Foamtec International
Wilshire Contamination Control Division
cleaning critical surfaces

VACUUM CHAMBER PM TECHNIQUE
NOVELLUS CONCEPT ONE & TWO /
SEQUEL & SEQUEL EXPRESS & VECTOR

OBJECTIVE:

TO PM THE NOVELLUS CONCEPT ONE AND TWO IN AN EFFECTIVE AND TIMELY MANNER WHILE REDUCING RISK OF DISHING TO THE HEATER BLOCK, IMPROVING PARTICLE PERFORMANCE, TOOL RECOVERY AND MAXIMIZING TOOL UPTIME

Vacuum Chamber: NOVELLUS CONCEPT ONE & TWO / SEQUEL & SEQUEL EXPRESS & VECTOR

Vacuum Chamber Process Residue: VARIOUS HARD OXIDE, NITRIDE, AND GLASSLIKE RESIDUES

Vacuum Chamber Components: HEATER BLOCK, FORK GROOVES AND CERAMIC FORK ASSEMBLY

Old Procedure: Scotch-Brite™, commercial grade sandpaper and cleanroom wipers. Hard, lengthy scrubbing regimes generate large amounts of particles and may cause dishing to the heater block

Solvent: DI followed by IPA, HF for ceramic fork assembly

Vacuum Chamber Products:

- (1) FT951 ErgoSCRUB® Handle
- (2) HT4514DC3-1 140 Grit Diamond ScrubDISK®, HT4516DC3-1 160 Grit Diamond ScrubDISK®, HT4518DC3-1 180 Grit Diamond ScrubDISK®, HT4522DC3-1 220 Grit Diamond ScrubDISK®, HT4528DC3-1 280 Grit Diamond ScrubDISK®, and/or HT4536DC3 360 Diamond ScrubDISK®
- (2) HT5790S-25 MiraWIPE® or HT4790-25 UltraSOLV® Wipe
- (1) HT4754 UltraSOLV® Sponge
- (10) HT1701 UltraSOLV® Swab
- (1) HT179018D-1 180 Grit Diamond ScrubTIP®
- (4) HT1700-5 UltraSOLV® Swab
- (1) Container that can hold 1 liter of DI water
- (1) FT900 Soft ErgoSCRUB®
- (1) HT4536D3-1 360 Grit Diamond ScrubPAD

