Beginning Your Session

Usually, the system remains on (with the electron column source on) but with the ion column LMIS (Liquid Metal Ion Source) off.

HV (high voltage) is typically off for both columns, but the mechanical HIGH TENSION button on the console is typically left on.

Follow the steps below when beginning the first work session of the day. Throughout the day, the system stays on from session to session

To begin your session:

1. Go to the Startup page.
2. If a sample is not already in the sample chamber, insert one according to the sample exchange directions for your system type.
3. **Loading a Sample**
4. To insert a sample, select the Loadlock group buttons or use the UNLOAD and LOAD buttons on the loadlock itself.
5. **To load a sample:**

   If the TO STAGE LED is illuminated, clicks UNLOAD to free the loadlock mechanism and prepare it for inserting the sample.

   The TO LOCK LED flashes during the transfer to the loadlock chamber and then becomes steady once the holder finishes moving into the loadlock chamber.

   When the TO LOCK LED becomes steady, the loadlock door opens automatically. If it should not open, check if the Nitrogen valve is open (**should be open only for opening the load lock**).
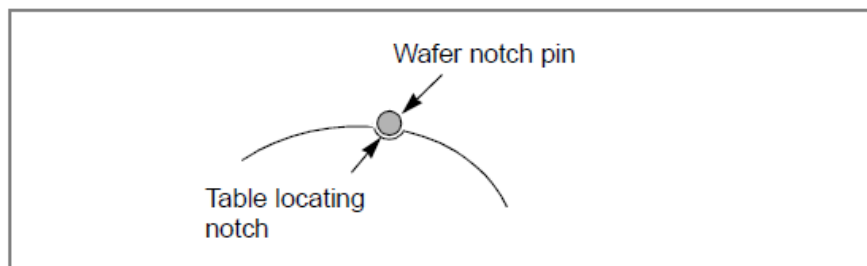
   Remove the sample holder and load the new sample onto it.

   Place the wafer on the wafer holder into the loadlock.

   The wafer holders have two table locating notches along their edges.

   The notches must fit against the wafer notch pins within the loadlock assembly.

Figure 4-3   Wafer Holder Notches

   If the notches and wafer notch pins are not properly aligned, the sample exchange will not work and an error message appears onscreen.

   Press LOAD on the loadlock. The TO STAGE LED flashes during the transfer to the stage and then becomes steady once the holder is on the stage completely. (**Shut Nitrogen valve, if open**)

   Wait about 2 minutes for the
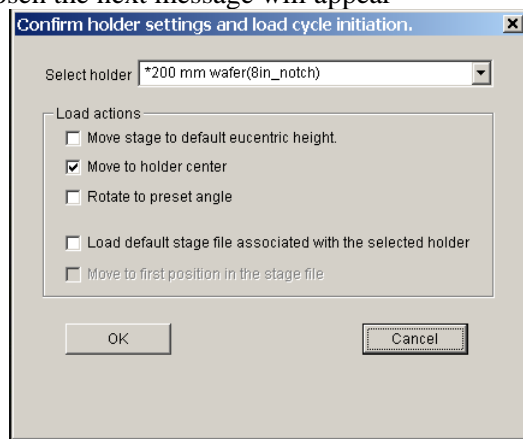
   > Loadlock to pump
   > Sample to transfer to the stage
   > Loadlock arm to return to the loadlock
   > Loadlock-to-sample chamber door to close
   > Allow the loadlock cycle to finish completely before performing other operations.

6. According to the wafer holder chosen the next message will appear

7. Mark 'move to holder center', then press OK

8. Only if needed Click BEAMS ON as a shortcut to turn on both the ion column source and HV along with the electron column HV. **Do NOT turn on Ion Column if you are only performing SEM, turn on only E-column HV as shown below.**
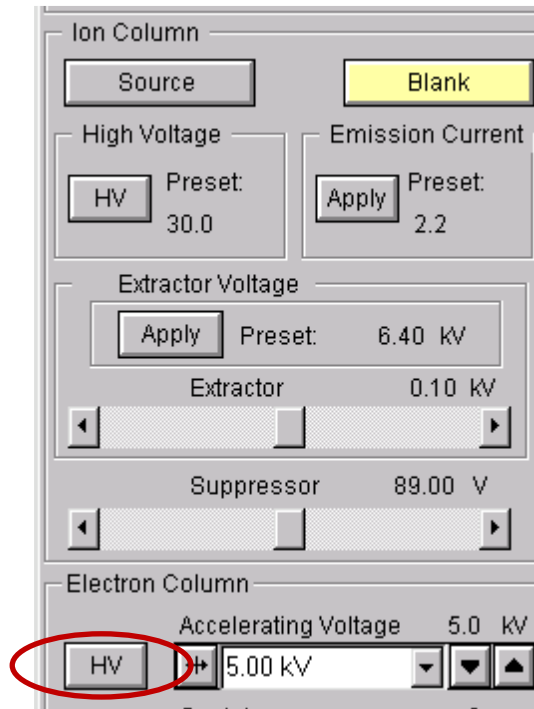

9. If you prefer, you can turn the beams on separately by clicking HV in the Electron Column group, and clicking SOURCE and HV in the Ion Column group. The buttons turns yellow.

