Chemical-Mechanical Polishing
Strasbaugh 6EC CMP

ID: bkside-1
Location: FabLab, Subfab

The Strasbaugh 6EC Chemical Mechanical Polisher (CMP) is used to remove thin layers of SiO2 on silicon wafers for planarization of devices and circuits. It is located in the subfab and is only available to users approved by and trained by FabLab staff.
Operating Procedure

1. Precautions
   a. Always remove **LOOSE WAFERS** and obstructions before beginning machine operation.
   b. **DO NOT** at any time put hands or objects beyond the operator doors while the machine is in motion.
   c. **DO NOT** wear loose clothing which may be caught by machine parts in motion.
   d. Wear **SAFETY GLASSES** whenever working near moving machinery.
   e. Wear **SAFETY GLASSES** and **GLOVES** when working with slurries.
   f. Operators **MAY NOT** open or unlatch any control and electrical cabinet doors.
   g. Operators **MAY NOT** override interlocks or safety devices under any circumstances.

2. Components
RO Water System Control Panel

- Water Conductivity
- Power Switch
- Operate Switch

Vacuum Unit
- Emergency Stop/Off Pushbutton
- Power ON Lamp
- Power ON Pushbutton
- Slurry Agitating Pump
- Slurry Reservoir

ViPRR Wafer Carrier
- Spring Loaded Latches
- Carrier Clamp (1 of 2)

ViPRR Wafer Carrier
- Wafer Carrier Container
3. **Commonly Used Graphical User Interface (GUI) Screens**

   a. Operators can navigate between the GUI screens by touching the pull-down menu located at the top right corner of each screen and touching the desired screen name on the menu.
4. **Start-up**

a. Water system
   i. Make sure that the **Power Switch** on the RO water system control panel is in **ON** position.
   ii. Switch the **Operate Switch** on the RO water system control panel from **Automatic** to **OFF** and then **Manual**.
   iii. The water conductivity should drop below 1 µS within a few minutes.

b. Vacuum pump
   i. Make sure that the **Power ON Lamp** on the vacuum unit control panel is lit.
   ii. Depress the **Power ON Pushbutton** on the vacuum unit control panel (you might first need to release the **Emergency Stop/OFF Pushbutton** on the vacuum unit control panel by rotating it clockwise).

c. 6EC machine
   i. Open operator door 3.
   ii. Remove the lid and the plastic sheet from the polish table.
   iii. Close operator door 3.
   iv. Make sure that the **Power ON Lamp** on the front control panel is lit.
   v. Depress the **Power ON Pushbutton** on the front control panel (you might first need to release the **Emergency Stop/OFF Pushbutton** on the front control panel by rotating it clockwise).

d. Log on to the GUI
   i. After the computer starts up and login screen appears, touch the white data entry box in front of **User Name** to display the alphanumeric keyboard.
   ii. Enter your user name and touch **Enter**.
   iii. Enter your password similarly and touch **Log On**.

e. Initialization
   i. Open **Setup** screen.
   ii. In the setup screen, check **Pad Conditioner Enabled** box by touching inside the box.
   iii. Touch **Home Pad Conditioner**. The pad conditioner arm moves and returns to its home position.

5. **Loading ViPPR Wafer Carrier** (To ensure safety, perform EXACTLY the following)

a. Make sure no wafer is present on the load/unload station.

b. Make sure the vacuum pump is running.

c. Open **Manual** screen.

d. Touch **Position** icon in the **Overarm** section of the manual screen to move the polish overarm away from the load/unload station.

e. Open operator doors 1&2.

f. Place the ViPPR wafer carrier on the load/unload station so that it is centered and seated in the load ring.

g. Close operator doors 1&2.

h. Position the polish overarm above the load/unload station by touching **Position** icon.

i. Touch the polish overarm **Up/Down** icon in the **Overarm** section of the manual screen to move the polish overarm down onto the carrier.

j. Open **Setup** screen.

k. In the setup screen, uncheck **ViPPR Retaining Ring** box by touching inside the box. This enables the vacuum at the back of the carrier to hold it.

l. Open operator doors 1&2. The polish overarm moves up with the carrier.
m. Make sure that the carrier is held securely.

n. Engage the two Spring-Loaded Latches mounted 180 degrees apart on the carrier by pressing down the lever on each latch.

o. Install the two Carrier Clamps 180 degrees apart from each other and 90 degrees apart from the latches on the carrier using two 1/4-20 socket head cap screws and a 3/16” hex key.


q. Open Manual screen.
r. Move the polish overarm and the carrier down onto the load/unload station.
s. Open Setup screen.
t. In the setup screen, check ViPPR Retaining Ring box and confirm after the warning message appears.
u. Open operator doors 1&2, and make sure that the carrier is secure.
v. Close operator doors 1&2.
w. Open Manual screen.
x. Position the polish overarm and the carrier above the polish table.

