Kratos XPS/ EELs History of Startup Failures:

**Analyzer Control Unit Board Shorting**

**First Observed:** 08/20/10 resolved: 09/15/10

**Description**: during scan intensity would suddenly plummet creating blips in the spectra, blips would not align on repeated scans. Isolated problem to voltage drop in the lens mechanism of the detector.

**Solution**: V7 card in the analyzer control unit was reseated (it had wobbled loose during shipping and occasionally lost electrical contact)

**Stage Control Unit Failure**

**First Observed:** 10/04/10 resolved: 11/02/10

**Description**: stage motors failed, no movement of stage. Replacement was sent, but first replacement would not engage on restart of software. Temp workaround used both stage control units. No know cause of failure.

**Solution**: replacement sent and installed but it did not work, third stage control unit sent and installed

**TSP Remote Controller Fail**

**First Observed:** 04/28/11 resolved: 06/16/11

**Description**: during the degassing of the (titanium sublimation pump) TSP, it stopped working. We had been degassing it by taking the degas current up in steps from 30A to 48A b/c it has been shutting itself off during a normal degas due to high pressures triggering the protected mains. At 44A which should be below its titanium sublimation point, the controller went from operational to "burned out" on all three filaments in one degas cycle. We tried restarting the TSP controller with no effect. Replacement filaments were sent, but when filaments were checked they appeared in tact. TSP remote controller was inspected and was fried.

**Solution**: replacement TSP remote controller sent and installed

**Wide Range Gauge Temporary fault:**

**First Observed:** 09/26/10 resolved 09/29/10

**Description**: load lock pressure unstable and in high E-6 T range. Initially suspected turbo pump, but problem was with the gauge.

**Solution**: restart the gauge (unplug and replug), think might have condensed water on it during a bakeout

**Transfer arm interlock fail:**

**First Observed:** 10/15/10 resolved: 11/19/10

**Description**: while the interlock was over ridden during a bakeout, the electronics were shorted and fried. We were able to bypass it, while waiting for the replacement.

**Solution**: new transfer arm interlock from Kratos

**TPD stage cable:**

**First Observed:** on installation resolved: pending

**Description**: there is a cable that was not installed during instrument installation of the TPD. Cable shipped but never installed,

**Solution**:

**Magnet Flow Meter Replaced:**

**First Observed:** 06/13/11 resolved: 06/16/11

**Description**: count rate intensity dropped by an order of magnitude in the middle of a scan. Checked VME, measured flow to magnet dropped, as did the magnet lens voltage. B/c measured flow was inconsistent; we suspected meter fault rather than a blockage.

**Solution:** replaced flow meter

**O-ring shearing:**

**First Observed:** 10/26/10 resolved: 03/03/11

**Description**: o-ring on flat valve would shear, tear, and pucker out of slot leaving the instrument inoperable.

**Solution**: Replaced O-ring multiple times be after short period each o-ring failed. Kratos sent smaller o-ring (240) that was installed.

**O-ring outgassing**

**First Observed:** 03/03/11 resolved: 05/10/11

**Description**: When first smaller o-ring of size 240 was installed (see above), adventitious carbon in the analysis chamber became noticeably worse.

**Solution**: new 240 o-ring sent from different manufacturer, adventitious carbon is lower and declining, though still present

**Load lock transfer arm movement slowed/slipping:**

**First Observed:** 09/27/10 resolved: 10/14/10

**Description**: the load lock transfer arm was moving very slowly and at times completely unresponsive due to the gear mechanism slipping. We believe this was caused by the forceful turning of the mechanism while the arm was extended and in contact with the magazine done by the Kratos engineer (Larry)

**Solution**: I tightened the set screw in the interior of the load lock mechanism

**Transfer arm to EELS not working;**

**First Observed:**

Description: Can not pick up sample from magazine in preparation chamber to move to EELS.

Solution: Discussions with Kratos and engineer visit to redo alignment of transfer arms;

**EELS vertical Transfer arm not working**

**First Observed:**

**Description**: Can not lower sample into EELS chamber

**Solution**: Bring EELS subsystem up to atmosphere and reattach vertical arm bellows to support

**EELS Camera not present:**

**Firslt Observed:** When vertical transfer arm failed?

**Description:** The position of sample in the EELS chamber cannot be monitored in order to correctly place the sample in the spectrometer.

**Solution:** Two remote cameras were installed on the EELS chamber

The electronic motor for the gate between chambers is starting to whine very loudly. Sounds like it might be a death wail. I suspect bits of o-ring might have gotten into the push/pull mechanism causing some increased friction.