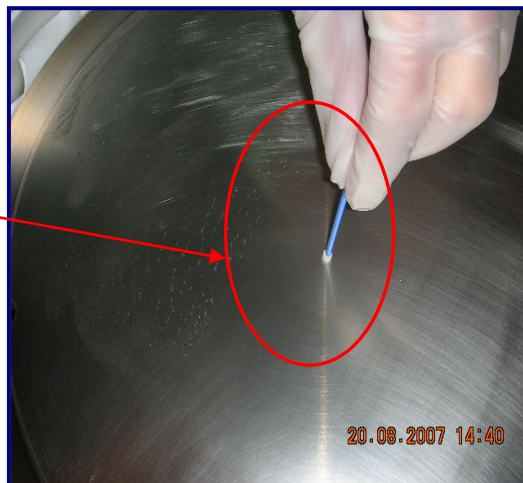
Fig 4: Standard fab wipers placed underneath Degas Heater



- Step 5:** Stage a hazardous waste bag next to chamber allowing easy access for rinsing out [HT4754](#) UltraSOLV® Sponge and Diamond ScrubPAD with DI water

- Step 6:** Take [HT1732](#) UltraSOLV® Swab and place into center hole of Degas Heater Assembly to help prevent any moisture from entering into the Degas Heater (See Fig 5)

Fig 5: UltraSOLV® swab in center of Degas Heater Assembly



- Step 7:** Using DI water, **LIGHTLY DAMPEN** UltraSOLV® Sponge and [HT4536D](#) 360 Grit Diamond ScrubPAD. Ensure items are only lightly dampened and not dripping with DI water (See Fig 6)

Plastic bag inside basket

Fig 6: Lightly dampen UltraSOLV® Sponge with DI water



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

Step 8: Using lightly dampened UltraSOLV® Sponge wipe Degas Heater (See Fig 7)



Fig 7: UltraSOLV®
Sponge wiping Degas
Heater

Step 9: Using lightly dampened 360 Grit Diamond ScrubPAD scrub an approximate 4" x 4" portion of Degas Heater (See Fig 8 & 9)

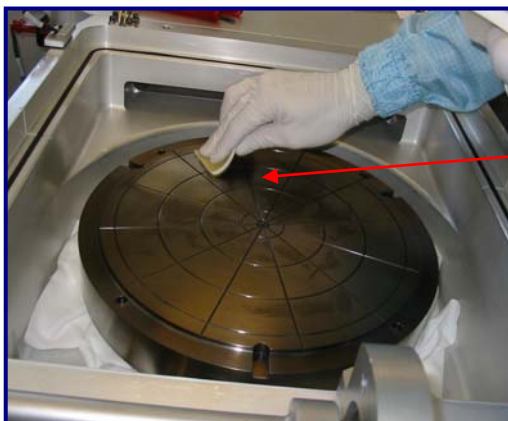
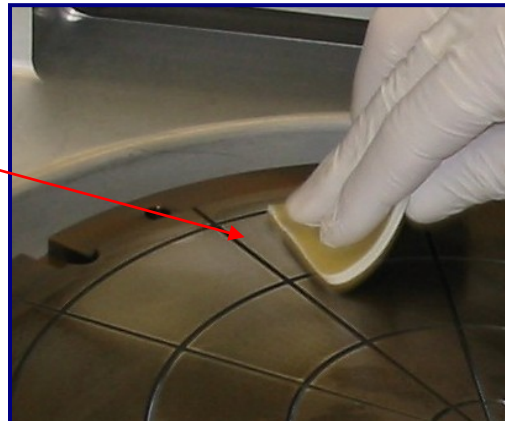


Fig 8 & 9: Diamond
ScrubPAD scrubbing a
small portion of Degas
Heater



NOTE: IT IS COMMON FOR DIFFERENT PROCESSES TO HAVE DIFFERENT LEVELS OF PROCESS INDUCED RESIDUES BUT IMPORTANT TO REMOVE ALL RESIDUE FOR EFFICIENT TOOL PERFORMANCE (See Fig 10a & 10b)

Fig 10a: Degas Heater
after scrub with 360 Grit
Diamond ScrubPAD

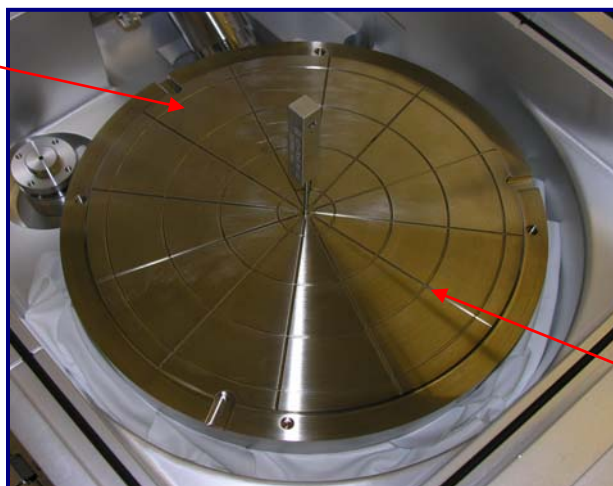


Fig 10b: Degas Heater
before scrub with 360
Grit Diamond ScrubPAD

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

Step 10: As loosened deposition builds up on Degas Heater, take lightly dampened [HT4754](#) UltraSOLV® Sponge and wipe the Degas Heater free of residue (See Fig 11 & 12)



