HITACHI HT-7700 TEM SOP

September 2025

UNIVERSITY OF LOUISVILLE
Micro/Nano Technology Center

The Hitachi HT7700 TEM is located in Room 526 of the MDR Building.

NOTE: The voltage must not be changed or adjusted from **80kV** on the TEM for the filament voltage and beam alignment are configured for this setting.

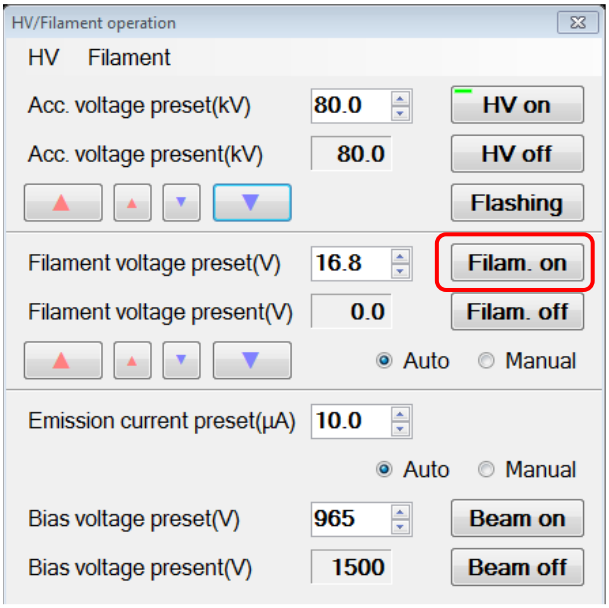
START THE TEM

1. Login into FOM to start an imaging session. If you do not log into FOM the center monitor will not turn on.

2. Turn on the left and right computer monitors.

3. Check the initial conditions. The vacuum level on the vacuum gauge next to the screen is in the **10^{-7} Torr** range and High Voltage (HV) is on.

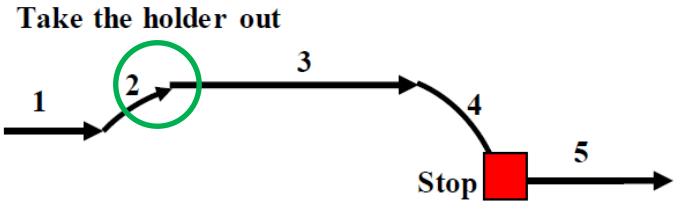
4. In the HV/Filament Operation window, turn on the filament by clicking **Filam. On**. A small green bar will also appear on the **Filam. On** button. It will take approximately 10 minutes for the filament to reach the **Filament Voltage Preset. T**he TEM is ready for use when the **Filament Voltage Preset** and **Filament Voltage Present** are the same value.



5. While the voltage is increasing you can load your samples into the TEM.

UNLOADING THE SPECIMEN HOLDER

1. To remove the specimen holder, gently pull it straight out until it stops at position 3. Turn the holder **30-degrees counter-clockwise** to reach the **STOP** position. ***Scan the QR code to see the video.***



2. Switch the **EVAC-AIR** switch to **AIR** and **WAIT** approximately 10 seconds until you hear 2 clicks. ***It is extremely important to not pull out the specimen holder until you hear 2 clicks.***

3. **CAREFULLY** extract the specimen holder from the EM column. **DO NOT touch the specimen holder in the designated box below or past the O-ring.**

4. Make sure a cloth is under the specimen holder to capture lost grids if they come out of the specimen folder.

5. With tweezers/forceps **GENTLY** open the lid of the spring loaded specimen holder.

6. Select a grid **by the edge** with your tweezers and place it into the specimen holder. Make sure the grid sits flat and the sample is facing upward. **CAREFULLY** close the lid using tweezers.

NOTE: **Grid #1** is closest to the tip of the specimen holder.

Grid #2 is in the middle.

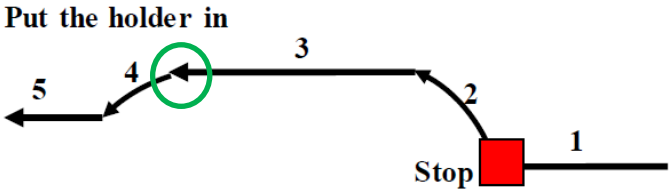
Grid #3 is closest to the handle of the specimen holder.

