

E-Beam (Angstrom Engineering Software)

Before Using this Tool:

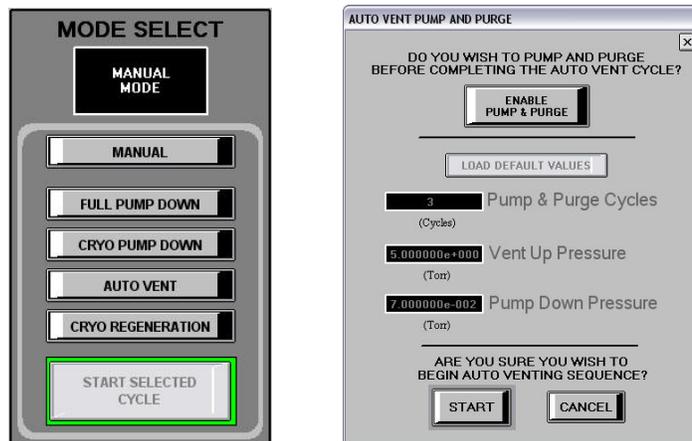
Users must wear gloves and respirator mask before operating.
Note the any chamber pressure change in the logbook.

Danger:

High Voltages. Human contact with any voltages may become fatal. DO NOT test any live circuits unless absolutely necessary.

Operating Angstrom Engineering Software:

1. Make sure that Nitrogen is flowing. Click on the Autovent, on the right hand side of the interface, to vent out the chamber. A new window will open – Click Start.



2. Open the latches of the chamber and wait for the chamber door to open. (The door automatically opens around .077 Torr)
3. Take the discharge rod and touch it with the inside of the chamber.
4. Click on the Source Control and Edit. A new window will open showing all the crucible materials, shutter control, and rotation control.
5. Load the crucible with material to be evaporated in the designated crucible pocket. (Please do not change crucible materials in the first four pockets: 1-4)
6. Take the sample stage out of the chamber and attach to your sample on the stage with clamps.
7. Close the chamber door, and click on the Full Pump Down to create the vacuum inside the chamber. (Initially the roughing pump will take the pressure to .05 Torr and then the cryo-pump valve will open)
8. Wait until the pressure goes down to 10^{-7} Torr (Takes an estimated time of 45 minutes)

9. After reaching the desired pressure, open the window of the SQS 42 Software.

Operating the SQS 42 Software:

1. Click on the Tab “Edit” in the main window and select “Material”
2. Open the edit material window and set the “Density” and “Z-factor” for the material that is going to be deposited.
3. Be sure to save the changes by clicking on the “Close Form” (Top, right corner)
4. Click on the tab “Edit” in the main window and select “Film”
5. In the tab “Source Sensor”, verify the maximum power is 20%.
6. Save the changes by clicking on the “Close Form”. (Save after changing parameters)
7. Click on the tab “Edit” in the main window and select “Process”
8. Select the material that you are going to deposit (There is a list already given)
9. In the parameter “Select Pocket”, make sure that the correct pocket is selected.
10. Parameters “Sweep, User 1, and User 2” should be set to 4 (ALWAYS TRUE)
11. Set the final thickness to 100-kilo angstrom. No matter what would be your final thickness, we will manually control the thickness of the deposited film.

Operating Deposition Control:

Once the system has been pumped down to less than 10^{-6} Torr and controller has been programmed, evaporation may begin.

1. Turn on the “HV Power Supply” (ON)
2. Turn on the “Telemark Sweep Controller” (ON)
3. Turn the key of the “HV Controller” (ON)
4. Press the switch to on of the “HV Controller” (ON)
5. Press “Reset” button on the “HV Box”. Verify that the “Air, Vac, and Aux” LED’s are all ON.
6. Press the ON button (complete name need to be checked)
7. Verify the “Acceleration Voltage”. Set it to -8.19kV and record the value in the logbook.

8. Verify the pocket number on the “Ficon Indexer” is right. (Motion should always be auto)
9. In the main software window of the Angstrom Engineering, click on the tab “Source Detail and Shutter Control” and verify the correct pocket is selected.
10. Close the shutter by clicking on “Sigma-Override”, using the main software.
11. Make sure that the “Rotation” is OFF
12. Ramp up the power using controller software (SQS 42) increasing 0.2% for metals and 0.1% for Silicon Oxide after every 1-2 minutes. Do not ramp up or ramp down the power too quickly --- This may break the crucible by thermal stress.
13. As the “A/s” (Deposition rate) value saturates in the controller software, open the shutter by clicking “Sigma Override” in the main Angstrom Engineering software. At the same time, change the thickness of the deposited material to zero, in the controller software.
14. Keep the “A/s” value constant by keeping the power ramp up and down accordingly.
15. Keep an eye on the thickness of the material deposited.
16. As soon as the desired thickness is deposited, close the shutter again by clicking “Sigma Override” icon in the main Angstrom Engineering software.
17. In the logbook, note down the material along with the thickness deposited.
18. Now start ramping the power down slowly (depending on the substrate material)
19. When the power reaches to zero, click on “Abort Process”
20. If another material is to be deposited, follow the same procedure starting from Step 7 controller setup for deposition.
21. After all the evaporations, turn the key of the “HV Controller” (OFF)
22. Turn off the “Telemark Sweep Controller” (OFF)
23. Press the on switch to off on the “HV Controller” (OFF)
24. Turn the on switch to off on the “HV Power Supply” (OFF)
25. Click on the “Autovent” tab to raise the pressure to atmospheric pressure
26. Open the latches of the chamber. As soon as the pressure is raised to atmospheric pressure, the chamber will automatically open
27. Take the substrate stage from the chamber.

28. Clean the sample holder and the chamber (IF required)
29. Close the latches of the chamber.
30. Create vacuum in the chamber again by clicking on the “Full Pump Down” and then click “Start Selected Cycle”.