

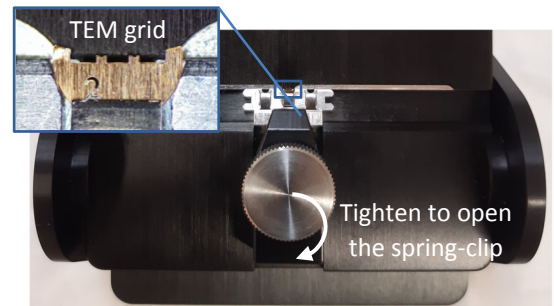


This guide contains only a brief sketch of the workflow. It by no means supersedes the training or user manual.

## HELIOS 660 Quick guide – general

### Starting the Session

1. Mount the appropriate stub with your conductively attached sample to the shuttle with a 38 ° pre-tilted slot.
2. Load the TEM grid into the row bar (use the Load base and stereomicroscope for the precise adjustment).
3. Load the row bar into the shuttle pre-tilted slot.
4. Check the transferability of your sample + shuttle assembly by using the Quick Loader gauge – do not try to load if failed. The thickest sample + stub assembly to reach 4 mm WD not to exceed **5 mm**.
5. Switch on the central monitor and log in into the user interface.
6. Push the “V” button to VENT the Quick Loader chamber.
7. Pull the Quick loader lid upward and turn it to the side using a handle.
8. Press the shuttle against the bayonet lock spring in the loader chamber and move the rod from the loading to the parking position.
9. Close the Quick loader lid (watch correct seating on the sealing), then press the “P” button to pump it down.
10. When “OK” lights up, open the gate valve (turn the valve to **UNLOCK** position, pull out to open and return to **LOCK** position again)
11. Hold the loading rod and move the rod from the Parking position to the end of the rod travel, then turn the bar counterclockwise to the base of the slot (to decouple bayonet lock), pull bar along the slot base, then turn clockwise and withdraw it back to the parking position.
12. Close the gate valve (turn the valve to **UNLOCK** position, push in and return to **LOCK** position again)
13. Click the “WAKE UP” button if the System module indicates it is in Sleep mode or press the **Beam On** buttons for electron and ion beam.
14. To get the navigation image go to **Stage-> Take NavCam photo** (or press Ctrl+Shift+Z).
15. Double-click on a suitable position in the NavCam photo (the tallest feature on your sample surface) to move the sample under the electron column.
16. Choose suitable condition for SE imaging (e.g. 20 kV, 0.4 nA, 200 ns) and unpause **Quad 1** (F6). Use F9 for automatic **contrast and brightness (CB)** adjustment. *If auto-CB seem not to work correctly, check that Gamma is set to default in the LUT tab at the Detector side panel .*
17. Rise/depress the stage to align your sample top surface with a 4 mm marker in the infrared camera view **Quad 4** by mouse drag while having the wheel pressed.
18. Find the **focus** (drag the mouse while holding the right button) and **stigmat** (shift + drag @ right mouse button depressed). Adjust magnification (Ctrl + Wheel roll Up/Down) to ~1000 mag. Refocus if necessary.
19. Click the “Link **Z to FWD**” toolbar button to link the physical position of the stage to the working distance.
20. Open the **Navigation Page**  on the top right side of the UI screen and set the **Z** value of the stage to **4 mm**.
21. Find the **eucentric height**: Apply the **Stage > Auto Beam Shift Zero** function. Show the **Window > Center Cross** (Shift + F5). Find some recognizable feature on your sample and place it to the Quad 1 centre by double click (Magnification ~ 1000x). Tilt the stage to 10°. If the feature moves away from the screen centre, adjust the stage Z height using a **slide bar** to bring the feature back to the centre of the screen. Tilt the stage to 52° (Ctrl+I). Get the feature to the centre of the