LOADING THE SPECIMEN HOLDER FOR IMAGING

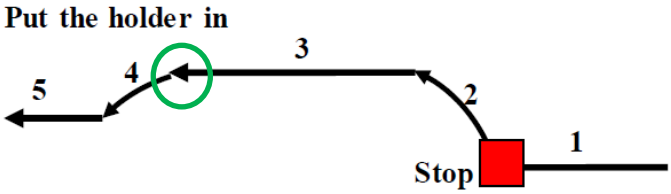
1. **CAREFULLY,** align the pin and guide the specimen holder into the TEM until it stops.

2. Switch the **EVAC-AIR** toggle to the **EVAC** and **wait** until the green light is illuminated along with a continuous beep.

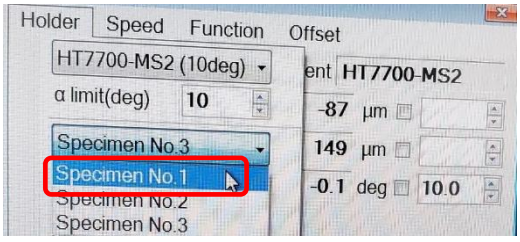
3. Turn the specimen holder **30-degrees clockwise**. The holder will pull itself into the standby position (green circle) due to vacuum. ***Scan the QR code to see the video.***



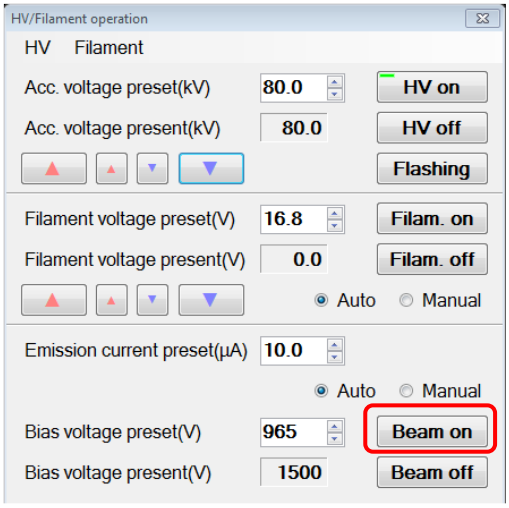
4. Turn the specimen holder **15-degrees counter-clockwise** and vacuum will pull the holder into the center of the column or the imaging position at **Step 5**.



5. From **Stage Operation** window on the left monitor select the **Holder** tab. Specify the grid you wish to image by selecting **Specimen No.** 1, 2 or 3.

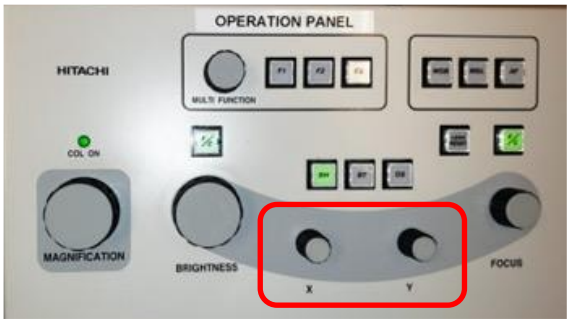


6. Click **Beam On** and confirm the green bar is showing on **Beam On**.



IMAGING THE SAMPLE

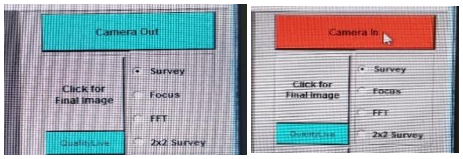
1. Increase magnification to 8k with the maginifcation knob.
2. Adjust brightness, so the spot is the same size as the large blue circle on the left monitor. Using the X & Y knobs, center the spot in the circle.



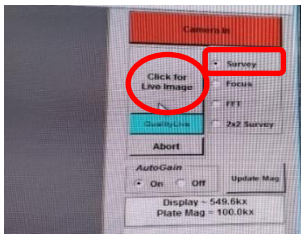
3. Reduce brightness so the spot is the same size as the largest visible circle.
4. Reduce magnification to 1k.
5. Make sure the **F/C button** is green (**green = coarse focus, no green = fine focus**).

6. Click on the **AMT700** icon at the bottom of the center monitor.

7. Click on the blue **Camera Out** button to switch from the Hitachi Camera to the AMT camera. The button will also turn red.



8. **Click for Live Image.** Make sure survey is also selected.

