CMP Operating Instructions

General Checklist for CMP Operation

1) Log into CAC
2) Mix slurry for your process (if necessary)
3) Check pad condition and change if necessary.
4) Check the carrier head extension for your wafers and adjust if necessary.
5) Verify backing film is ok.
6) Load carrier head and ready load station.
7) Setup slurry for your process.
8) Polish wafers. Do not let pad dry out during polishing. If tool is to be left idle for more than 10-15 minutes, put the tool into a wet idle state.
9) Remove and clean carrier head.
10) Clean up slurry tubing and buckets.
11) Leave tool in wet idle state.
12) Record pad changes, slurry used, and materials polished on logsheet. **Enter all pad and slurry charges in the ‘Other charges’ field when you log out of CAC.**
Measuring the Wafer Extension

1. Lay the carrier head on the carrier work table
2. Place a test wafer of the same thickness as your wafers to polish on the carrier head in the pocket.
3. Place the base of the digital depth gauge on the wafer and zero it with the plunger on the wafer surface.
4. Move the depth gauge so that the plunger rests on the retaining ring and measure the extension at the locations of the three jack screws.
5. Values should be approximately 1/3 of the wafer thickness and vary by no more than ± 2 mil (0.0020").
6. Remember to turn off and store the depth gauge when not in use.

Adding or removing shims

1. Using the power screwdriver, remove the screws holding the white clamp ring.
2. Remove the clamp ring, retaining ring, and any shims found. Gently wipe them down with Betawipes until clean taking care not to damage the shims. Keep track of the retaining ring such that it is put back on in the same orientation.
3. Add or remove shims based on the change in extension you want. There should not be more than five shims under the retaining ring. If you need to make more of a change than that, adjust the height using the jack screws.
4. Place the retaining ring and clamp ring back on the carrier head.
5. Tighten the screws using the power screwdriver set on 3 until the power screwdriver clicks. Tighten the screws in the following star pattern:
6. Measure the wafer extension to confirm the correct value.

Adjusting the Jack Screws

1. Remove the rubber ring from around the carrier head and clean it with Betawipes.
2. Place the carrier head on the carrier work table and gently lock it in place by turning the locking pin into the gimbal pin.
3. You can now rotate the carrier head on its gimbal and lock it in place by wedging the small piece of tygon tubing in between the gimbal rings.
4. Face the carrier head with the jack screws up and using the allen wrench, loosen the three bolts holding the backing plate in.
5. Using the ½” crescent wrench to keep the jack screws from turning, loosen the lock nuts using the 7/8 wrench.
6. Turn the jack screws the amount required to change the extension. Each turn of the jack screw corresponds to 25 mils. The handle with the arrow on it may be used to help keep track of the number of turns.
7. Using the ½” wrench to keep the jack screw from turning, just tighten the lock nut enough to keep the jack screw from moving easily. Also snug the backing plate mounting bolts using the allen wrench.
8. Rotate the carrier head over and measure the extension of the wafer. If slight adjustments need to be made, you can leave the depth gauge on the carrier head and turn the screws under the carrier head until the gauge reads the correct level. Do not allow the locking nut or mounting bolt to overtighten while doing this. If the jack screw will not easily move then check the lock nut and the mounting bolt to make certain they are not too tight.

9. Once the jack screws are all set correctly, tighten the lock nuts with the torque wrench set at 120 in-lbs. Tighten the mounting bolts to with a setting of 60 in-lbs. **Return the torque wrench back to its lowest setting before putting it back in its case.**

10. Measure the extension to confirm that it is at the correct amount.

**Replacing the backing film**

1. Locate the replacement film before removing the backing film already on the carrier head.

2. Remove the carrier clamp ring and retaining ring following the instructions under changing shims.

3. Gently peel back the edge of the backing film and remove it from the backing plate. Do not use any sharp objects to scrap the backing plate as this will damage the precision flat surface.

4. Gently clean the surface of the backing plate using water and IPA. Make certain to remove all adhesive residue.

5. Put the locator pins into the two holes in the backing plate. Check to make certain no water or IPA comes out when you do this.

6. Align the backing film with the locator pins to that all of the vacuum holes will line up. There is only one correct way to put the film on but two ways to line up the locator pins.

7. With the locator pin holes at top and bottom, peel back the adhesive covering from the side to expose only half of the adhesive.

8. Push the film over the locator pins and checking alignment, tack down the center of the film. Remove the locator pins.

9. Gently smooth out the film from the center outward being careful not to get any wrinkles or bubbles under the film.

10. Follow the procedure to replace the retaining ring and measure the wafer extension.

**Loading the carrier head**

1. Bring the polish arm over the load station.

2. Using the manual mode, rotate the spindle until one of the bolt holes is next to the slurry dispense tube.

3. Connect the vacuum tube to the elbow on the carrier head.

4. Carefully line up the four holes on the spindle to the holes in the carrier head, checking that the vacuum line will not be pinched in the process.