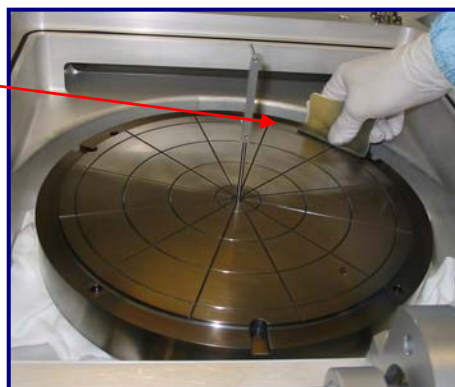
Fig 11: UltraSOLV® Sponge wiping loose residue on surface of Degas Heater



Fig 12: Deposition pulled off of surface of Degas Heater

Step 11: Using the same technique described above, continue to scrub the remaining areas of Degas Heater (See Fig 13)

Fig 13: Scrubbing the remaining areas of Degas Heater



Step 12: As ScrubPAD begins to load up with deposition, pull across dampened UltraSOLV® Sponge to unload ScrubPAD (See Fig 14, 15 & 16)



Fig 14: ScrubPAD loaded with deposition



Fig 15: Pull ScrubPAD across UltraSOLV® Sponge

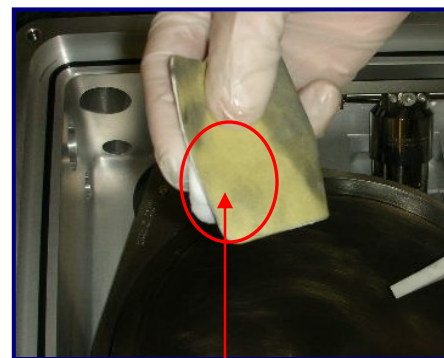


Fig 16: Unloaded ScrubPAD

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

Step 13: Continue to rinse UltraSOLV® Sponge with DI water as sponge begins to load up with deposition (See Fig 17 & 18)

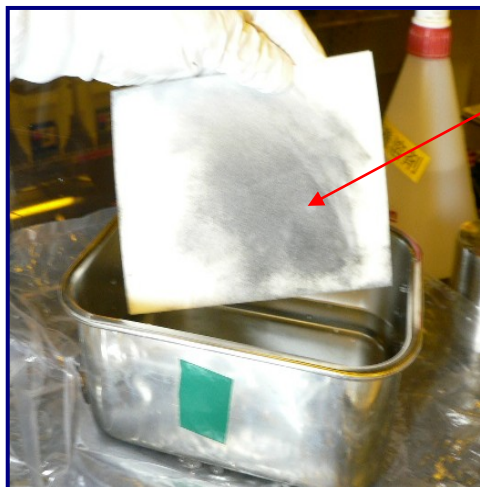


Fig 17: UltraSOLV® Sponge loaded with deposition

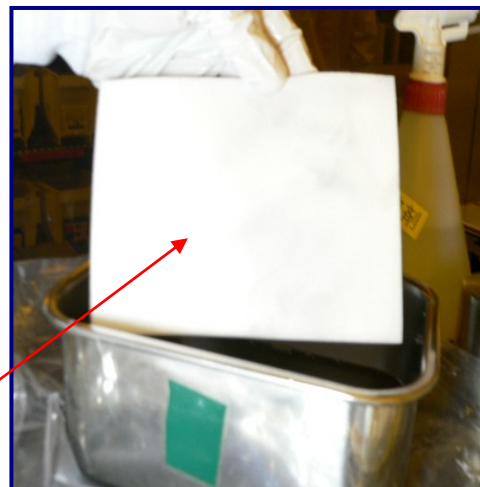
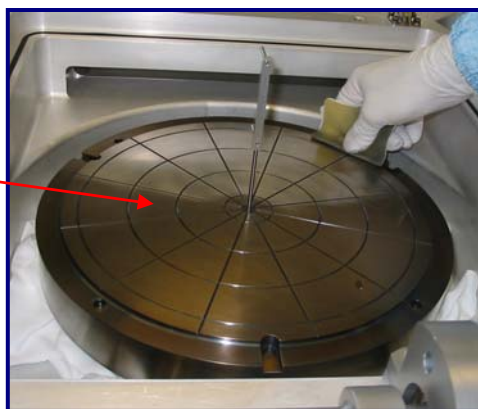


Fig 18: UltraSOLV® Sponge free of deposition after rinse in DI water

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

Step 14: Repeat steps 7 – 13, scrubbing the remaining areas of the Degas Heater, ensuring to rinse UltraSOLV® Sponge and unload 360 Grit Diamond ScrubPAD as necessary (See Fig 19)

Fig 19: Scrubbing the remaining areas of Degas Heater



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

NOTE: ENSURE TO CONCENTRATE ON REMOVING THE HEAVY BUILD UP ALONG THE EDGES OF THE DEGAS HEATER (See Fig 20)

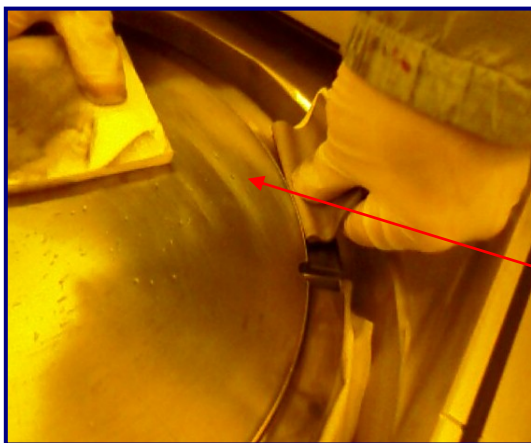


Fig 20: Scrubbing heavy build up along edges of Degas Heater

Step 15: When cleaning of 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 21, 22 & 23)