10. Choose the primary beam from the menu or toolbar. (It will be the beam used for imaging in the current image window.)

11. Click START SCANNING to begin the imaging process.

12. **Choosing Working Distance** - Focus on the surface of your sample, then press the Z=FWD , a message will appear on the screen presenting the current working distance, press OK. Change the z height to 5.
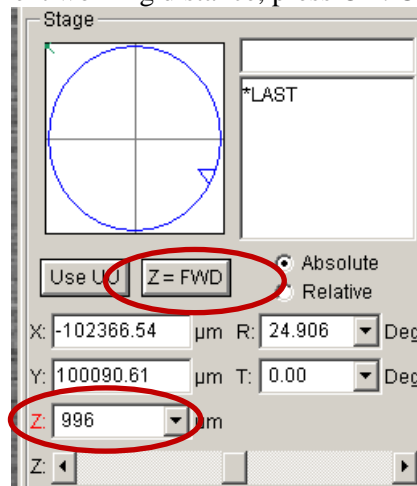
Saving a picture

13. Saving pictures- before saving a picture press ctrl + 'camera icon'
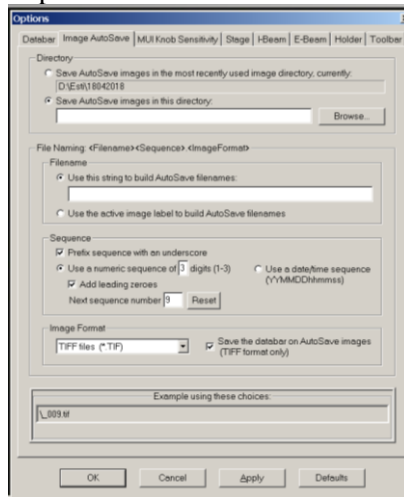
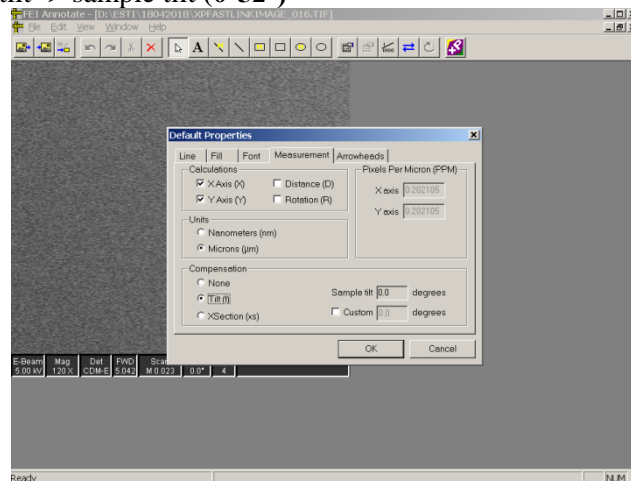**14.** Select browse and choose your directory, enter a file name, press reset and OK.

Annotate

15. To measure tilted sample uses Annotate

16. Press on the Annotate icon

17. Press ok

18. Properties-> measurments-> tilt -> sample tilt **(0-52◦)**
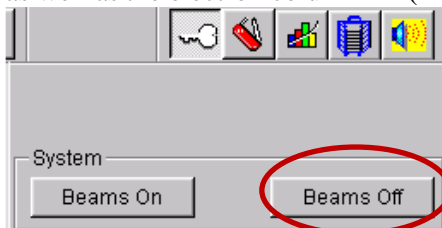

19. Saving a picture: picture-> export

Ending Your Session

When you have finished your session:

1. If the system will not be used any more that day, click BEAMS OFF to turn off both the ion column SOURCE and HV as well as the electron column HV. (The buttons should turn gray.)

2. Make sure the tilt is zero

3. Press Stage->Zero beam shift

4. Turn off OM lights

5. Unload your sample

6. Remove the sample.

7. Log out

FIB

Only for FIB Qualified (not for SEM qualified)

1. **If the source does not start automatically**, make adjustments to the suppressor and extractor voltages manually by following this sequence:

• Increase the SUPPRESSOR adjuster 200 volts.