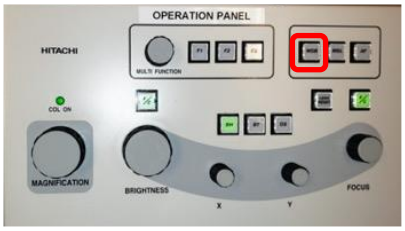


9. Use the trackball to move to different sections of the grid while adjusting the magnification and brightness.

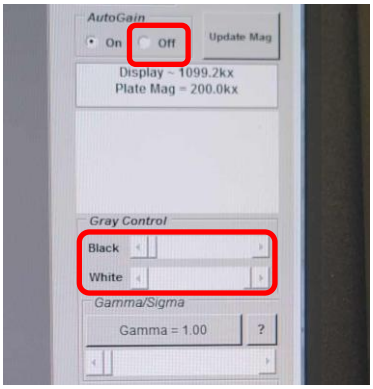
10. If you get a **LOW SIGNAL** warning, increase brightness.

11. If you see an **OVERSATURATED** warning for the camera, **IMMEDIATELY REDUCE BRIGHTNESS.** Failure to do so can damage the scintillator.

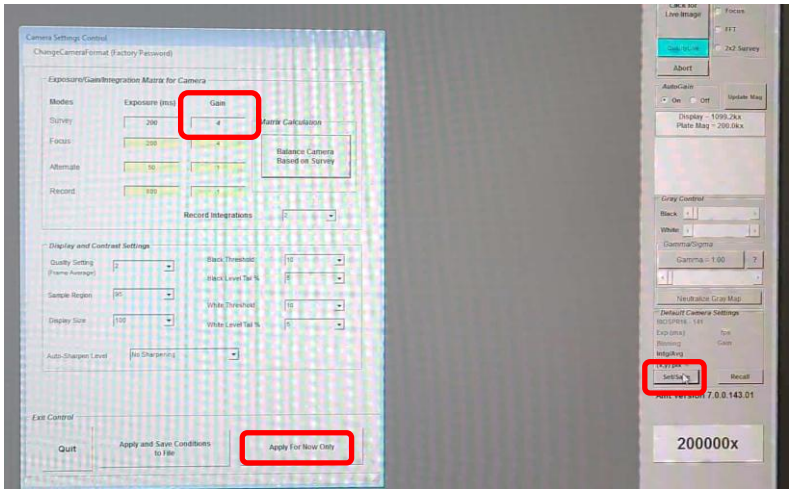
12. If you have trouble with focus, press the **WOB** button. With the focus knob, adjust focus until the sample stops moving. Before taking an image, turn off WOB and further adjust focus.



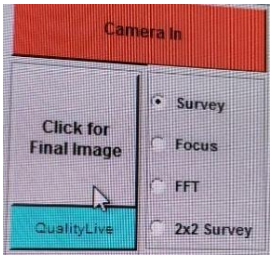
13. If you need to adjust contrast, adjust Gamma and/or turn off AutoGain and manually adjust contrast with the Black and White sliders.



14. An optional aid to get better contrast is select the **Set/Save** button to open the **Select Camera Control** window. Increase the gain value for **Survey,** click **Apply for Now Only** then click **Show Live Image.**

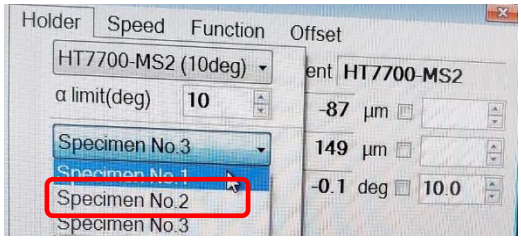


15. To save an image, select **Click for Final Image.** Click **Save with Caption** option for annotative data to be embedded within the picture and to change annotative data per your preferences.



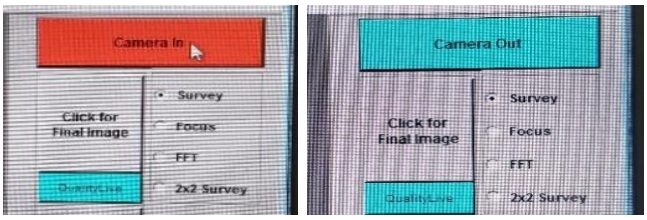
16. To resume imaging, select **Show Live Image**.

17. To image another grid, select **Holder** on the left monitor and click on the preferred specimen number. Repeat the previous steps for locating items of interest, focus and taking images.