Fig 21: Wiping Degas Chamber wall



Fig 22: Scrubbing top portion of Chamber walls



Fig 23: Wiping Degas Chamber wall clean

NOTE: CONCENTRATE ON SCRUBBING ONLY THE TOP PORTION OF CHAMBER WALLS (THE AREAS ABOVE HEATER)

DO NOT ALLOW DI WATER TO RUN BELOW HEATER

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

Step 16: Ensure to target all areas within chamber above heater assembly (See Fig 24 & 25)



Fig 24 & 25:
Scrubbing areas
throughout Degas
Chamber



Step 17: Ensure to reach into the slit valve and scrub the top and bottom areas of this region (See Fig 26 & 27)

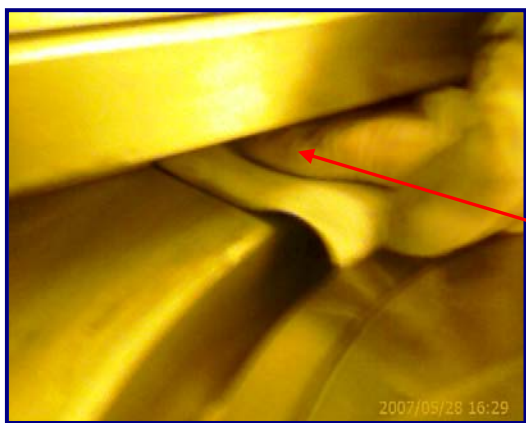
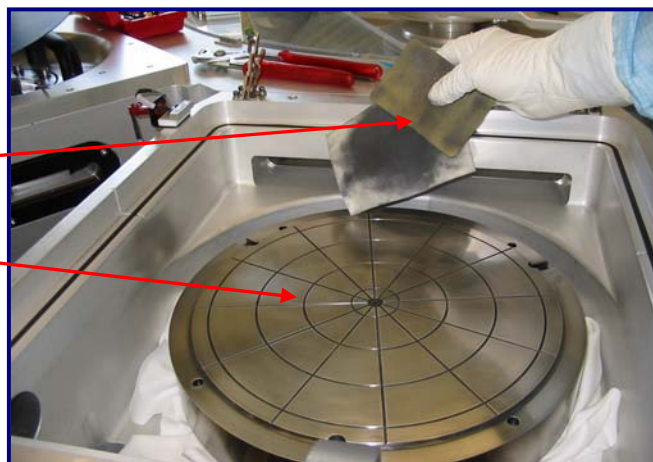


Fig 26 & 27: Scrubbing
top and bottom
portion of slit
valve area



Step 18: Rinse out the [HT4754](#) UltraSOLV® Sponge with DI water and wipe the entire chamber in preparation for inspection step. One [HT4536D](#) 360 Grit Diamond ScrubPAD should be able to complete the initial Degas Heater and chamber scrub (See Fig 28)

Fig 28: Complete initial
scrub of Degas
Heater and
chamber with (1)
360 Grit
Diamond
ScrubPAD



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

Step 19: When entire Degas Chamber has been scrubbed, saturate a single HT5790S MiraWIPE® with DI water and wipe throughout the entire Degas Chamber (See Fig 29, 30, 31 & 32)

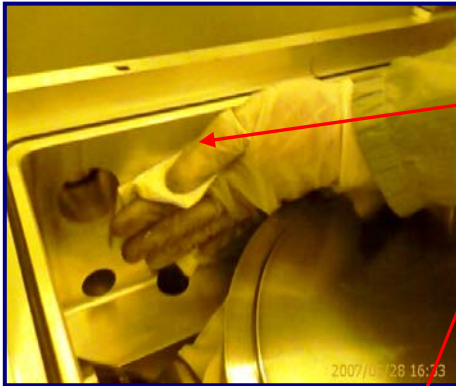


Fig 29, 30 & 31: Wiping throughout entire Degas Chamber with MiraWIPE® using DI water



Fig 32: Single MiraWIPE® after wiping entire Degas Chamber with DI water



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

Step 20: After wiping entire chamber with 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 33 & 34)

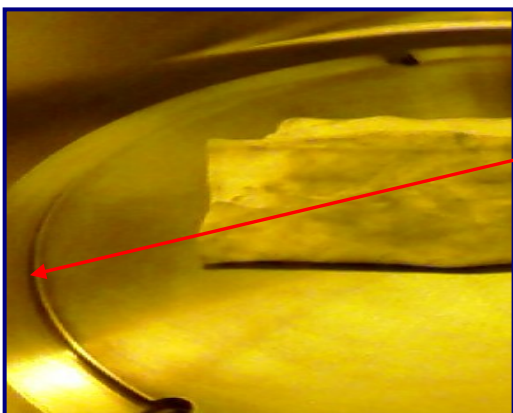


Fig 33 & 34: Process build-up on the edge of heater missed during initial scrub of Degas Chamber



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

Step 21: Moisten second [HT4536D](#) 360 Grit Diamond ScrubPAD with DI water and scrub off the process buildup **missed** during the initial scrub of Degas Chamber (See Fig 35 & 36)

