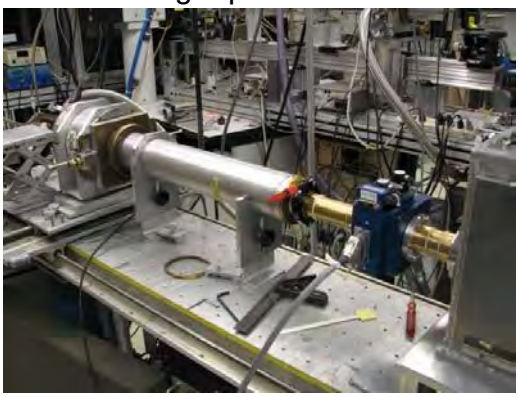
ADC Inc.
126 Ridge Road
Lansing, NY 14882
www.adc9001.com

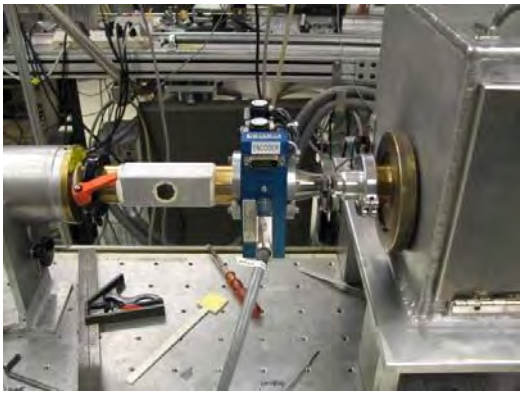
Blade Polishing

ADC has worked with the Cornell High Energy Synchrotron Source (CHESS) for many years developing a polishing process that produces the best slit blade knife-edges in the synchrotron community. We have collaborated in the design and test of slit blades in tungsten and tantalum with lessons learned that could be applied to other materials.

Recently we delivered 8 sets of slits to CHESS and we decided to go through another round checking our polishing process. ADC would polish different blade with small process modification. We would then have Cornell do the scattering test for us and compare the results.

The tests were conducted on a rotating anode source at Cornell University's lab with an evacuated flight path and a CCD.





This is a small-angle setup on a laboratory source with an approximately 1 meter path length, the wavelength was about 1.5 A. We did not use a calibrant here, so I don't know exactly -how- low of an angle we achieved at the beamstop, but based on this typical configuration I would expect at least down to q = 0.01 (2Pi Sing(theta)/lambda) or equivalently (d-spacing of maybe 600 A).

The setup already has beam defining slits and guard slits in place. We place a single blade half way in the direct beam (in vacuo) after the guard slits and compare the scattering with what we see without the blade. We know that the blade cuts through 1/2 the beam due to PIN diode readings in the beamstop. We are not measuring slit width, only the cleanness of a single blade at a time.

