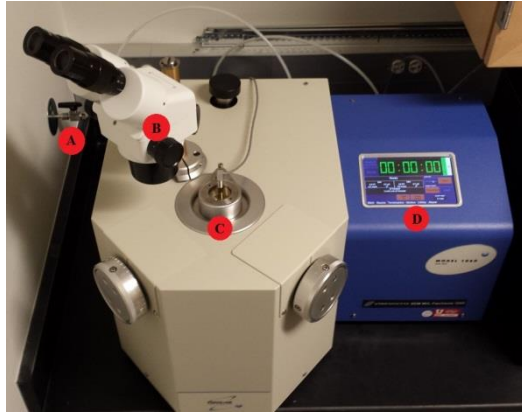


Fischione Model 1060 SEM Mill: Simplified user instructions



- A. Argon gas valve
- B. Stereo Microscope
- C. Load Lock Chamber
- D. Touch Screen Panel

The Fischione Model 1060 SEM Mill is an ion milling and polishing system used to enhance the surface characteristics of a sample for use in SEM and STEM systems. This guide will cover using Argon gas to sputter material from the sample to mill and polish the sample. More detailed information about the system can be found in the user manual.

0. Start the use log on the PC.

Sample Mounting:

The SEM Mill requires a special sample stub for milling or polishing.

1. The Fischione requires a special sample stub (**Figure 1a**) and stub holder (**Figure 1b**) for the mounting of samples. The stage has a special clamp for holding the sample that is operated by a knob on the stub stand. Other sample stubs are available for samples that will not fit on this specific stub. The extra stubs and spacers are located in the drawers underneath the Fischione



Figure 1a: Special Sample Stub

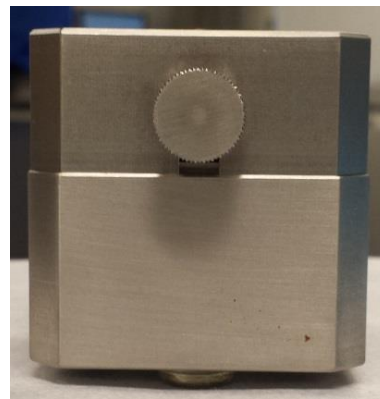


Figure 1b: Special Stub Holder

2. To place the stub in to the stand, align the bottom of the stub (**Figure 2a**) with the top of the stub stand (**Figure 2b**). The notch in the stub should be aligned with the pin on the top of the stand. After the stub has been inserted use the knob to open the clamp on the stub. Place the sample in to the clamps and use the knob to close the clamps.



Figure 2a: Bottom of Sample Stub

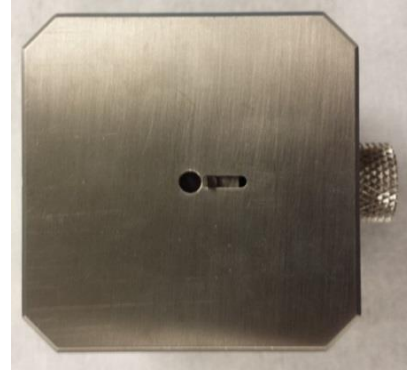


Figure 2b: Top of Stub Holder

3. A spacer must be added to the stub to fit in to the sample stage of the SEM mill (**Figure 3a**). The spacer has an index hole, offset from the center of the spacer, which will fit the index pin on the sample stage of Fischione.



Figure 3a: Sample Stub Spacer

SEM Mill Initial Setup and Sample Loading

- To begin setup, open the valve for the Argon (**Figure 4a**) on the wall next to the Mill (Located on the left hand side of the instrument). One of the tools has a small leak and the tank will be depleted quickly if not closed after each use.

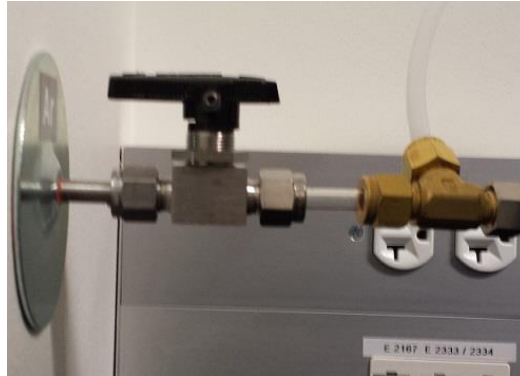


Figure 4a: Argon valve in the open position.