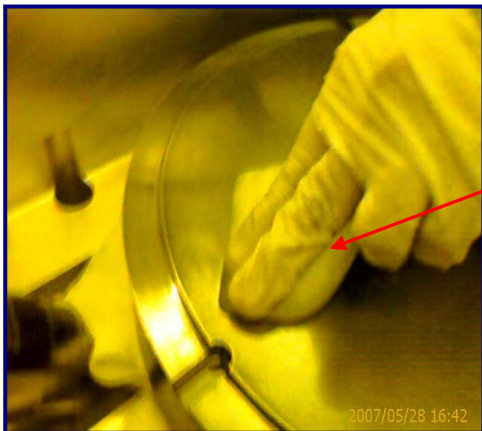
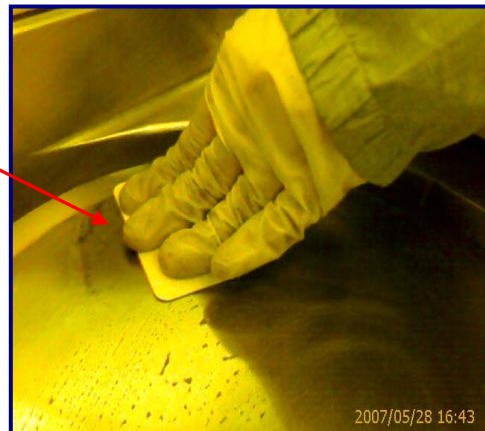


Fig 35 & 36: Second 360 Grit Diamond ScrubPAD scrubbing buildup missed on initial scrub of Degas Chamber



Step 22: Put [HT4536DW-1](#) 360 Grit Diamond ScrubBELT® onto the [FTPEN-1](#) ScrubWRIGHT™ Pen and, using the same technique as diamond ScrubPAD, scrub the edges and tight corners throughout the Degas Chamber (See Fig 37, 38 & 39)

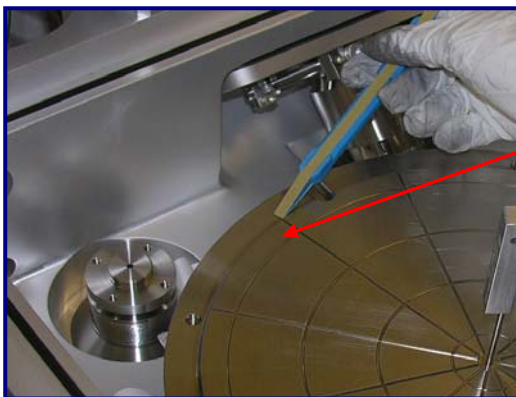
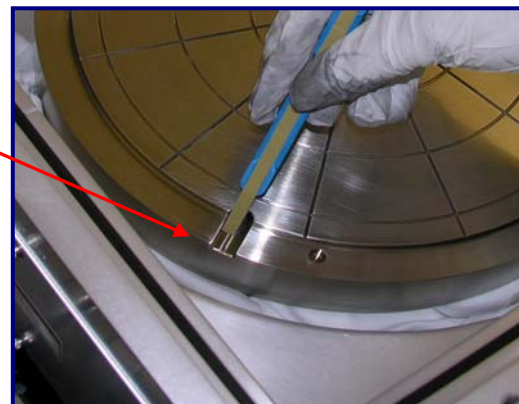


Fig 37, 38 & 39: ScrubWRIGHT™ Pen scrubbing edges and tight areas throughout Degas Chamber



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

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

Step 23: Lightly dampen the ScrubBELT® with DI water (See Fig 40 & 41)

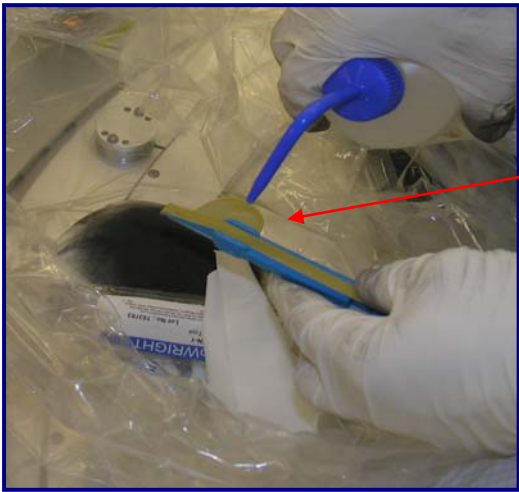
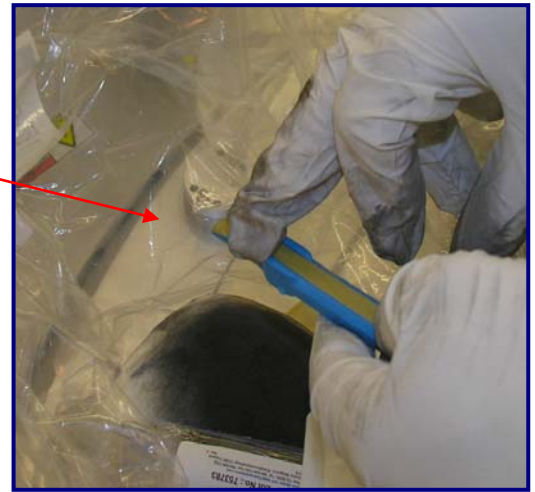


Fig 40 & 41: Lightly dampening ScrubBELT® with DI water



Step 24: Continue using the ScrubWRIGHT™ Pen and clean all of the tight grooves along the top of Degas Heater Assembly (See Fig 42 & 43)

NOTE: THE COMPLETION OF THIS STEP MAY TAKE SOME EXTRA TIME, AS THESE GROOVES PROBABLY HAVE NOT BEEN EFFECTIVELY CLEANED DURING PREVIOUS PM'S. AS THIS STEP IS PERFORMED MORE FREQUENTLY, THE PM WILL BECOME EASIER