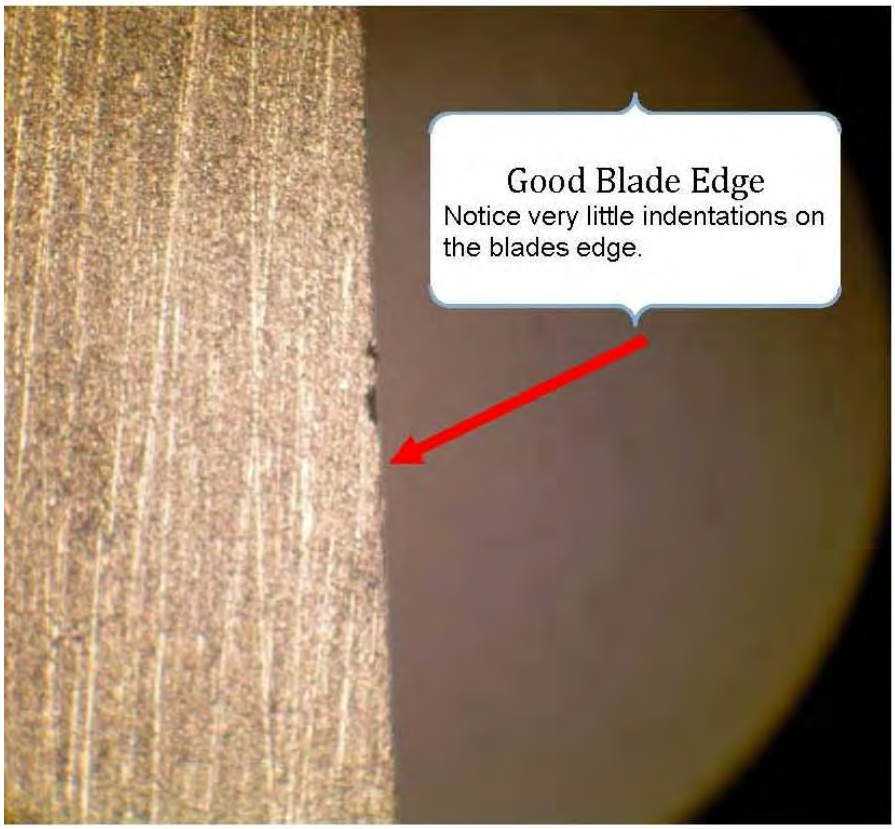
Results:

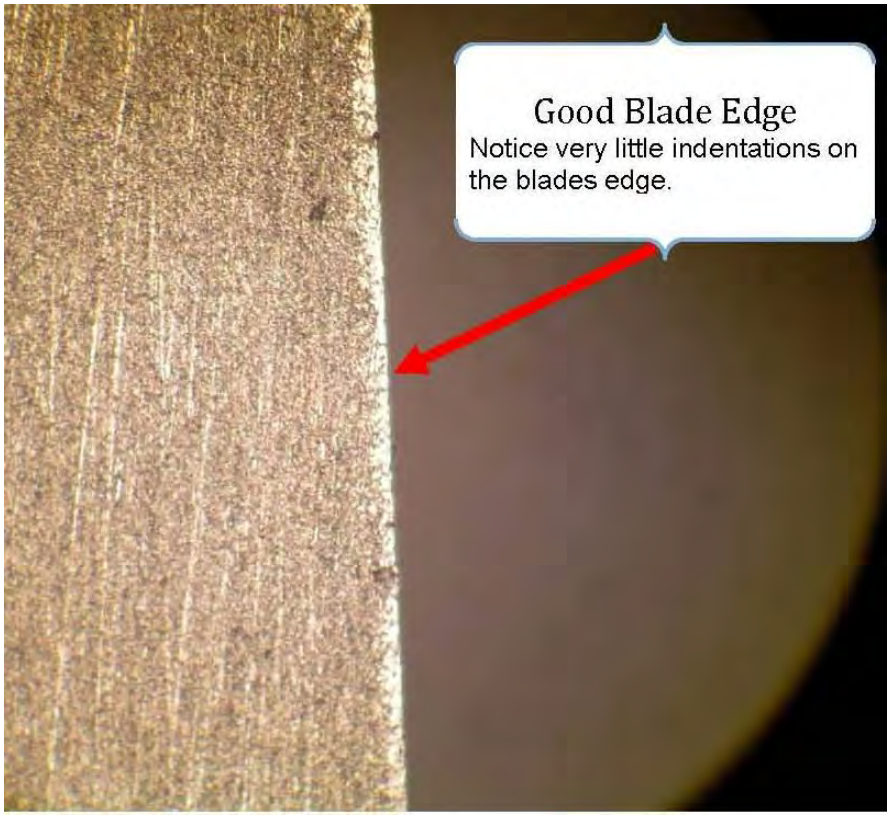
These tests were conducted on the same material but different polishing process. The following pages show photos of the blades,

Material: Tungsten 95%~3.5% Ni~1.5% Cu which is Tungsten Alloy Product Standard: ASTM B 777 Class 3

Using an Olympus microscope at a 200x power.