- Vent the sample chamber by clicking on the “Vent” button in the software (**Figure 5**). It is located in the upper right corner of the computer screen. Buttons in the software that are blue are the currently active mode. The Fischione should be under vacuum when not in use.

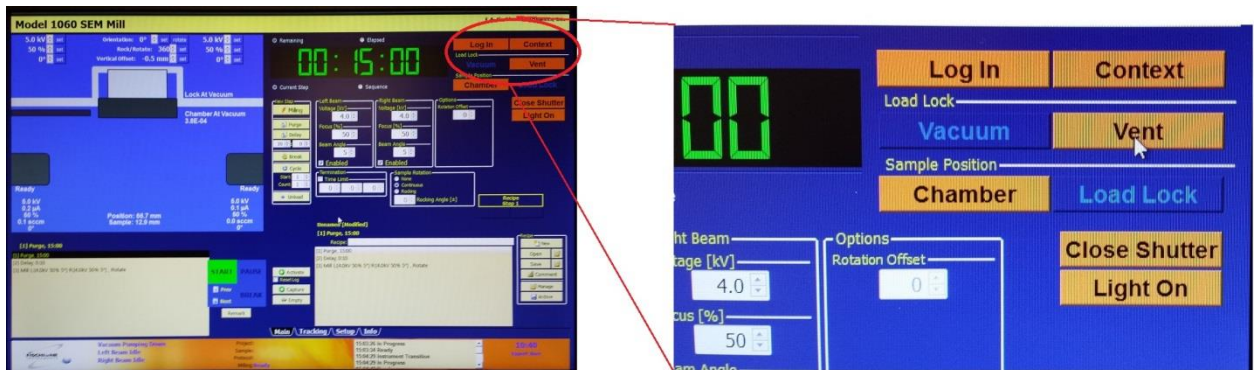


Figure 5

- After venting is complete, the closed chamber (**Figure 6a**) can now be opened (**Figure 6b**) and the sample loaded in to the chamber. The chamber is located on the top of the SEM mill, lift the cover up and rotate it to the right. Place the spacer on the sample stage. Make sure the index pin of the spacer is aligned with the index hole (**Figure 6c**). Then place the spacer on the sample stage (**Figure 6d**), then place the stub on top of the spacer (**Figure 6e**).

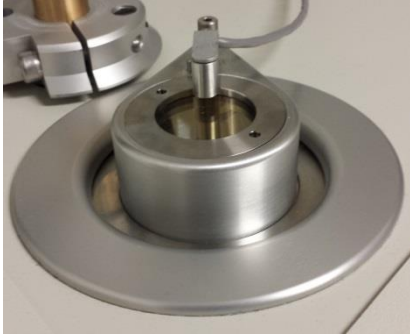


Figure 6a: Closed Sample Chamber



Figure 6b: Open Sample Chamber



Figure 6c: Index Pin

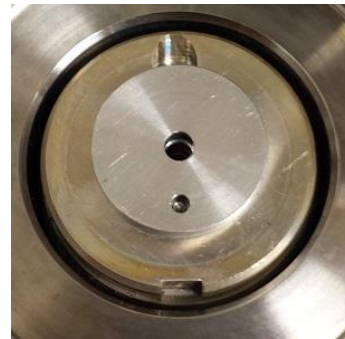


Figure 6d: Spacer on Top of Sample Stage

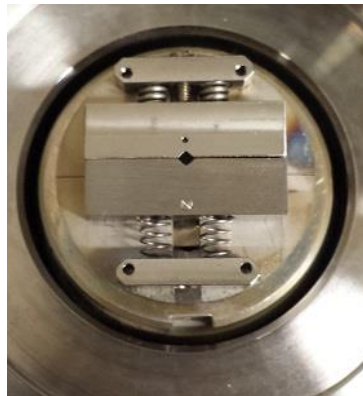


Figure 6e: Stub on Top of Spacer in Chamber

7. Close the sample chamber and click the “**Vacuum**” button, next to the “**Vent**” button. Press down on the lid of the chamber while the vacuum pump is pumping to ensure a good seal.