5. Screw in 3 of the mounting screws to just snug. Do not overtighten!

6. Close the door and use the manual mode to rotate the spindle until the fourth mounting hole is in front. Screw in the last mounting screw.
Preparing the load station
1. Check to see if you need to change the wafer lift pin. If so, remove the 3 holding screws being careful not to drop them into the drain.
2. Unscrew the lift pin from the vacuum line and screw in the other lift pin. Insert the spring into the base of the new lift pin and fasten it into place with the three screws.
3. Check to make certain that the lift pin has some ability to rock back and forth.
4. Carefully wipe down the white load ring and the load station to remove any slurry residues.
5. Insert the load ring, flat side up, and press down until it seats in the load station.

Applying a new pad
1. Locate a new pad of the type you want before removing the old one.
2. Move the polish arm over the load station and open the side access panel on the tool.
3. Find an edge you can begin to peel back the pad with and pull it off of the platen. Try not to leave any adhesive residue on the platen.
4. Gently clean the platen with water and IPA to remove any slurry or adhesive residue. Allow the platen to fully dry.
5. Peel back the adhesive covering on one edge of the polishing pad and lining it up on the platen, tack it down. While using one hand under the polishing pad to slowly pull back the adhesive covering, move the pad smoother back and forth across the top of the pad to attach it to the platen. Make certain that the pad is completely attached to the platen.
6. Note the pad change on the CMP logbook and fill out the appropriate pad charge.

Slurry Setup
To use SS12 slurry follow the instructions below. For all other slurries, skip to the next section.
1. Wipe down the top of the slurry container around the opening to remove any dried up slurry.
2. Open the container of slurry, be careful not to let dried up slurry particles fall into the container.
3. Put the tube labeled “Oxide Slurry” into the slurry container.
4. From the manual mode, run slurry pump #1 until slurry is coming out of the tube.

For slurries besides SS12:
1. Locate the tubing for the slurry you wish to use.
2. Determine from the slurry information sheet if the slurry is ready to use or needs to be mixed or diluted first. If the slurry needs to be mixed, follow the process manual instructions for mixing it before proceeding.
3. Open the side panel of the polisher to access the slurry pumps.
4. Thread the output end (short side) of the slurry tubing through the tie-ups along the polishing arm. Position the end of the slurry tube at the end of metal dispense tube on the polishing arm. Make certain that the slurry tube will not interfere with the polishing arm or conditioning arm motion.
5. Open the Quickload pump head and thread the pump tubing through the pump head. Close the pump head making sure that all of the tubing is within it and it is loaded in the correct direction.
6. Run the rest of the slurry tubing out the back of the tool and into the slurry container you are using.
7. From the manual mode, run the slurry pump until the line is full of slurry.

Polishing Wafers
1. Ensure that the correct size carrier head & load ring are installed and that the carrier head has been setup for your thickness substrates.
2. Determine which recipe to use and verify the recipe settings.
3. Rinse both sides of the wafer with DI water and place your wafer onto the load station polish side down. It does not matter if the load fingers are in the up position.
5. The polisher should load the wafer, polish it, and then return the wafer the load station. Wait until the load fingers lift the wafer up before opening the doors.
6. Rinse the slurry off of the load station and wafer. Keep the load station well rinsed with water in between the polish steps to prevent the slurry from binding it up. Remove the wafer and then close the door again.
7. The polish arm will now come over the load station to perform a spindle flush. If you are running with ex-situ conditioning, the tool will perform the conditioning after the spindle flush.
8. Problems with loading the wafer can usually be fixed by:
   a. Allow the vacuum level to reach full vacuum prior to pressing start
   b. Spraying water on the back of the wafer and rinsing the backing film off
   c. Verify the vacuum hose is not kinked inside the carrier head
Cleaning up

Clearing the slurry tubing
1. Run water through the slurry tubing until it runs clear and then run it dry until it is empty.
2. Close the slurry containers and store them in the appropriate cabinets.
3. If you mixed slurry up for this work:
   a. Dispose of the mixed slurry according to the process sheet.
   b. Clean and rinse out the mixing containers
   c. Remove and clean the stirrer, storing it in the appropriate location.

Removing the Carrier Head
1. Remove one of the screws holding the head to the polish arm.
2. Close the door and using the manual mode, rotate the spindle until that screw is under the polish arm.
3. Holding one hand under the carrier to keep it from falling, remove the remaining screws.
4. Carefully loosen the carrier head from the polish arm, being careful not to drop it on the load station. Disconnect the vacuum hose from the carrier head and remove the carrier head.
5. Thoroughly rinse the slurry off of the carrier head and store it under water.

Leave the tool in ‘Wet Idle’
Clean up the work area.