> **NOTE**: Depending on amount of deposition build-up and if the tool has been PM'd in the past, products may vary and/or additional products may be required
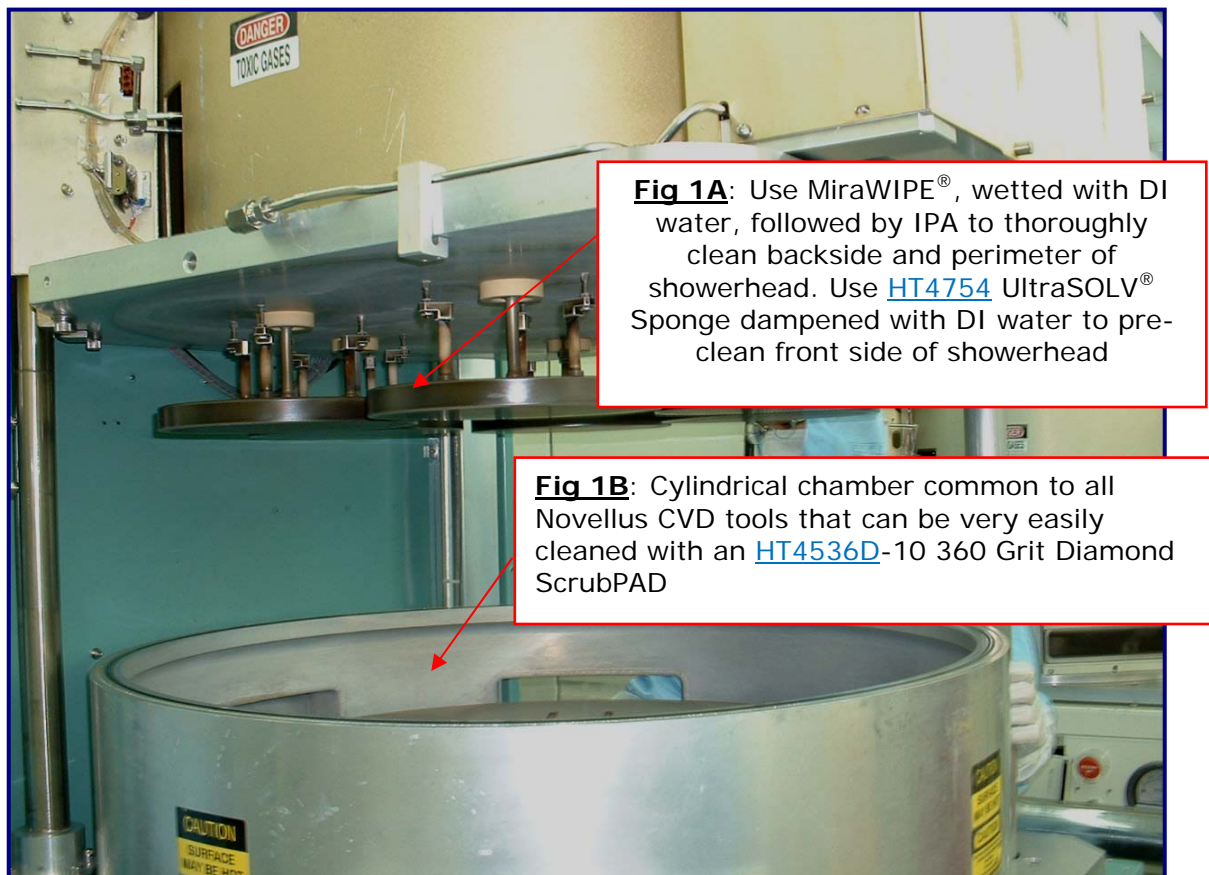
NOVELLUS CONCEPT ONE & TWO PM PROCEDURE:

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

NOTE: If ceramic forks need to be cleaned manually, the use of the HT4528D-10 or HT4536D-10 360 Grit Diamond ScrubPAD is recommended. This pad can also be used to speed up the cleaning of the ceramic fork groove. If the fork grooves will be cleaned manually, an additional 10 pieces of HT5790S wipers will be required

PRE-CLEANING THE TOOL

Step 1:   Use the HT4754 UltraSOLV® Sponge to clean the lightly adhered residue on and around the showerhead, heater block and base of the tool. Immerse sponge into DI water to clear, wring-out to remove excess water (See Fig 1A)

Fig 1A: Use MiraWIPE®, wetted with DI water, followed by IPA to thoroughly clean backside and perimeter of showerhead. Use HT4754 UltraSOLV® Sponge dampened with DI water to pre-clean front side of showerhead

Fig 1B: Cylindrical chamber common to all Novellus CVD tools that can be very easily cleaned with an HT4536D-10 360 Grit Diamond ScrubPAD

(Fig 1 Novellus Concept I Chamber: Oxide or Nitride Films)

NOVELLUS CONCEPT ONE & TWO PM PROCEDURE (CONT'D):

SCRUBBING THE TOOL

Step 2: If the heater block will be scrubbed with DI water, pre-clean the entire heater block with the rinsed HT4754 UltraSOLV® Sponge

If the heater block will be scrubbed dry, assemble the appropriate ScrubDISK® and ErgoSCRUB® handle and proceed to scrub the heater block. Use a back and forth motion from the perimeter to the center of the block or a circular motion. To remove build-up from the ScrubDISK®, use the lightly dampened UltraSOLV® Sponge or HT4790 UltraSOLV® Wiper **(do not use the HT5790S MiraWIPE® Wiper for this)** and wipe the face of the ScrubDISK® in one direction (See Fig 2, 3 & 4)