Operation of the Fischione Model 1060 SEM Mill

Now that the sample has been loaded and is under vacuum, the setup of milling and polishing processes can begin. The Fischione can be operated by the touch screen or the software. This guide will cover the use of the software, as it has more functionality.

Software Screen Overview



- A. Instrument graphic.** This is a representation of the instrument in its current state and shows the current location of the sample.
- B. Timer, Load, Lock and Sample Position.** This area displays the timer for the current step and the buttons that operate the load lock and sample position of the instrument.
- C. Main Tab.** This area will change depending on which tab is selected. The main tab is the currently displayed tab. This contains the “Milling”, “Purge” and “Delay” buttons.
- D. Beam Controls.** The beam controls control voltage, focus, beam angle, sample rotation and whether the beam is enabled.
- E. Currently active recipe.** Users can make their own recipe and use them to automate steps in their processing.
- F. Step Screen.** Intermediate steps will be placed in this dialog box. The intermediate steps will be sent to the currently active recipe window.

- Before any milling can begin, the system must be purged before the first use of the day. Use the up and down arrows to adjust the amount of time in minutes and seconds (**Figure 8a**). Click “**Purge**” from the main tab. This will add this step to the Step Screen (**Figure 8b**). To remove any step in the step screen, right click on the step and click “**Delete**”. **Purging must be done for 15 minutes.**

