# Development of Optical Metrology Data Analysis Engine

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X-ray Optics

- As beamlines get better, need better mirrors
  - Residual slope error below 50 nrad
- Long trace profiler (LTP) is a high precision metrology tool
  - Measures slope of mirror at each point to within 50 nrad
  - Extremely accurate for small range of angles, but has problems farther out
  - New analysis tools needed to handle this
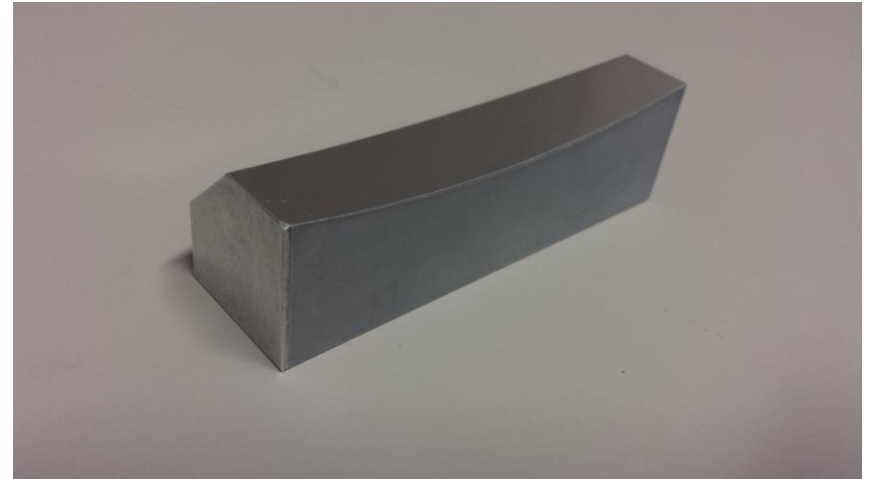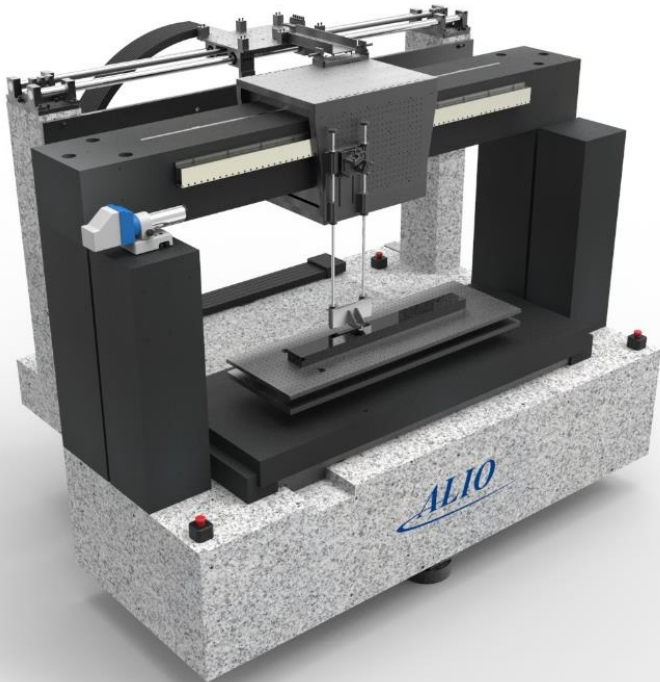
Analysis Software

- Developed Optical Metrology ENgine (OMEN) in Python
- Handles standard analysis
  - Easy, dynamic filtering
  - Fitting options, with live-updated residue plot
  - Region-of-interest selection
- Tools to deal with high angles
  - Stitching together overlapped, adjacent scans of mirror segments
  - Soon will include option to add calibration run
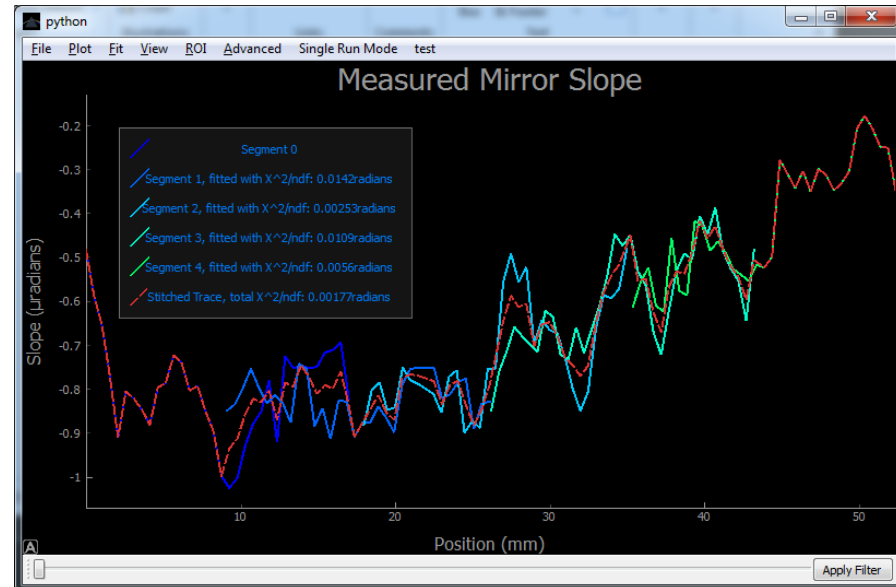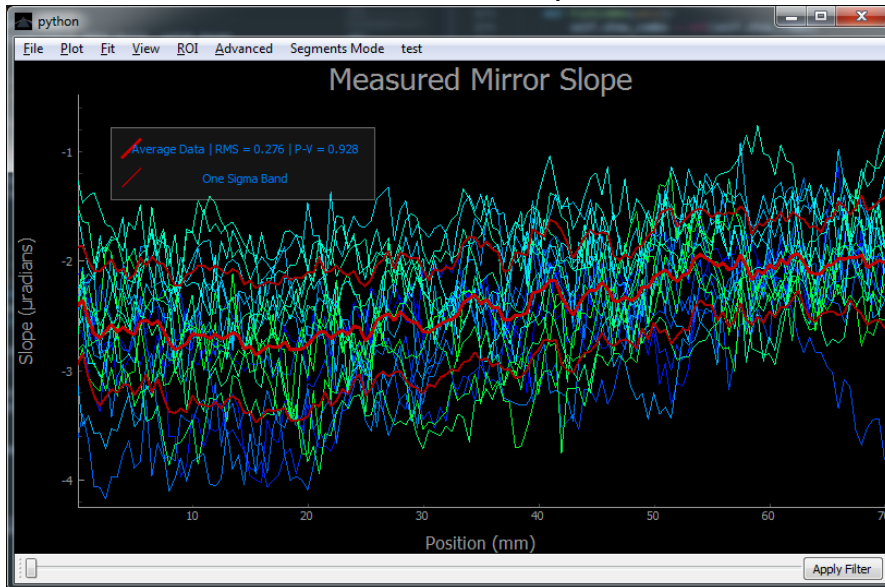
Goals

- Complete a calibration curve for the LTP
  - Make working calibration look-up table
  - Analyze systematic errors
  - Integrate into OMEN
- Improve stitching code
  - Standard deviation of difference between stitched and unstitched is about equal to standard deviation of either

Measured Mirror Slope

Stitched Data | RMS = 0.31 | P-V = 1.14
Unstitched Data | RMS = 0.278 | P-V = 1.06
Average Residue | RMS = 0.104 | P-V = 0.458

Slope (µradians)

Position (mm)