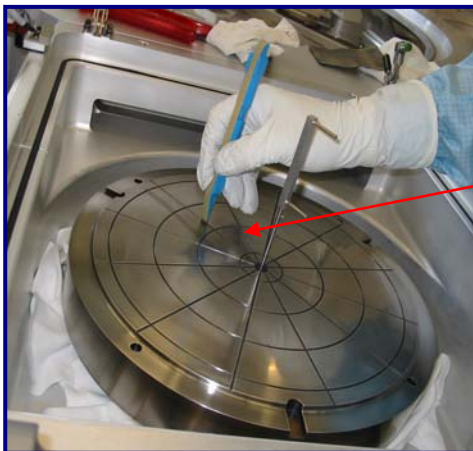
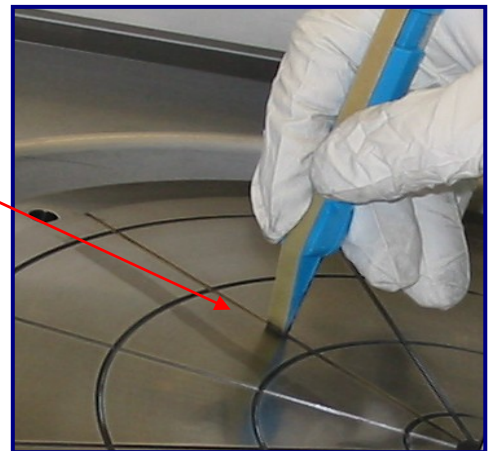


Fig 42 & 43: ScrubWRIGHT™ Pen cleaning tight grooves along top of Degas Heater



NOTE: CONTINUE TO USE UltraSOLV® SPONGE TO UNLOAD 360 GRIT DIAMOND ScrubBELT®, BUT USE MiraWIPE® DAMPENED WITH DI WATER TO WIPE OFF THE DEPOSITION FROM THIS DETAILED WORK DONE ON DEGAS HEATER

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

Step 25: Use ScrubWRIGHT™ Pen to clean the three lift ring inserts along edge of the Degas Heater Assembly (See Fig 44, 45, 46 & 47)

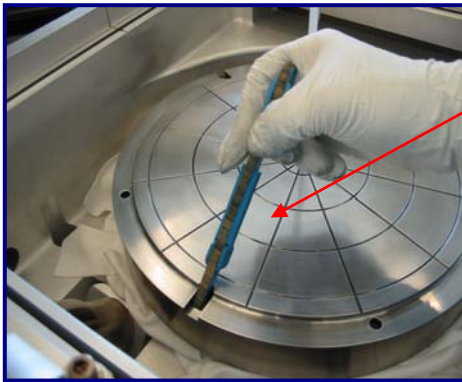


Fig 44 & 45:
ScrubWRIGHT™ Pen
cleaning lift ring inserts
along edge of Degas Heater

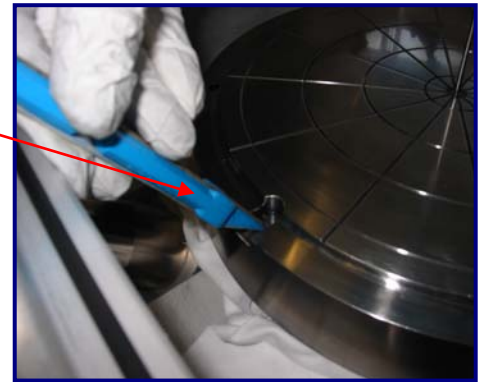
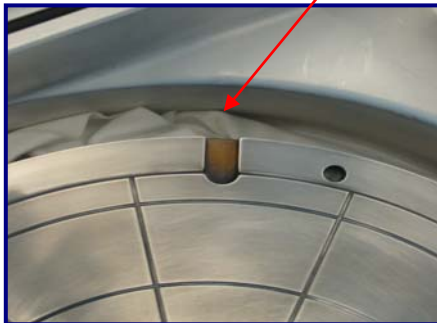


Fig 46 & 47: Lift ring
inserts **BEFORE & AFTER**

**IMPORTANT NOTE**

THE USE OF HT5790S MiraWIPES® AND HT1511FC MiraSWABS® DURING THE FINAL WIPE PROCEDURE IS A CRITICAL STEP 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 48a & 48b)

