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Digital Radiography of Feature Edges for NIF RadHohl 09C Ta₂O₅ Targets 18, 19, and GA

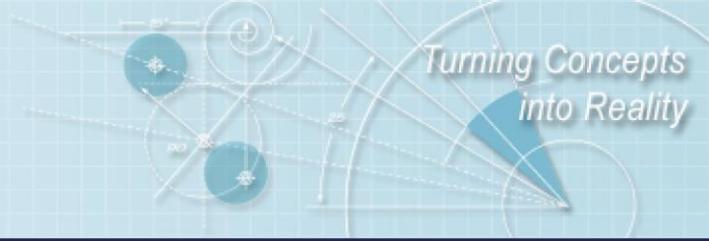
J. D. Sain, P. E. Young, R. J. Vargas

August 24, 2009

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Digital radiography of feature edges for NIF RadHohl 09C Ta₂O₅ targets 18, 19, and GA (Rev. 3)

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&
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Dec 17, 2008



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Livermore National Laboratory under Contract DE-AC52-07NA27344.*

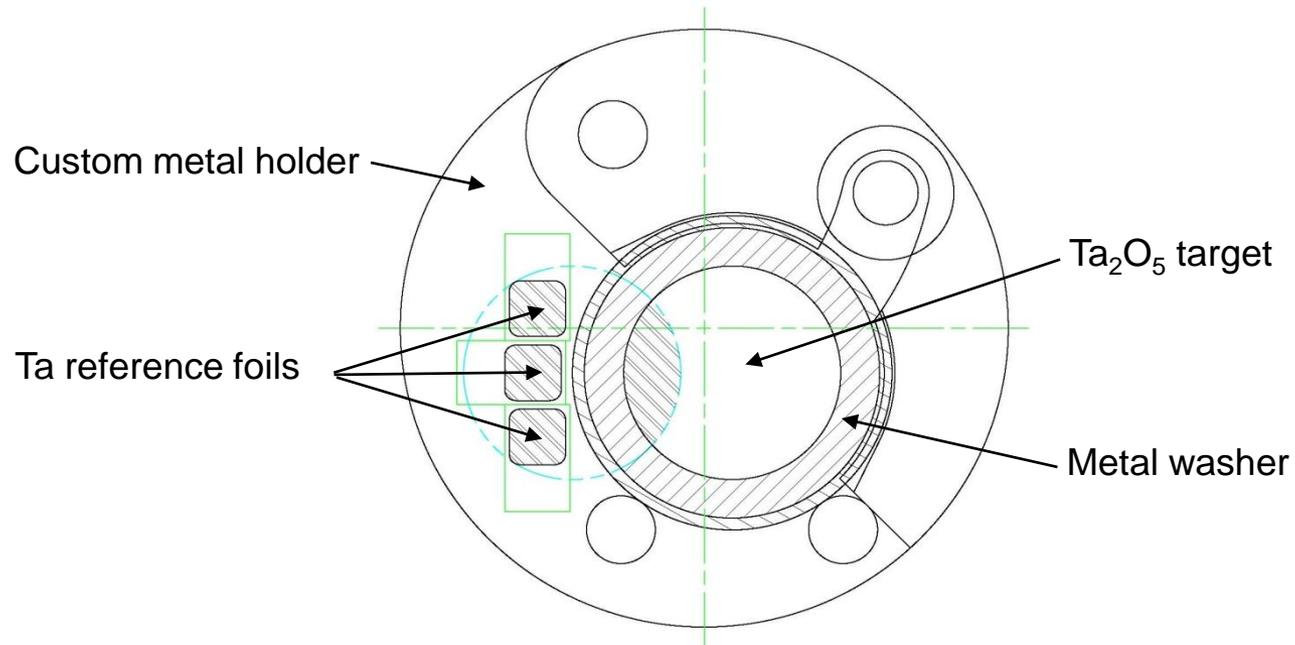
LLNL-TR-416054

Background information for the digital radiography data collection



- Digital radiography data was collected for three NIF RadHohl 09C targets in order to characterize the edges of the features placed in the tantalum-oxide (Ta_2O_5) target material.
- The features for two of the targets, labeled as 18 and 19, were milled by LLNL TFAB (Rick Vargas). The features for the other target, labeled as GA, were laser cut by General Atomics (GA).
- The Xradia Micro XCT system in B432 was used to collect the data. The system parameters were:
 - source:
 - x-ray energy = 49 kVp
 - power and current = 3.3 W and 66 μA
 - detector:
 - imaging optics magnifications = 20X
 - effective pixel widths = 0.6 μm
 - integration time = 50 s

The target was mounted on a metal washer and placed in a custom holder for the radiography.



Each target contains a specific feature.