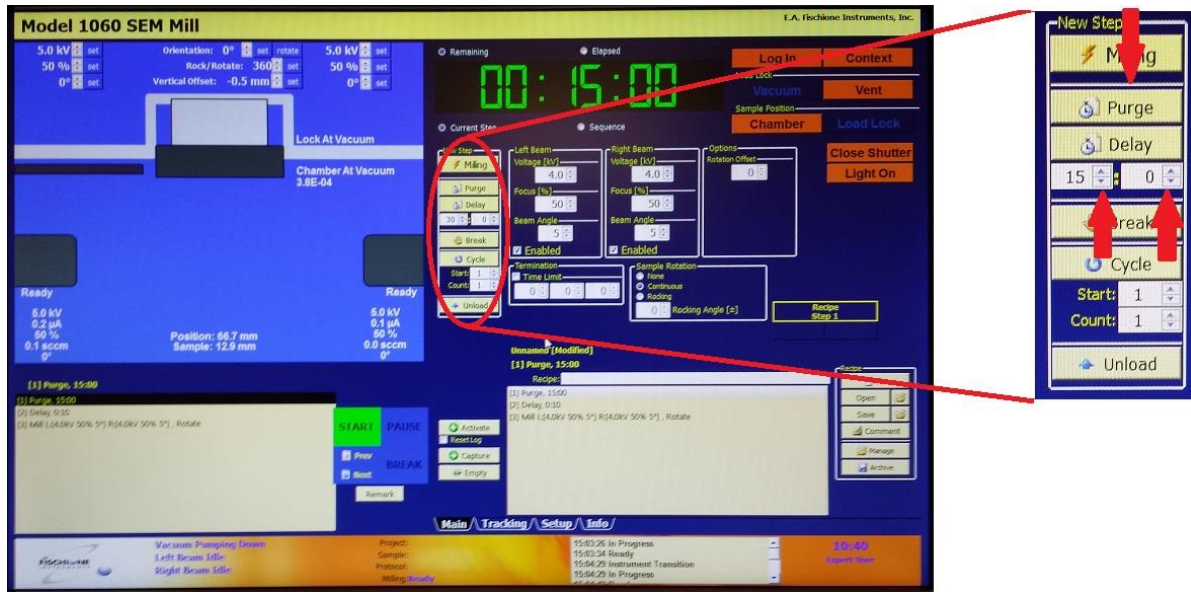


Figure 8a

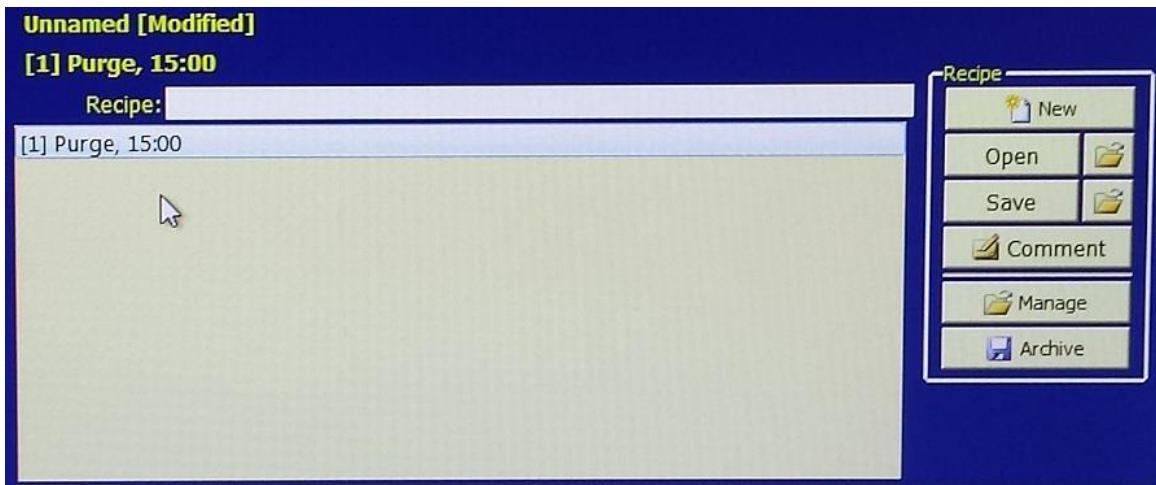


Figure 8b

- Adding a delay to the process is the same as the purge, use the up and down arrows to select the amount of time and then click on the “**Delay**” button add this to the step screen.

10. Set milling parameters (**Figure 10**). This is where the initial beam parameters are set. The voltage, focus, beam angle, rotation and time limit can be set here. The time limit for milling is controlled by the “**Termination**” dialog box. These parameters are sample dependent. Some experimentation may be required to optimize the parameters for a specific sample. Use the up and down arrows to adjust the parameter values. After the parameters are set click on “**Milling**” to add this to the step screen. **Once all steps have been added, the steps can be saved as a recipe for later use, by clicking on “Save”.**

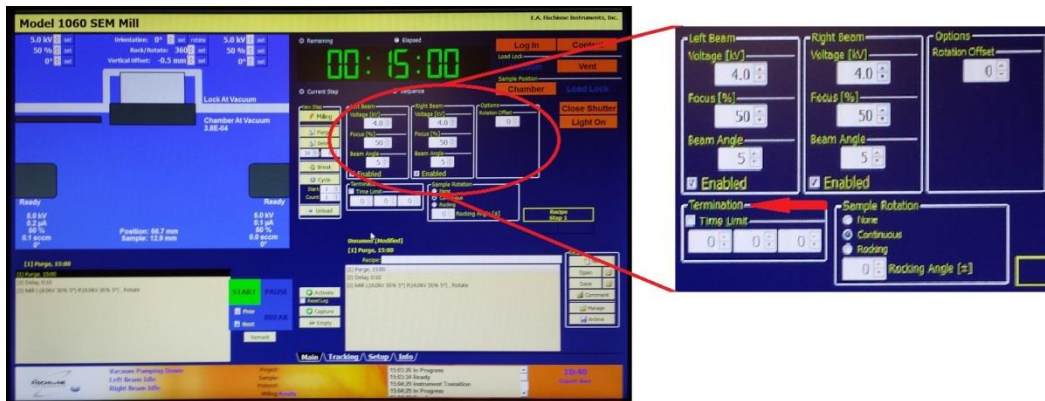


Figure 10

11. Move the sample in to the chamber by clicking on the “**Chamber**” (**Figure 11**) button and close the shutter to the chamber by clicking on the “**Close Shutter**” button. After clicking on “**Close Shutter**” it will change to “**Open Shutter**”. The shutter does not have to be closed during operation; this allows observation of the sample during milling. Leaving the shutter closed is recommended to minimize the buildup of material on the viewing window.