Fig 48a: Current fab wiper after completely wiping Degas Chamber

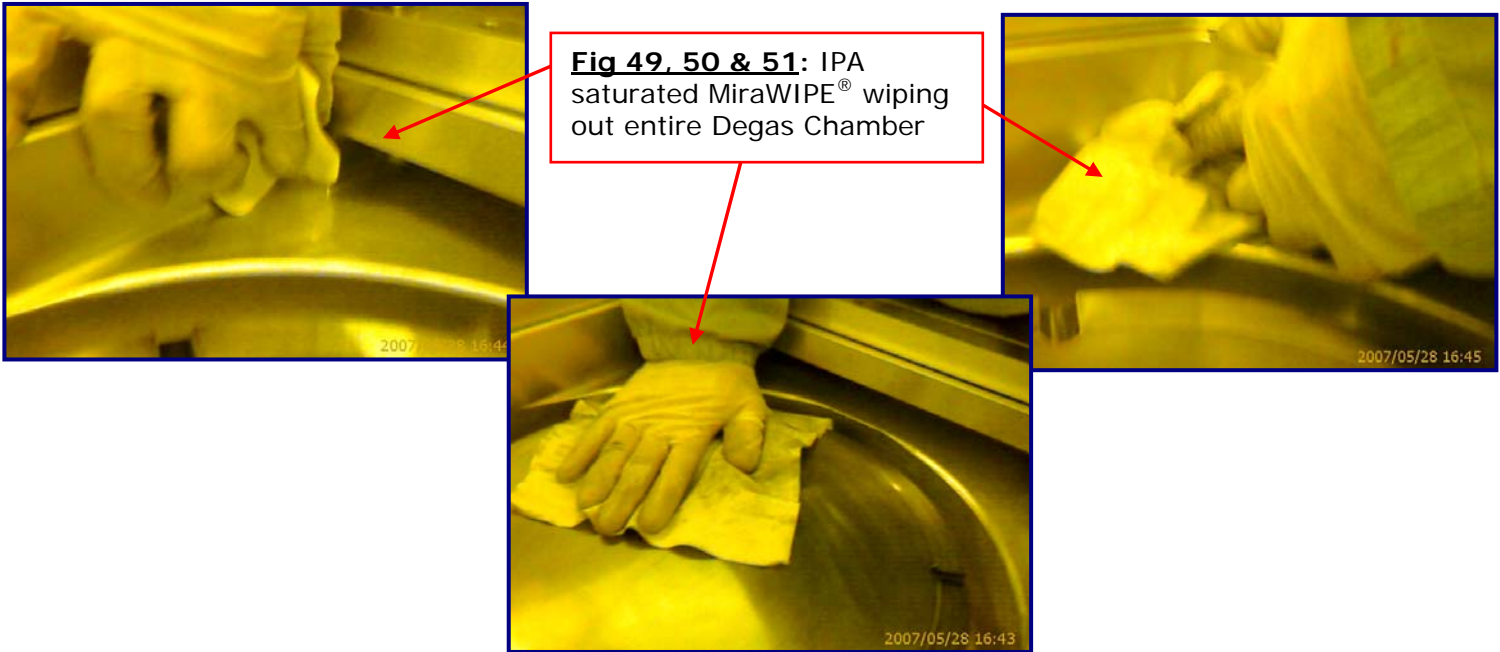


Fig 48b: Particles picked up using HT5790S MiraWIPES® after completely wiping with current fab wiper

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

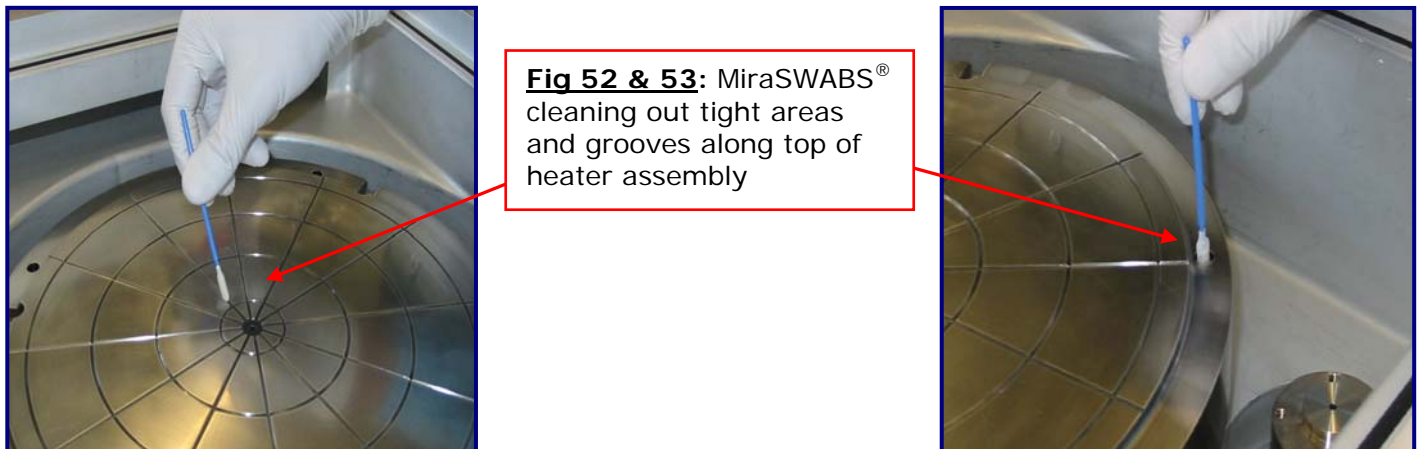
AMAT ENDURA®* DEGAS CHAMBER PM PROCEDURE (CONT'D):

Step 26: 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 49, 50 & 51)



Step 27: Replace deposition saturated MiraWIPE® with a fresh MiraWIPE® as necessary, and continue wiping Degas Chamber until MiraWIPE® is no longer able to remove process film from chamber

Step 28: During final wipe procedure of PM, use [HT1511FC](#) MiraSWABS® saturated with IPA and wipe deposition out of all the hard to reach areas, concentrating on the grooves on the top of the heater assembly (See Fig 52 & 53)



NOTE: IMPORTANT TO USE MiraWIPES® ALONG WITH THE MiraSWABS® AS THE SWABS WILL PULL LOOSE DEPOSITION OUT ON TOP OF THE HEATER ASSEMBLY

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

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

DEGAS CHAMBER HEATER LIFT RING CLEANING PROCEDURE:

Step 29: Place lift ring on protective workstation in preparation for lift ring scrub (See Fig 54)

Fig 54: Degas Heater lift ring placed onto protective workstation



Step 30: Using the same technique as described above scrub entire lift ring (See Fig 55 – 58)