“double-smile”
curved edges

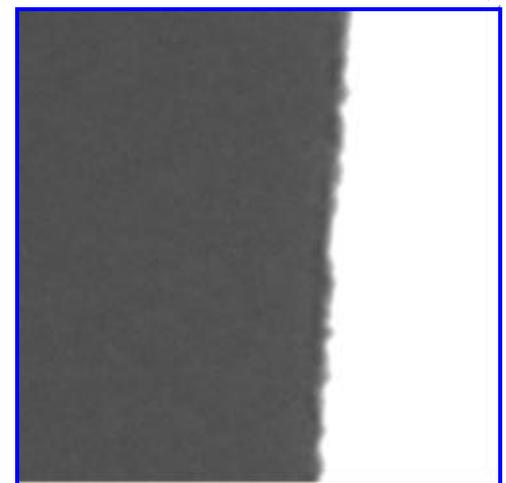
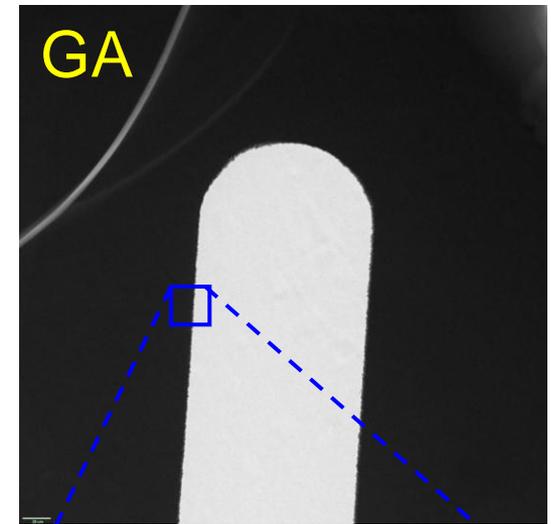
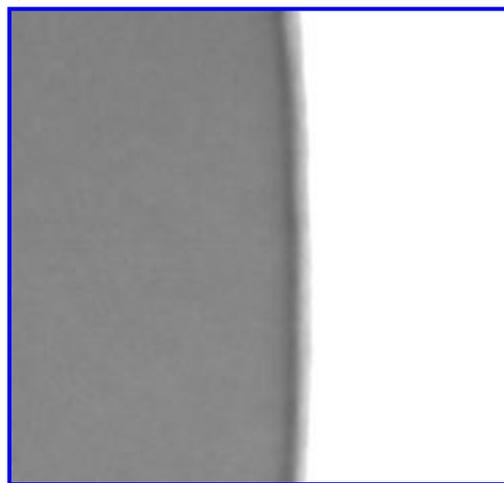
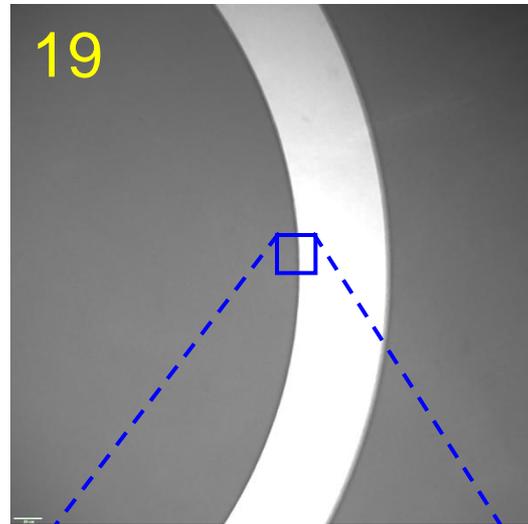
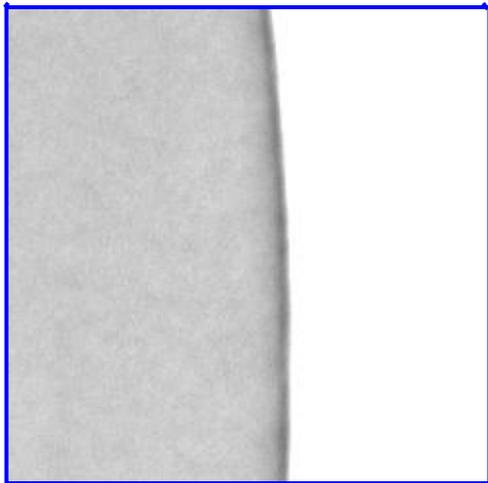
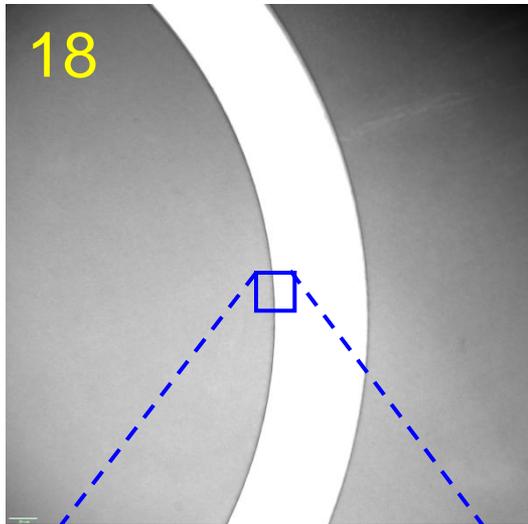