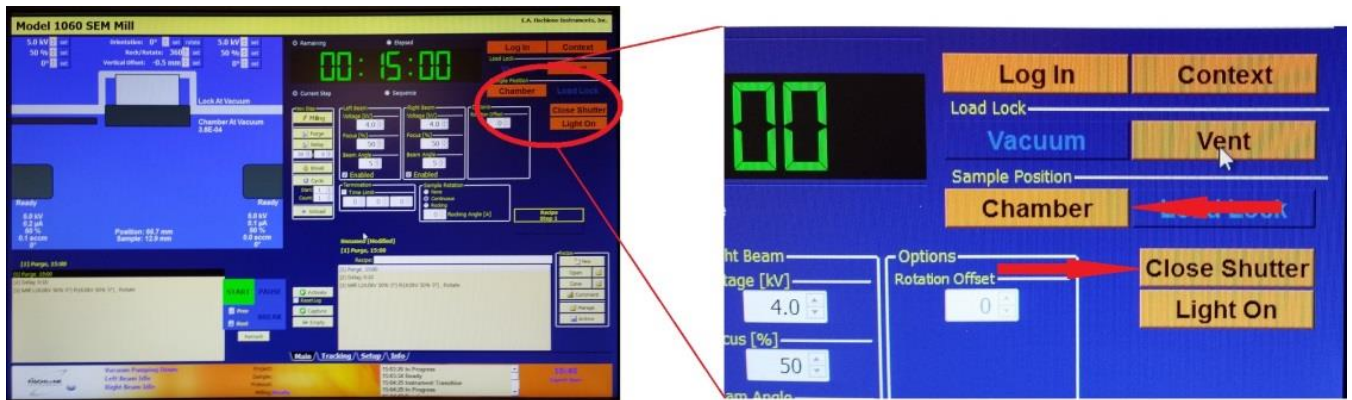


Figure 11

12. Once all of the steps have been selected in the step window, click on the “**Activate**” (Figure 12) button, to the right of step window, to send all steps in the “**Steps Window**” to the “**Currently Active Recipe**” window. Click on “**Start**” to begin the steps of the recipe.

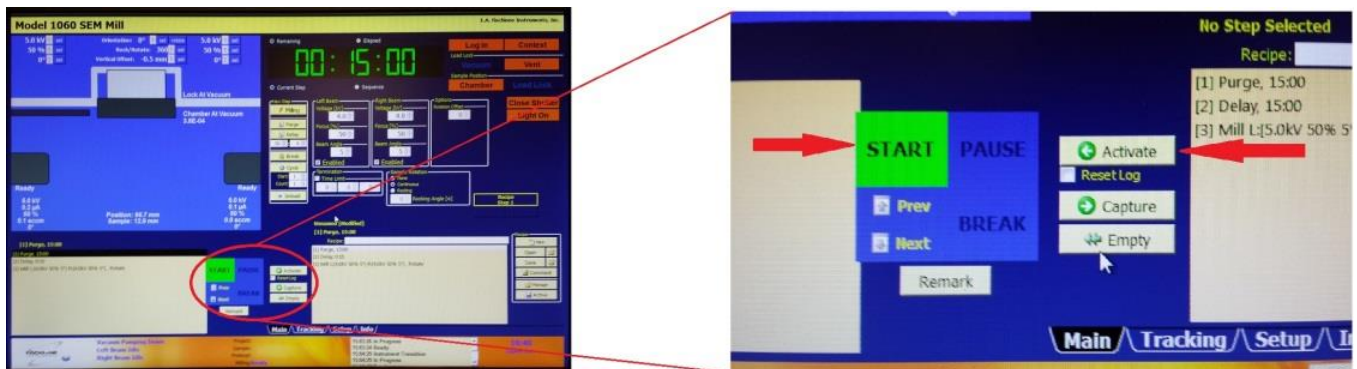


Figure 12

13. During the milling process, the Instrument Graphic (Figure 13) can be used to adjust any of the voltage, focus, beam angle, rotation/rock milling parameters. Use the up and down arrows to change the value and click “**Set**” to enable the change. The “**Vertical Offset**” for a sample can be adjusted using only this screen.