• Use the EXTRACTOR adjuster to slowly increase the voltage while monitoring the emission current (µA) that appears in the Status area. Emission current should increase from 0 to a value > 2 µA. **Above this value you should decrease the extractor**.

• When the emission current is set (2.2), gradually reduce the extractor voltage to the preset value (9.5) . Your column is optimized for this voltage.

• You may need to adjust the suppressor voltage again to keep emission current at the optimum preset.

2. **If the source emission current does not reach the preset value during startup**, the following dialog box appears.
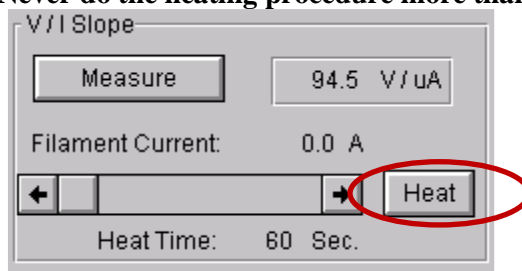
Click OK.
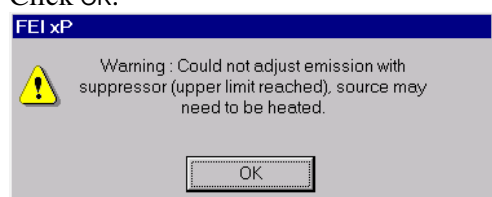
Click OK.

3. **If the source needs to be heated**, you will need to access the Supervisor page. Select File > Supervisor Login and upgrade to Supervisor.

**Never do the heating procedure more than twice**

4. Monitor the emission current (µA) that appears in the Status area, if a sigh of '****' appear stop the heat.

5. Return to User level by selecting File > Supervisor Logout and repeat *Step 1*.
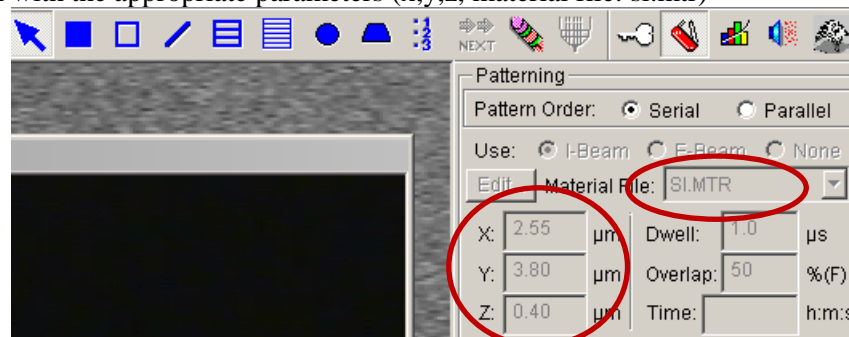
Cross section

a. Electron control- focus on a dot in the surface.
b. Tilt the sample in steps of ~10 till 52 degrees (**absolute**), after each step reurn the cross to the spot using the z bar (loacated under the z height)
c. Stop the live view
d. Heat the Pt
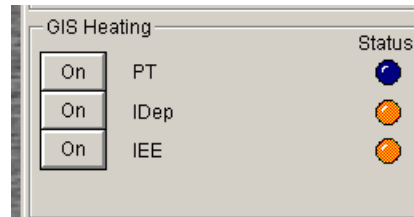
e. After the PT is hot, insert the GIS (PT – in)
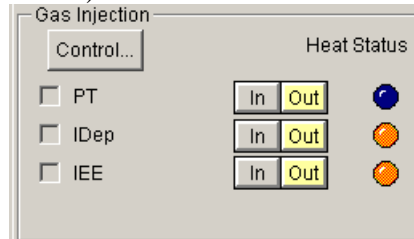
f. Turn to ion control and focus on the surface with the lowest possible ion current (high ion current will damage the surface)
g. draw filled box with the appropriate parameters (x,y,z, material file: pt_via.mtr)
h. Press Start patterning
i. Check the Pt coating using electron mode
j. delete all of the drawing
k. Stop the live view
l. Turn to ion control and focus on the surface with the lowest possible ion current (high ion current will damage the surface)
m. draw cross section with the appropriate parameters (x,y,z, material file: si.mtr)

n. Press run
o. Check the cross section using electron control
p. delete all of the drawing
q. do the same steps (k-p) but now use cleaning cross section, and draw it on the interface of the etch-not etched.
r. Turn off and exit the GIS

Loadlock

The loadlock allows sample exchanges without venting and evacuating the entire sample chamber. The sample and holder must be oriented correctly on the carrier for the loadlock to be lowered. A positioning arm then transports the wafer holder to the stage.