“double-smile”
curved edges

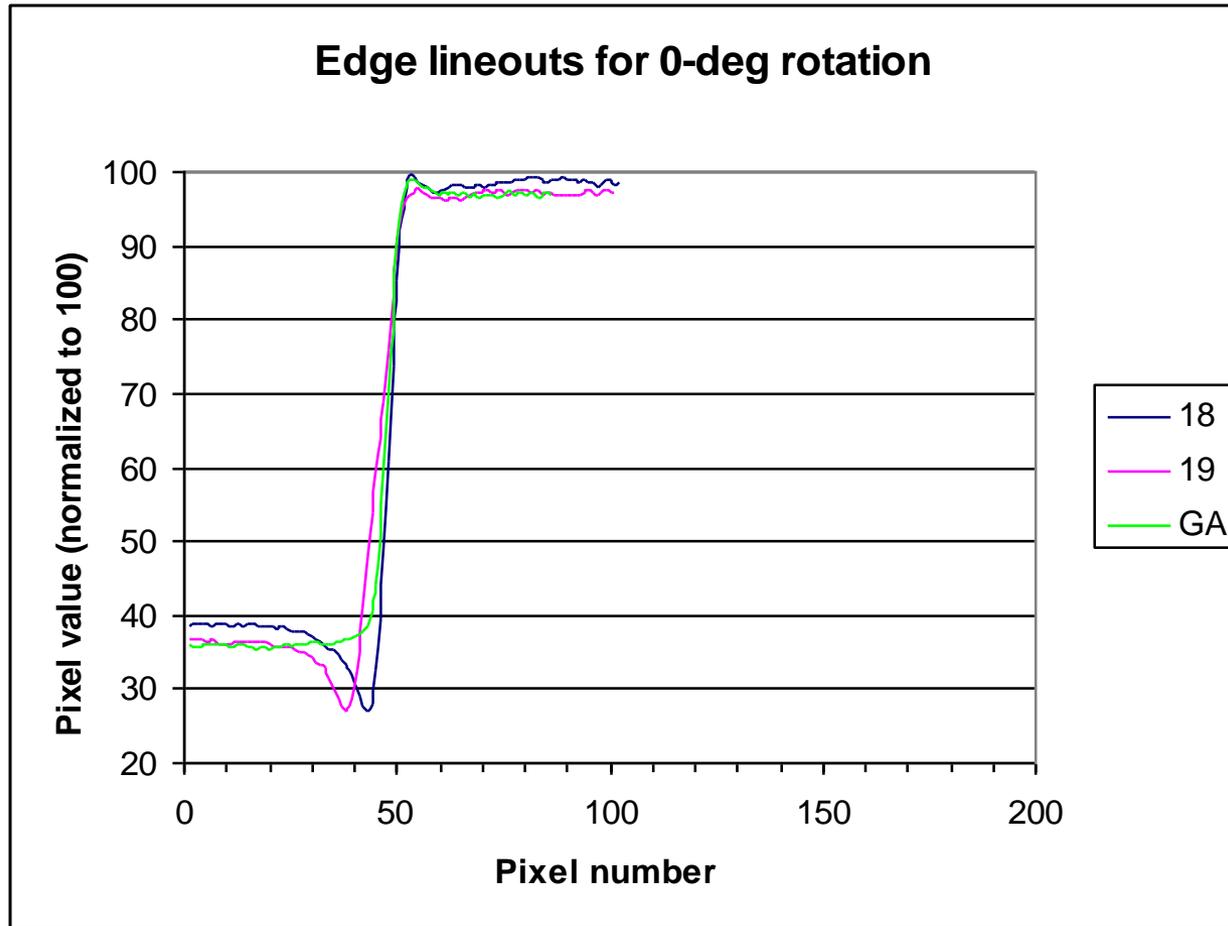


“double-Y”
straight edges

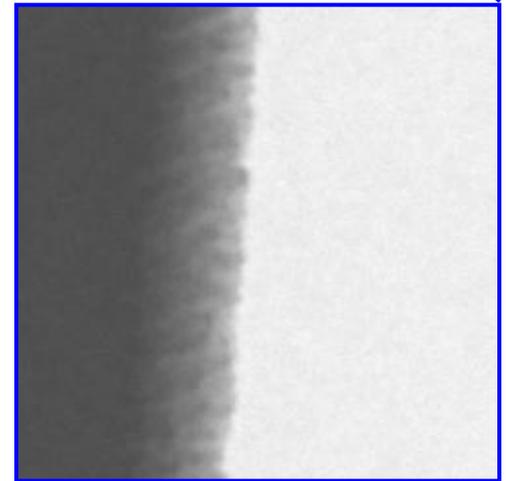
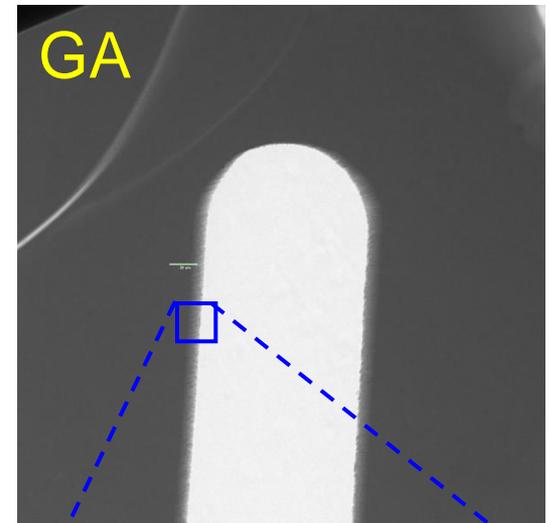
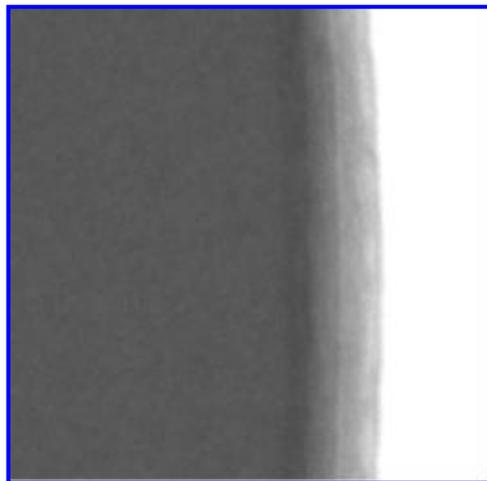