Fig 2: ScrubDISK® loaded with deposition

Fig 3: Pull & twist ScrubDISK® across UltraSOLV® Sponge
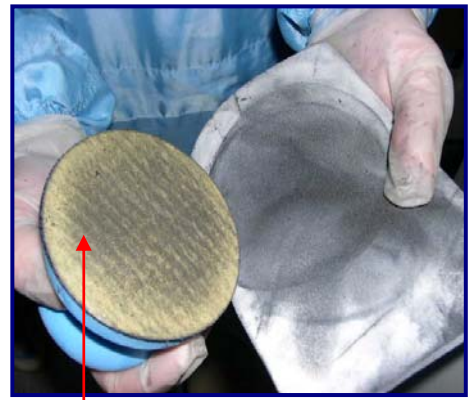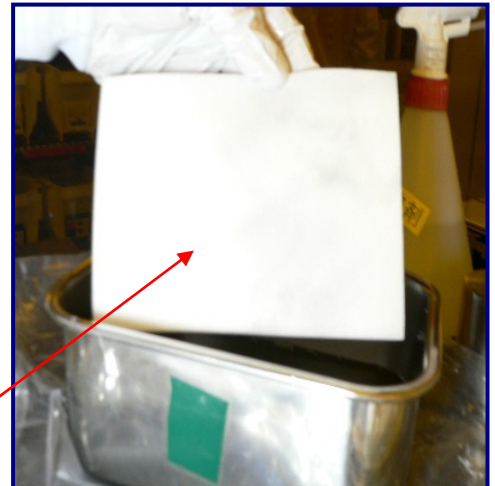
Fig 4: Unloaded ScrubDISK®

As UltraSOLV® Sponge becomes loaded with deposition, rinse in container of DI water (See Fig 5 & 6)

Fig 5: UltraSOLV® Sponge loaded with deposition

Fig 6: UltraSOLV® Sponge free of deposition after rinse in DI water

NOVELLUS CONCEPT ONE & TWO PM PROCEDURE (CONT'D):

Each time a section of the block has been scrubbed, thoroughly clean the section with the dampened HT4754 sponge. For best results, it is suggested to clean each section several times with the rinsed sponge

Repeat step 2 until the heater block is clean

NOTE: The hardness of the build-up will determine which grit (140 – 280) Grit Diamond ScrubDISK® is selected. It is recommended to start with the 280 Grit ScrubDISK® and move down until the residue is easily removed from the block, using the lightest, more uniform scrubbing motion possible (See Fig 1B)

SCRUBBING THE FORK GROOVES

Step 3: To clean the fork groove, run the HT179018D ScrubTIP® up and down the fork groove until the entire residue is removed. This can be accomplished dry or wet, but in either case it will be necessary to clean the residue off the ScrubTIP® with the HT4754 UltraSOLV® Sponge or with an UltraSOLV® Wiper. If the build-up in the groove is very hard, fold it over and shape it to the groove. Run it up and down the groove using the HT179018D ScrubTIP® as a handle (See Fig 8A)

To pre-clean the fork grooves after scrubbing, use the edge of the HT4754 UltraSOLV® Sponge to clean the groove with DI water

IMPORTANT NOTE

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

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 7a & 7b)

Fig 7a: Current fab wiper after completely wiping the novellus

Fig 7b: 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 ONE & TWO PM PROCEDURE (CONT'D):

Step 4: To finish cleaning the heater block and fork grooves, use IPA with HT5790S MiraWIPE® Wipers backed up by the HT1700 Swab to completely clean loose particles out of all the grooves. For better results, alternate back and forth between the wiper and the swab. Repeat until no visible residue transfers to the wiper or swab (See Fig 8B)

Once the grooves are clean; use IPA on one of the wipers (HT4790 or HT5790S) to clean the block. Clean one section at a time and repeat until no visible residue transfers to the wiper

For customers with heater blocks that have ports built into the side of the block, the HT1701 UltraSOLV® Swab wetted with IPA can clean the inside of the port

Fig 8C: A folded ScrubDISK® and a HT179028D ScrubTIP® can clean the fork grooves and wide throat areas free of deposition. A sponge and MiraWIPE® wrapped around the swab can finish the job

Fig 8A: ErgoSCRUB® and a 140/180/220 or 280 Grit Diamond ScrubDISK® can clean the heater block in about 45 minutes

Fig 8B: After scrubbing, use an HT1700 and HT1701 wrapped with MiraWIPE® to thoroughly clean the fork groove and recessed center portion of the heater block in order to remove contamination generated by surface abrasion, created during the movement of the spindle assembly against the block

