

## **Appendix: Troubleshooting**

This section highlights some of the common troubleshooting issues that have presented themselves on systems in the past. In many cases a problem can be remedied by rebooting the PC or performing a hard restart on the system to restart the PLC to clear out any glitches brought on in some cases by power fluctuations to the system. To perform a hard restart shut down the system PC completely and then open the main disconnect (turn to off) for 30 seconds. Close the disconnect switch, restart the control software and deposition software where applicable.

Operators are encouraged to contact Customer Service at Angstrom Engineering with any concerns they may have at any time.

| Symptom:                       | Possible cause/ Resolution:  |
|--------------------------------|--|
| System has lost base pressure. | <ul style="list-style-type: none"> <li>- Check front and rear door seal faces for scratches that are perpendicular across the o-ring contact area. Carefully polish or sand surface with Scotchbrite or very fine sandpaper only in the direction of the o-ring. Keep in mind that the o-ring contacts only in the middle of the seal face, so scratches on the interior of exterior edges may not have an effect.</li> <li>- Check door o-rings for particulate, or chunks missing. Wipe the o-ring with Isopropanol and replace if damaged. Contact Angstrom Engineering for replacements and spares.</li> <li>- Particulate in vent valve or roughing valve. Clean seal face of roughing valve. Blank vent valve and pump to confirm valve is the leak. Replace valve if so. Contact Angstrom Engineering for a replacement or advise on cleaning the roughing valve.</li> <li>-Particulate in foreline valve or purge valve. This is less common. Best detected with a leak detector with the cryo pump off, warm and fully purged of contaminates if possible. Contact Angstrom for advice on how to leak check the valve.</li> <li>- Particulate in the cryo pump overpressure valve. Commonly occurs after a cryo regeneration. Most pumps now have screens to prevent charcoal from the pump from making it to the valve. Valve is easily disassembled (unscrews by hand) and cleaned with the cryo pump at atmosphere.</li> <li>- Cryo pump compressor helium level is low. Top up as required. Special tools and procedure must be strictly followed. See cryo pump manual or contact customer service at Angstrom for more advice.</li> </ul> |

|  |   |
|--|---|
|  | <ul style="list-style-type: none"> <li>- Contamination. Clean chamber debris shields and interior components. Or an item has been cleaned inappropriately with a substance that has affected the part, like acid etching aluminum for example or wet spun films.</li> <li>- Resistive source feed through has overheated. This is a rare occurrence where a source has run too hot for too long and the Viton seal for the feed through has deteriorated. Remove feed through and replace o-ring. Contact Angstrom Engineering for replacements and spares.</li> </ul>  |
| <p>Communication from Inficon software is not working.</p> | <ul style="list-style-type: none"> <li>- If the system has been completely off and the control software is restarted sometimes it may ask what mode the PLC should be in. The user must select monitor mode. If run mode is selected the communication from the Inficon software to the PLC does not work properly. Consult Angstrom customer service for a simple fix if this occurs.</li> </ul>   |
| <p>Deposition from Inficon not working</p>                 | <ul style="list-style-type: none"> <li>- Blown fuse. Fuses blow on occasion when the output power is very high and the source is shut off. This happens on occasion when the source runs out of material and runs to maximum power. Using a post condition in the deposition recipe may alleviate this, or reducing the desired final thickness so that the deposition ends using a post condition may also prevent this. Consult the electrical drawing for the fuse location and replace with the correct type and rating as per the drawing. Repeated fuse blowing may indicate other concerns.</li> <li>- The relay assignments in the Inficon Edit/System/I/O tab have been changed. Refer to the appendix in the system manual for the proper relay assignments and change as required to correct the issue.</li> <li>- Communication issue with Inficon from the PC to the PLC/ This is a rare occurrence that may occur if another item or software has been added to the PC that uses serial or Ethernet communication. Typically a hard restart of the system will cure the problem. Check to see that the shutters open and substrate rotation is enabled when a Inficon process is started with the Inficon software in manual mode.</li> <li>- Communication cable is unplugged. Check connections at the back of the PC and the PLC to ensure they are secure. These may become dislodged during maintenance.</li> <li>- Source is empty or broken. Vent chamber and inspect source and material for continuity and proper contact to the source clamps.</li> </ul> |

|   |  |
|---|--|
| <p>Deposition rate not registering in Inficon software when source is known to be working</p>   | <p>- The tooling factor has been set to zero. Check the tooling factor in the film and adjust accordingly.</p>   |
| <p>Control software not responding</p>  | <p>- Similar to Inficon communication problems where the communication has stopped working between the SCADA software and the PLC. A hard restart will commonly fix this problem. May be caused by adding an Ethernet communicating device to the PC or changing communication settings.</p>   |
| <p>Cryo temperature readings on control software screen are not the same as the temperature readings shown on the cryo temperature monitor.</p> | <p>- Refer to the appendix section of the system manual for the correct settings for the cryo temperature monitor. Occasionally power brownouts have been known to affect these settings.</p>  |
| <p>Cryo has stopped and temperature is rising or at room temperature.</p>   | <p>- Insufficient cooling of the cryo compressor. The compressor has internal thermal protection. If it overheats the switch on the front of the compressor turns off. For water cooled compressors loss of water flow will cause this. For air cooled compressors typically a blockage of the cooling air through the compressor (someone places a box in front of the compressor, places an item of clothing over the front of it, or moves it too close to the wall or the system) will cause the compressor to overheat. Resolve the cooling issue, flip the switch on the compressor to on and perform a full pump down.</p>  |
| <p>Rough pump not working when turned on from the software, or rough pump has faulted alarm is raised in the control software.</p>              | <p>- Some rough pumps require an overload for protection in addition to fuses. If your system has an overload it will typically show an alarm when the overload is tripped. Find the overload on the electrical panel in the cabinet and push the reset. Consult Angstrom customer service for additional guidance. Not typical but happens on occasion if pump runs for long periods of time or is low on fluid (rotary vane) or a pump runs for an extended period of time at atmosphere (door of chamber left open).<br/>         - Blown fuse. Check fuse and replace. Inspect power cord to pump for damage and repair or replace as needed. May indicate short in motor requiring repair. Try again and if fuse blows repeatedly contact Angstrom Engineering.</p> |

Rough pump not attaining low enough pressure for cryo cross-over or chamber cross-over.

- Pump has run low on oil (rotary vane). Top up oil level and try again. Be careful as pump will be hot! Or failure or wear in a scroll pump dictates an overhaul is required.
- Leak in the roughing line. Check all fittings and hoses for loose connections, failures or kinks.