Row bar on Load Base



Loading the shuttle to the Quick loader

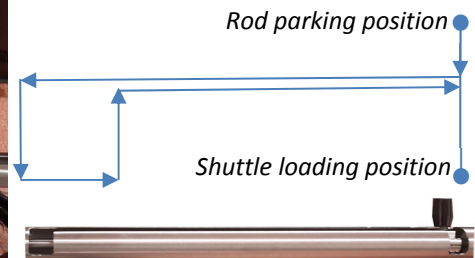



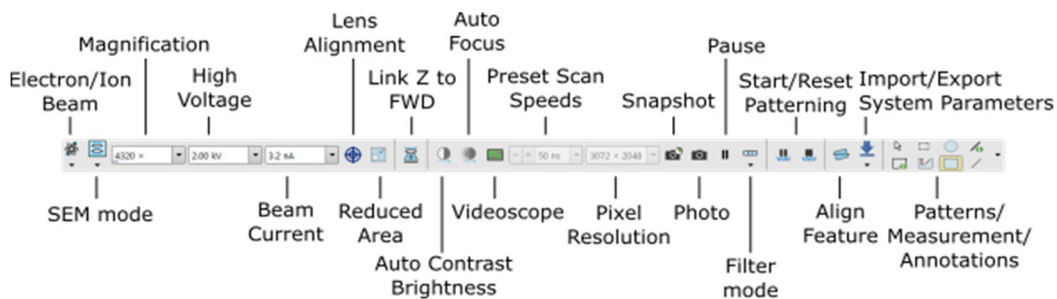
Diagram of loading the shuttle into the microscope chamber

screen again (using the Z slider) if necessary. **The WD has to be larger than 3.9 mm. Otherwise, there is a risk of collision of the GIS needle with the sample.**

- If this is the case, go to tilt 0° (Ctrl+E), press F8 to degauss and check the focus. Align the e-beam thoroughly. Link WD and Z again. Repeat the procedure for setting the eucentric height.
  - If still unable to set eucentric distance at WD at least 3.9 mm, restart the “xT microscope server” application.
22. Set the **coincidence point** of the electron beam and ion beam: At 52° tilt, leave the recognizable feature in the centre of Quad 1 and pause it. Using the toolbar, select the working condition (high voltage and beam current) and pixel resolution **768 x 512 for the ion beam** in Quad 2. Press two times F6 for a single scan. Estimate and set CB manually, then do a single scan again. Repeat if necessary. Use the **Shift+left mouse** button to drag your recognizable feature to the centre of the Quad 2 by beam shift. Now the electron beam and ion beam meet at the same point.
  23. Focus and stigmatize the ion beam aside from your area of interest if necessary.
  24. Use the electron beam for searching the area of interest. Be quick when working with an ion beam to avoid damaging your sample, especially at high beam currents. Open the Patterning side panel  to define your work.
  25. Important hints:
    - The minimum **WD** for **GIS** insertion is **3.9 mm**
    - **EasyLift** insertion **ALWAYS** into **Park position**

<b>F9</b>	Auto <b>Contrast and Brightness</b> procedure	<b>Esc</b>	Stops the stage movement
<b>F5</b>	Brings active Quad to <b>full-screen mode</b>	<b>Ctrl + B</b>	<b>Blanks/</b> un-blanks the beam
<b>F7</b>	<b>Reduced Area/Full frame mode</b>	<b>Ctrl + K</b>	Sets the <b>Spot mode</b>
<b>Ctrl + Wheel roll Up/Down</b>	Increases/decreases <b>magnification coarsely</b>	<b>Ctrl + M</b>	Sets the <b>Full frame mode</b>
<b>Shift+ Wheel roll Up/Down</b>	Increases/decreases <b>magnification finely</b>	<b>F6</b>	<b>Pause/</b> un- pause the beam
<b>Ctrl + I</b>	Tilts stage to 52°	<b>Ctrl + Shift + Z</b>	Take <b>Nav-Cam photo</b>
<b>Ctrl + E</b>	Tilts stage to 0°	<b>CTRL + A</b>	Selects all items in an active window

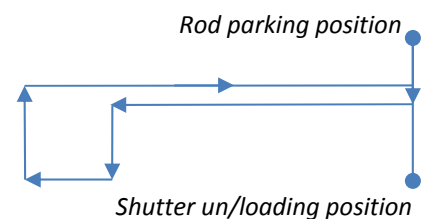
### Most frequently used shortcuts



### Ending the Session

### Toolbar layout

1. Click the **“BEAM ON”** buttons (both for the electron and ion beam).
2. If the system is not used anymore that day, click the **“SLEEP”** button to turn off the ion source emission. Obey instructions on leaving/stopping ion emission written by the guarantor.
3. Reset digital zoom in any Quad if changed during your session.
4. Delete all your markers, patterns, stage points, etc. Set Gamma to default in all Quads if changed during your session.
5. Press the **“P”** button on the Quick loader; the stage will automatically move to the position for unloading.
6. Open the gate valve. Move the rod into the microscope chamber (turn the bar clockwise) and return to the **Parking position** as visualized on the diagram. Close the gate valve.
7. Press the **“V”** button to vent the Quick loader chamber. Open the Quick loader lid. Hold the shuttle and, with the other hand, move the rod to the **Unloading position** to release it. Withdraw the shuttle.
8. Close the chamber lid and press the **“P”** button to pump down.
9. Select **File -> Lof Off**.
10. Switch off the central monitor (the right one will dim synchronously).



**Diagram of unloading the shuttle from the microscope chamber**