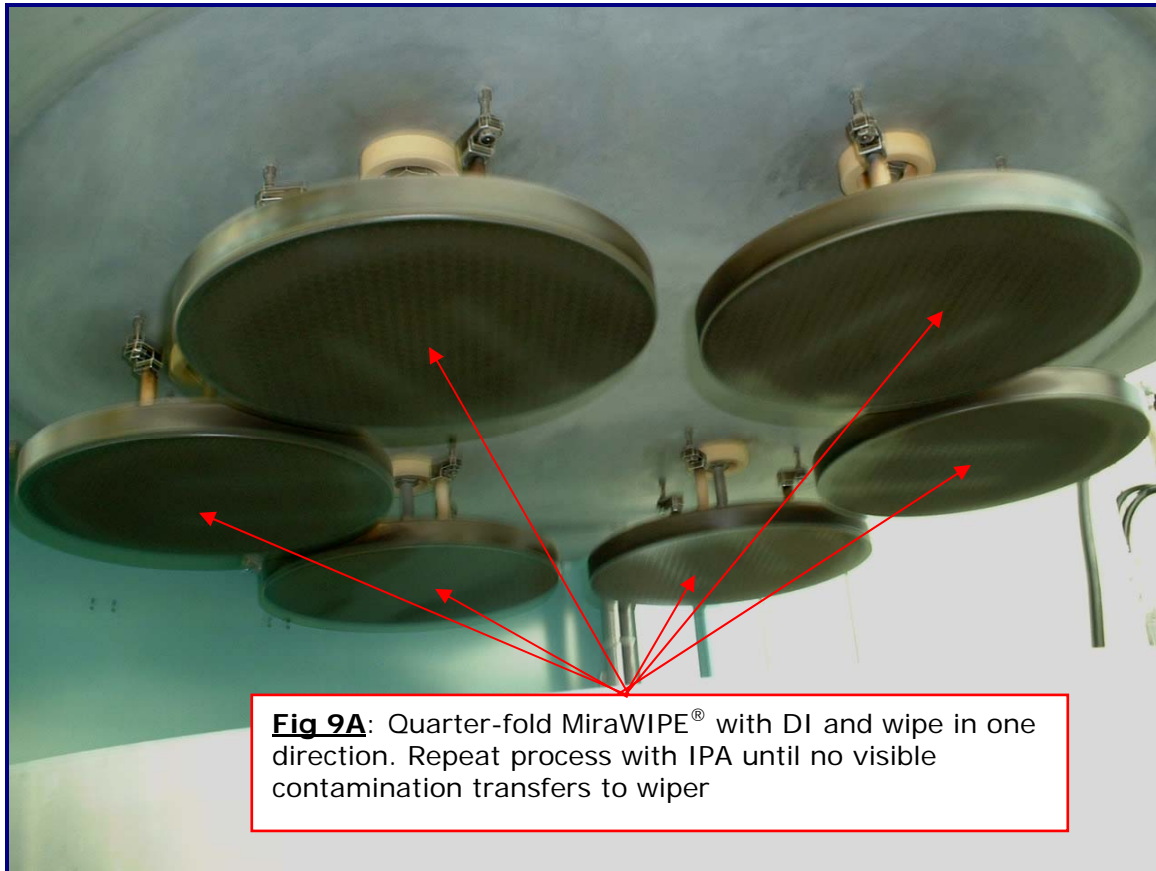**Fig 8D**: The HT4536D-10 ScrubPAD can easily clean off the deposition on the ceramic fork
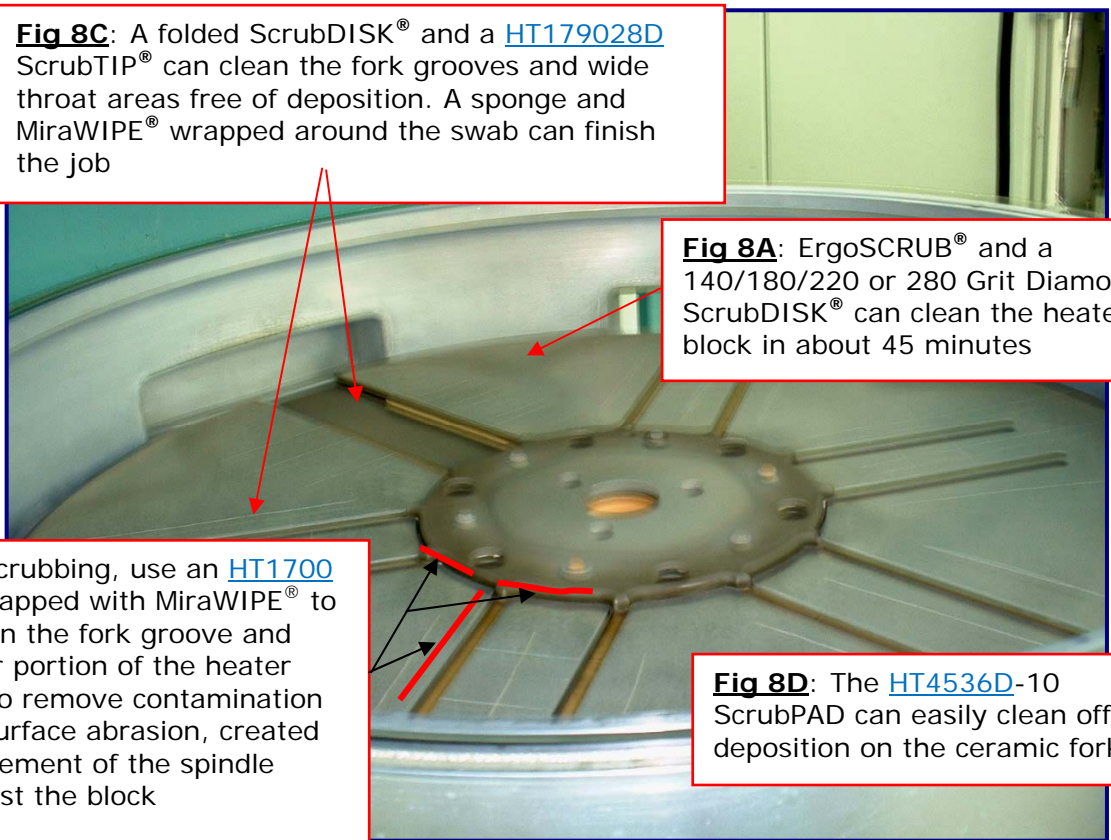
Step 5: The fork assembly can be cleaned with an HT4536D-10 or a HT4528D-10 ScrubPAD, depending on process residue. Choose the ScrubPAD that removes the residue with the lightest scrubbing action. The fork assembly should be cleaned wet. Pre-clean the assembly with the HT4754 sponge wetted with DI water. Final Clean it with an HT5790S wiper wetted with IPA (See Fig 8D)