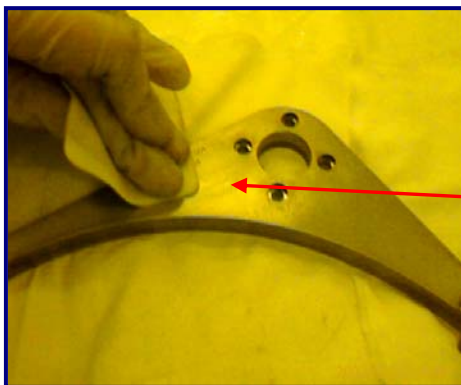
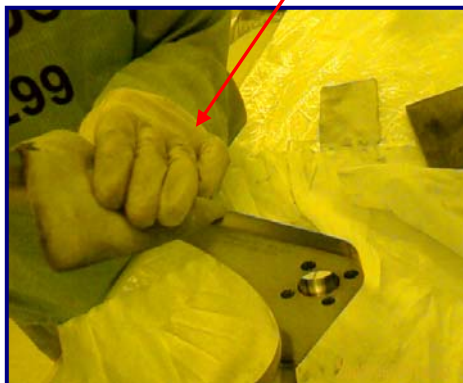


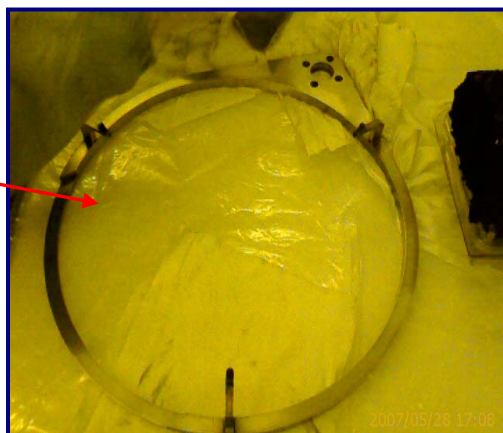
Fig 55 - 58: Scrubbing Degas Chamber lift ring on workstation



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

NOTE: IF LIFT 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 59)

Fig 59: (2+) years of process buildup on lift ring



Step 31: When scrub of lift ring is complete, saturate [HT5790S](#) MiraWIPE® with IPA and perform a complete lift ring wipe down (See Fig 60 & 61)



Fig 60: Saturating MiraWIPE® with IPA

Fig 61: Wiping down entire lift ring



Step 32: Prior to placing the clean lift ring back into the Degas Chamber, vacuum out the Degas Chamber using a certified fab vacuum (See Fig 62 & 63)

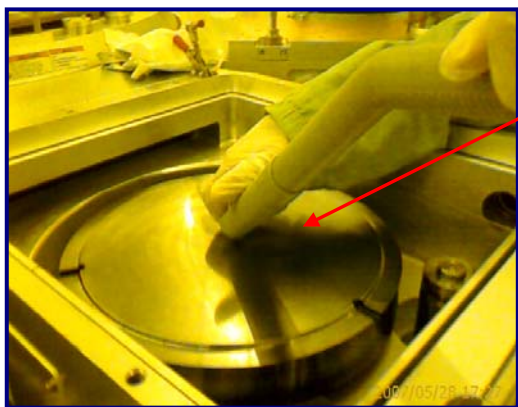
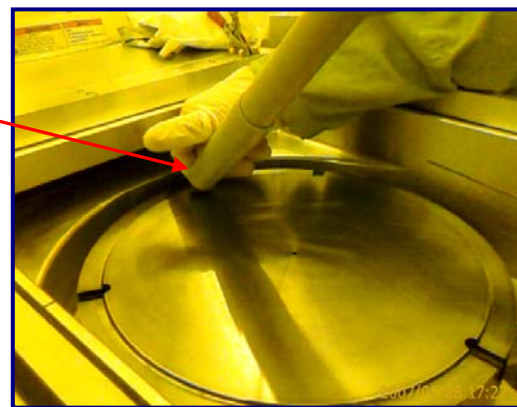


Fig 62 & 63: Vacuuming Degas Chamber with certified fab vacuum



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

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

Step 33: After vacuuming Degas Chamber, perform a complete wipe of the chamber using additional IPA saturated MiraWIPES® (See Fig 64, 65 & 66)



Fig 64, 65 & 66: IPA saturated MiraWIPES® wiping down Degas Chamber



Step 34: Place an IPA saturated MiraWIPE® underneath the heater, then remove the [HT4536DW-1](#) ScrubBELT® from the [FTPEN-1](#) ScrubWRIGHT™ Pen and using the pen as a tool on top of the MiraWIPE®, wipe underneath the Degas Heater the best you can (See Fig 67 & 68)

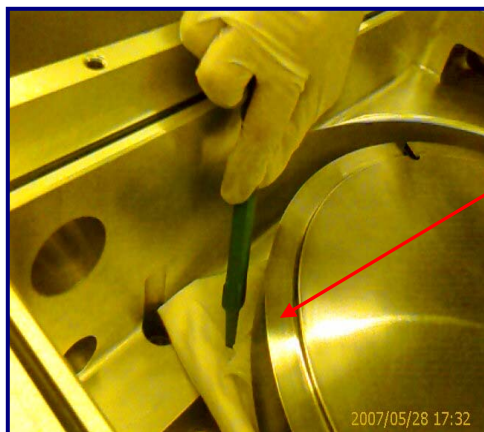
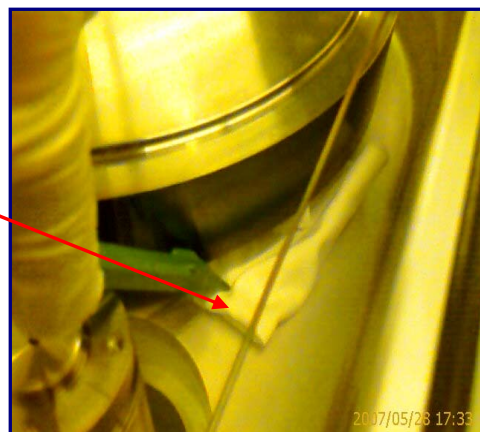