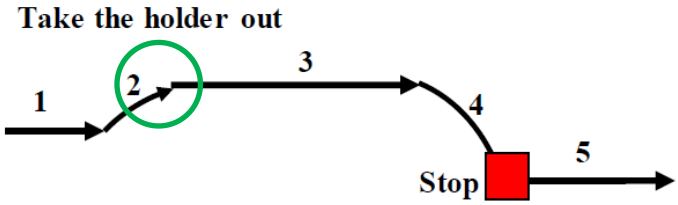


CHANGING SAMPLES AND REMOVING THE SPECIMEN HOLDER

1. Exchange out the AMT Camera by clicking the red **Camera In** button in the center monitor. It will turn blue and exchange to Hitachi Camera.



2. Click **Beam Off** on the left monitor.
3. Pull the specimen holder to the end of 1 and rotate clockwise 15 degrees to the standby position (green circle). ***Scan the QR code to see the video***

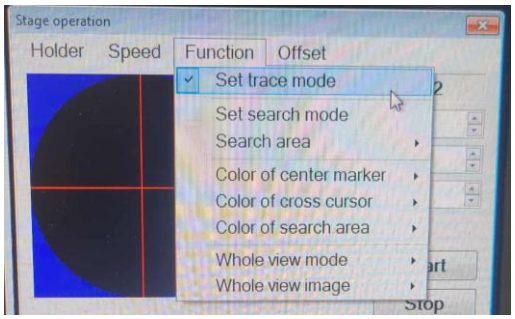


4. Pull the specimen holder to the end of 3.
5. Rotate the specimen holder 30^{o} counter-clockwise to the STOP position.
6. WAIT until you hear the beep and the green light comes on.
7. Toggle the EVAC-AIR switch to AIR.
8. Wait 10 seconds or until you hear 2 clicks.
9. Carefully pull out the specimen holder.
10. Exchange the samples and reload the specimen holder into the TEM column.
11. Click **Beam On** and confirm the green bar is showing on the button.
12. Turn on the High Resolution Camera by clicking the blue **Camera Out** button. It will turn red and change to **Camera In**.

WHEN FINISHED IMAGING

1. When finished imaging, turn off the High-Resolution Camera by clicking the red **Camera In** button. It will turn blue and change to **Camera Out**.
2. If you need to transfer photos or other documents from the TEM, insert a flash drive into the computer on the right side of the desk**. DO NOT** use the computer that is in the desk below the **Emergency Stop** button.
3. Close the **AMT 700** application.
4. On the left monitor, click **Beam Off** and confirm the green bar is not showing on the button.

5. Remove your trace lines by selecting **Function** and toggle the **Set trace mode** button off, then back on again. Repeat this step for any grid positions 1, 2 or 3 (if used).

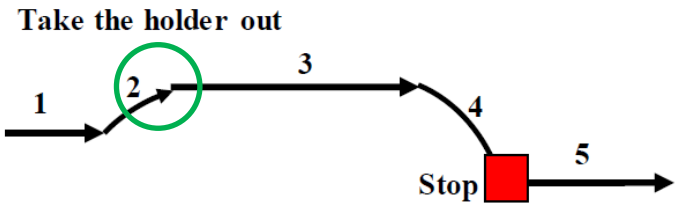


6. Place the Sample Holder back to position #1 and center the position to 0,0.

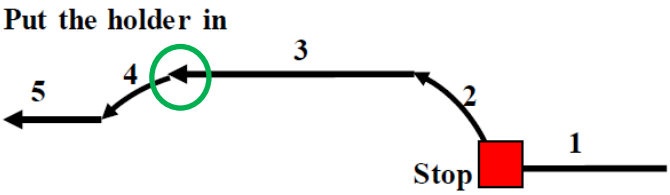
7. Turn off the filament by selecting **Filam Off.** Confirm the **Present Voltage** is 0.0 and the green bar is no longer seen on the button.

NOTE: DO NOT TURN OFF THE HV VOLTAGE.

8. Unload the specimen holder and remove your grids. ***Scan the QR code to see the video.***



9. Place the specimen holder into the TEM column in the **standby position** (green circle). **DO NOT leave the Specimen Holder out of the TEM.** ***Scan the QR code to see the video.***



10. Adjust magnification to 200k.

11. Log out of your imaging session in FOM.

12. Turn off the left and right monitors.

13. Turn off the lights in the room and make sure the door is tightly closed when you leave.