Blade Polishing



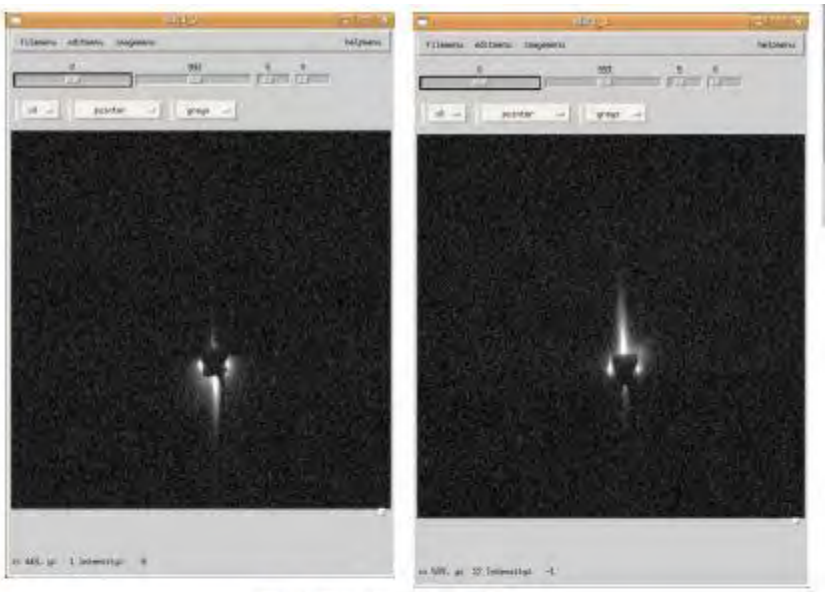


ADC Inc.
126 Ridge Road
Lansing, NY 14882
www.adc9001.com

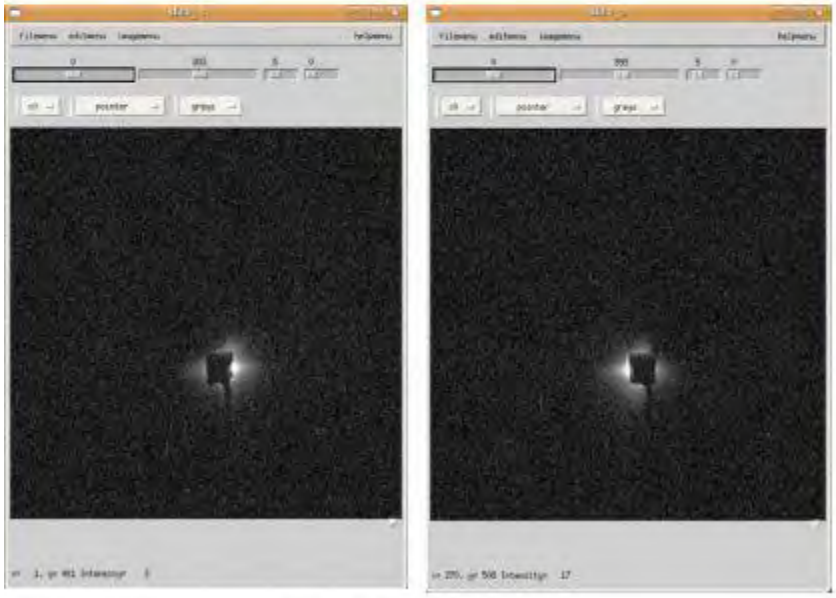
Blade Polishing

Presented below is a x-ray scattering document showing the beam with no slit, photos of a set of bad blades (1 & 2), and a set of good blades (3 & 4). These tests were done at Cornell for a comparison purposes so that one can see what is really meant by a "bad" polished blade and a "good" polished blade. Notes: intensity in flares is 6000 cts Exposure 2 x 100 sec

No slits



Bad Blades (1 & 2)



Good Blades (3 & 4)