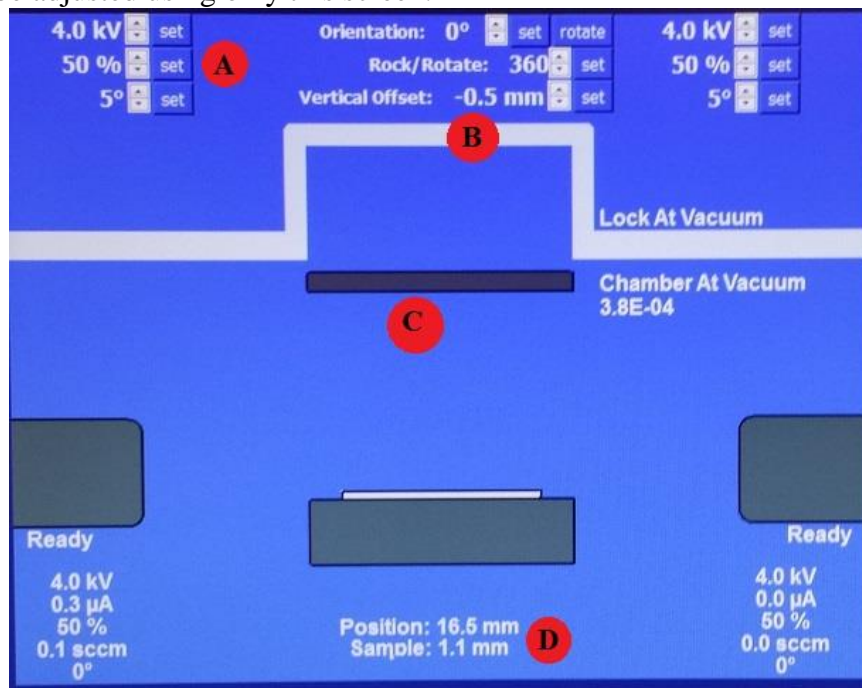


Figure 13

- A. **Parameter Adjustments:** Use arrows to adjust values and click “**Set**” to change the value
- B. **Vertical Offset:** Used to adjust sample height
- C. **Shutter Position:** Open or closed position
- D. **Sample Height:** Current sample height.

14. To view the sample during milling, use the microscope attached on the top of the Fischione. Loosen the knob on that is attached to the microscope post (**Figure 14a**), and rotate the microscope over the viewing window (**Figure 14b**). Turn on the light with the button “**Light On**” which is located underneath the “**Close/Open Shutter**” button. The shutter must be open to view the sample during milling.

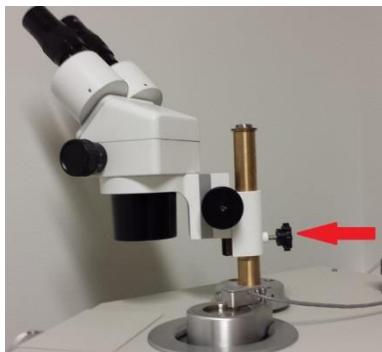


Figure 14a

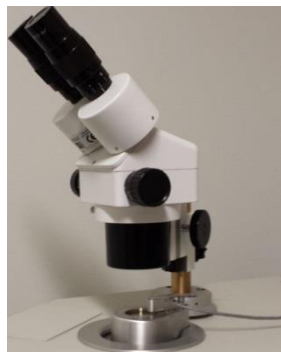


Figure 14b

15. Once milling of the sample is complete click “**Open Shutter**”, “**Load Lock**” then “**Vent**” to remove the sample. Once the sample is removed, click on “**Vacuum**” to leave the system under vacuum when not in use.

16. Close the Argon valve (**Figure 16**).



Figure 16: Argon valve in closed position.

17. End the use log on the PC.