6. Selecting/Defining Polish Recipe

a. Open Recipe screen.
b. To select and download a predefined recipe, touch Recipe Name pull-down menu, then touch the desired recipe from the menu.
c. To define a new recipe or edit an existing recipe, enter parameters in each tab in the recipe screen, then save the recipe by touching SAVE As … button.
d. To enter each parameter, touch the white box next to the parameter and enter the value using the opened numeric keypad.

7. Polishing Wafer

a. Make sure that a polish recipe has been downloaded.
b. Open AUTO screen.
c. (If necessary) touch Start Break-in button and wait until the break-in cycle is finished. To stop the cycle, touch Stop button.
d. (If necessary) touch Start Conditioning button and wait until the conditioning cycle is finished. To stop the cycle, touch Stop button.
e. Open operator doors 1&2.
f. Manually load the wafer on the load/unload station with the side to be polished facing down.
g. Close operator doors 1&2.
h. Touch Start Polishing button. The polish overarm loads the wafer onto the carrier at the load/unload station.
i. After the polish overarm loads the wafer and before it finishes the upward motion, open operator doors 1&2. Check whether the wafer sits properly on the chuck.
j. Close operator doors 1&2 and confirm to resume the polishing cycle.
k. Wait until the polishing cycle is finished and the wafer is unloaded at the load/unload station and the polish overarm returns to the polish table. To stop the cycle, touch Stop button.
l. If the flush chuck after polishing option is enabled, the GUI will prompt for confirmation of flush chuck. Open operator doors 1&2 at this point and unload the wafer.
m. Close operator doors 1&2.
n. Confirm the flush chuck. The polish overarm moves to the load/unload station and the chuck is flushed with water.
8. Cleaning

a. Wafer carrier (perform before unloading the carrier)
   i. Open Manual screen.
   ii. Touch Options icon. Chuck options window opens.
   iii. Touch Back Flush icon in the window. Let the water run for 1 minute.
   iv. Touch Options icon.
   v. Touch Blow Off icon. The water flow stops and air blows off the carrier. Let it run for 1 minute.

b. Slurry lines (perform before shutdown)
   i. Disconnect the used slurry line from the slurry reservoir and place the end of the slurry line in a container with enough clean water.
   ii. Open Manual screen.
   iii. Touch Slurry 1 or Slurry 2 icon. The slurry line will be flushed with water. Let it run for a while until the line is clean.
   iv. Touch the icon again to stop the water flow.
   v. Reconnect the slurry line to the slurry reservoir.
   vi. Repeat this procedure for any used slurry line.

c. Polish table (perform after unloading the carrier)
   i. Open operator door 3.
   ii. Rinse the polish table with water using the manual gun for 5 minutes. Any slurry residue or wafer piece MUST be washed off the table.
   iii. Cover the polish table with the plastic sheet and the lid.
   iv. Close operator door 3.

d. Load/unload station (perform after unloading the carrier)
   i. Open operator doors 1&2.
   ii. Rinse the load/unload station with water using the manual gun for 5 minutes. Any slurry residue or wafer piece MUST be washed off the station.
   iii. Close operator doors 1&2.

9. Unloading ViPPR Wafer Carrier (To ensure safety, perform EXACTLY the following)

a. Make sure the cleaning procedure for the carrier has been performed before unloading the carrier.
b. Make sure no wafer is present on the load/unload station.
c. Make sure the vacuum pump is running.
d. Open Manual screen.
e. Position the polish overarm above the load/unload station.
f. Open Setup screen.
g. In the setup screen, uncheck ViPPR Retaining Ring box.
h. Open operator doors 1&2.
i. Remove the two Carrier Clamps from the carrier using a 3/16” hex key.
j. Disengage the two Spring-Loaded Latches by pulling the levers out and up.
k. Close operator doors 1&2.
l. Open Manual screen.
m. Move the polish overarm and the carrier down onto the load/unload station.
n. Open Setup screen.
o. In the setup screen, check ViPPR Retaining Ring box and confirm after the warning message appears. This disables the vacuum at the back of the carrier.
p. Open operator doors 1&2. The polish overarm moves up and separates from the carrier.
q. Open **Manual** screen.

r. Position the polish overarm away from the load/unload station.

s. Open operator doors 1&2.

t. Remove the carrier from the load/unload station and place it inside the wafer carrier container with about 1” of water.

u. Close operator doors 1&2.

v. Open **Manual** screen.

w. Position the polish overarm above the load/unload station.

10. **Shut-down**

   a. GUI  
      i. In any GUI screen, touch the pull-down menu.  
      ii. Touch **EXIT** and confirm.  
      iii. Shut down Windows NT from the start menu.  

   b. 6EC machine  
      i. Depress the **Emergency Stop/OFF Pushbutton** on the front control panel.

   c. Vacuum pump  
      i. Depress the **Emergency Stop/OFF Pushbutton** on the vacuum unit control panel.

   d. Water system  
      i. Switch the **Operate Switch** on the RO water system control panel from **Manual** to **OFF** and then **Automatic**.

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