Fig 67 & 68: [FTPEN-1](#) guiding a saturated MiraWIPE® beneath Degas Heater

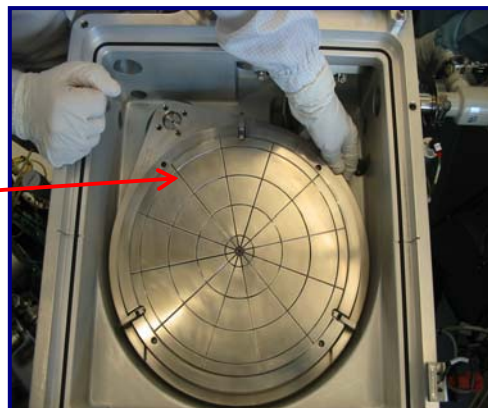


AMAT ENDURA®* DEGAS CHAMBER PM PROCEDURE (CONT'D):**LIFT RING REPLACEMENT PROCEDURE:**

Step 35: Replace the Degas Chamber by following AMAT's recommended lift ring replacement procedure (See Fig 69 & 70)



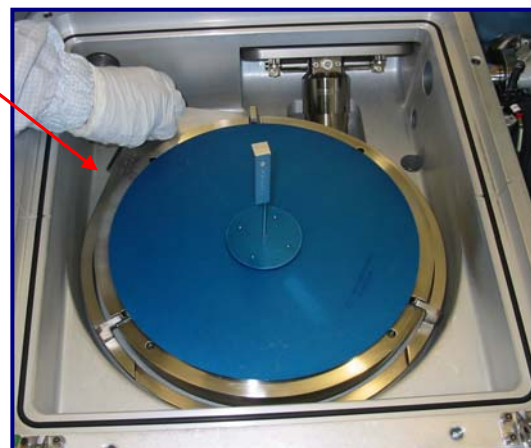
Fig 69 & 70: Replacing lift ring back into Degas Chamber (1st & 3rd generation shown)



Step 36: Ensure to align the lift ring in accordance with AMAT's recommendation using the Degas Chamber Lift Ring Alignment Fixture (See Fig 71 & 72)



Fig 71 & 72: Aligning to Degas Heater lift ring using AMAT's alignment fixture (1st & 3rd generation shown)



Step 37: When the lift ring has been properly reinstalled into the Degas Chamber, perform a final wipe using an IPA saturated MiraWIPE®

1. Make sure to wipe all pump ports, slit valves and o-ring surfaces
2. Wipe the top reflector plate with a freshly IPA saturated MiraWIPE®

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

Step 38: To complete an effective final wipe procedure of PM on the 3rd Generation Degas Heater Assembly, fold the [HT4790](#) UltraSOLV® Foam Wiper into quarters, lightly dampen with IPA and pull across entire surface of Degas Heater Assembly (See Fig 73 & 74)

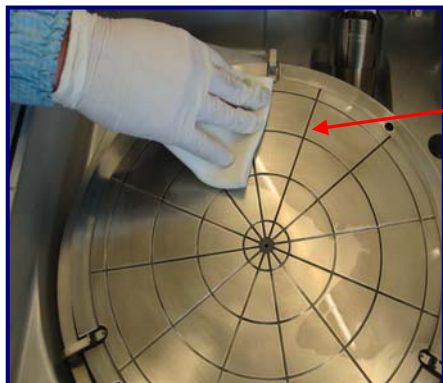
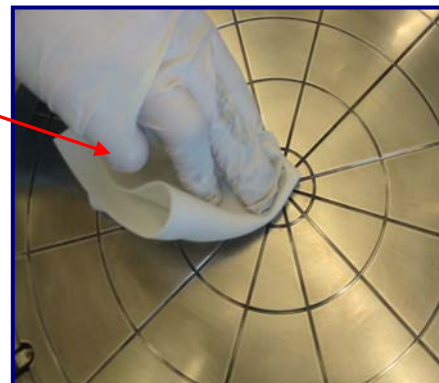


Fig 73 & 74: [HT4790](#) UltraSOLV® Foam Wiper cleaning surface of heater assembly



NOTE: THE USE OF THE [HT4790](#) UltraSOLV® FOAM WIPER WILL GREATLY REDUCE BACKSIDE PARTICLE PROBLEMS (SEE FIG 75)

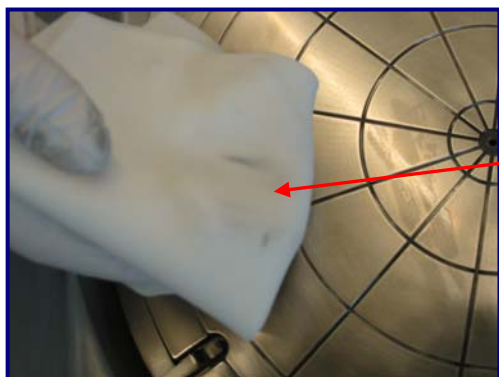


Fig 75: Particles removed by using [HT4790](#) UltraSOLV® Foam Wiper on surface of heater assembly

Step 39: Close Degas Chamber and bring it back to production using AMAT's recommended recovery procedure

COMPLETED DEGAS CHAMBER SCRUB