Repeat until no visible residue transfers to the wiper

NOVELLUS CONCEPT ONE & TWO PM PROCEDURE (CONT'D):

Step 6:   After heater block has been cleaned, precede to final clean the shower heads following the procedure outlined in picture (See Fig 9A)

Fig 9A: Quarter-fold MiraWIPE® with DI and wipe in one direction. Repeat process with IPA until no visible contamination transfers to wiper

(Fig 9 Concept I Shower Head)

Step 7:   Finish the PM by thoroughly cleaning areas under the heater block as particles generated by scrubbing the block may have deposited on the base

NOTE: For users that need to clean the showerheads while hot, the risk of melting wipers to the showerhead can be reduced as follows:

Use a fresh UltraSOLV® HT4754 Sponge and fully saturate with DI water. Squeeze it so that is it 50% saturated. Wrap three to four damp sheets of HT5790S MiraWIPE® Wipers around the sponge so that only the face of the wipers will make contact with the showerhead. Wipe the showerhead in one direction

Step 8:   Use the HT4536D-10 Diamond ScrubPAD to clean the chamber barrel. If the deposition is very heavy, an FT900 ErgoScrub® handle and an HT4536DC3-1 ScrubDISK® will speed up the scrubbing procedure. The chamber should be final cleaned with DI water dampened HT5790S followed by an IPA dampened HT5790S