The loadlock, fully protected by safety interlocks, must be raised for insertion of the sample holder. You can raise the loadlock with the LOAD and UNLOAD buttons in two locations:

The Loadlock group on the Startup page

The buttons on the exterior of the loadlock itself
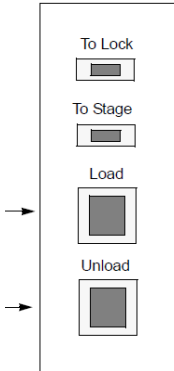
Loadlock LEDs

The loadlock LEDs reflect the status of the loading process.

Table 4-3 Loadlock LED Conditions

| To Lock LED	To Stage LED	Condition
Steady	Off	Sample is in the loadlock or the loadlock is ready for the sample.
Off	Flashing	Sample is moving into the specimen chamber.
Off	Steady	Sample is in the specimen chamber and on the stage.
Flashing	Off	Sample is moving into the loadlock.
Steady	Steady	Loadlock is in an unknown condition. Click UNLOAD.
Flashing	Flashing	Loadlock error detected.

If both LOAD and UNLOAD are illuminated, the loadlock needs to run through at least one unload cycle before it can accept a load command.

Loadlock Status Area Messages

If the loadlock door is closed without a sample holder mounted, the message "Loadlock is parked. No wafer holder detected" appears in the white background of the status area. The background stays white until a sample holder is mounted; then it turns gray.

Multi-Stub Holder Considerations

If the multi-stub holder is selected from the Select Holder combo box, the check boxes for moving the stage to eucentric height and associating the stage file automatically become deselected.
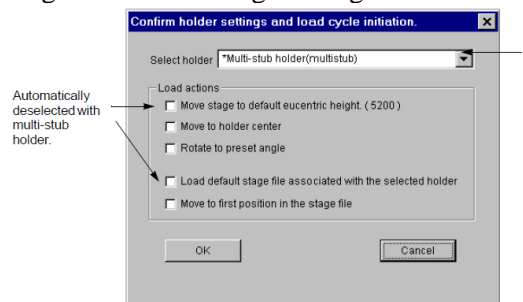
If they remain selected and the sample is very thick, the stage Z default position could be too high and the sample could be damaged during loading.

If you reselect the check boxes after selecting the multi-stub holder, the Confirm Setup dialog box appears:
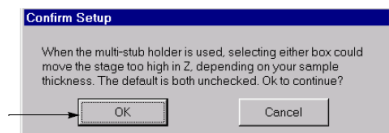
If you click CANCEL, the Confirm Holder Settings and Load Cycle Initiation dialog box reappears to allow you to change the check box settings.

Unloading a Sample

To unload a sample, click UNLOAD on the Startup page or press the hardware UNLOAD button. If already on, the high tension for both beams will automatically ramp down and the sample will be unloaded.
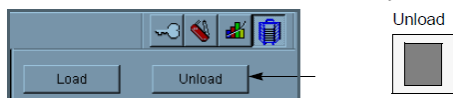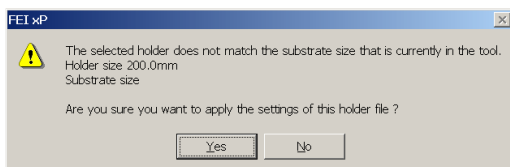

Automatic Sample Holder Selection

As part of the tool setup, your FEI field service engineer defines parameters for each sample holder used in your system. Sample holder definitions can include information on the substrate size and type to be mounted on the sample holder. For example, a sample holder such as "200 mm wafer (8_in notch)" can be explicitly associated with a 200 mm substrate, notch type. This sample holder and substrate type can further be set as the default for any port or combination of ports.

Nonautomated xP Systems

At the beginning of the load cycle, the system detects the size and type of substrate being loaded. It then displays the Confirm Holder Settings and Load Cycle Initiation dialog box, selecting the default holder for the current port. Once you confirm this selection, the load cycle continues.

If you select a sample holder whose definition does not match the detected substrate size, the system displays the following dialog box.

Click YES to use the sample holder selected at the start of the load cycle. Click NO to select a different sample holder.

Defect Analyzer or IC3D Systems

On automated systems such as Defect Analyzer or IC3D, the system does not prompt you to select a sample holder. Instead, the system detects the substrate size and type during the load cycle, then automatically applies the appropriate sample holder.

Automated Wafer Transfer

Wafers are loaded into the loadlock by a robotic arm. The arm lifts a wafer from the FlexiLock, FOUP, SMIF, or cassette, places it on the aligner, where it is centered and notch-aligned, and then transfers it to the vented loadlock. The loadlock is evacuated and the wafer is placed onto the stage. Each step of the process is graphically displayed on the Wafer Handler page, with the current location of the wafer indicated in blue.