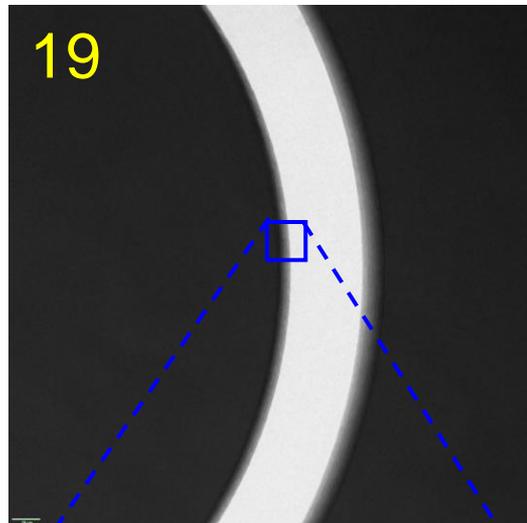
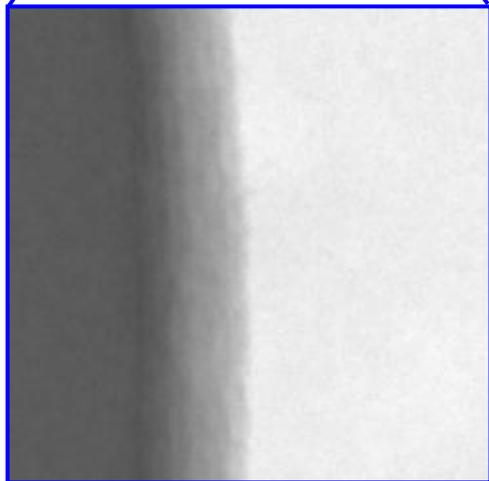
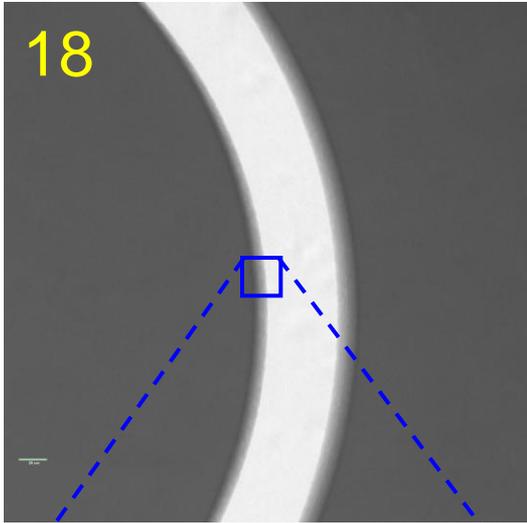
Data was collected for the target face normal rotated at 0 degrees with respect to the x-ray beam.



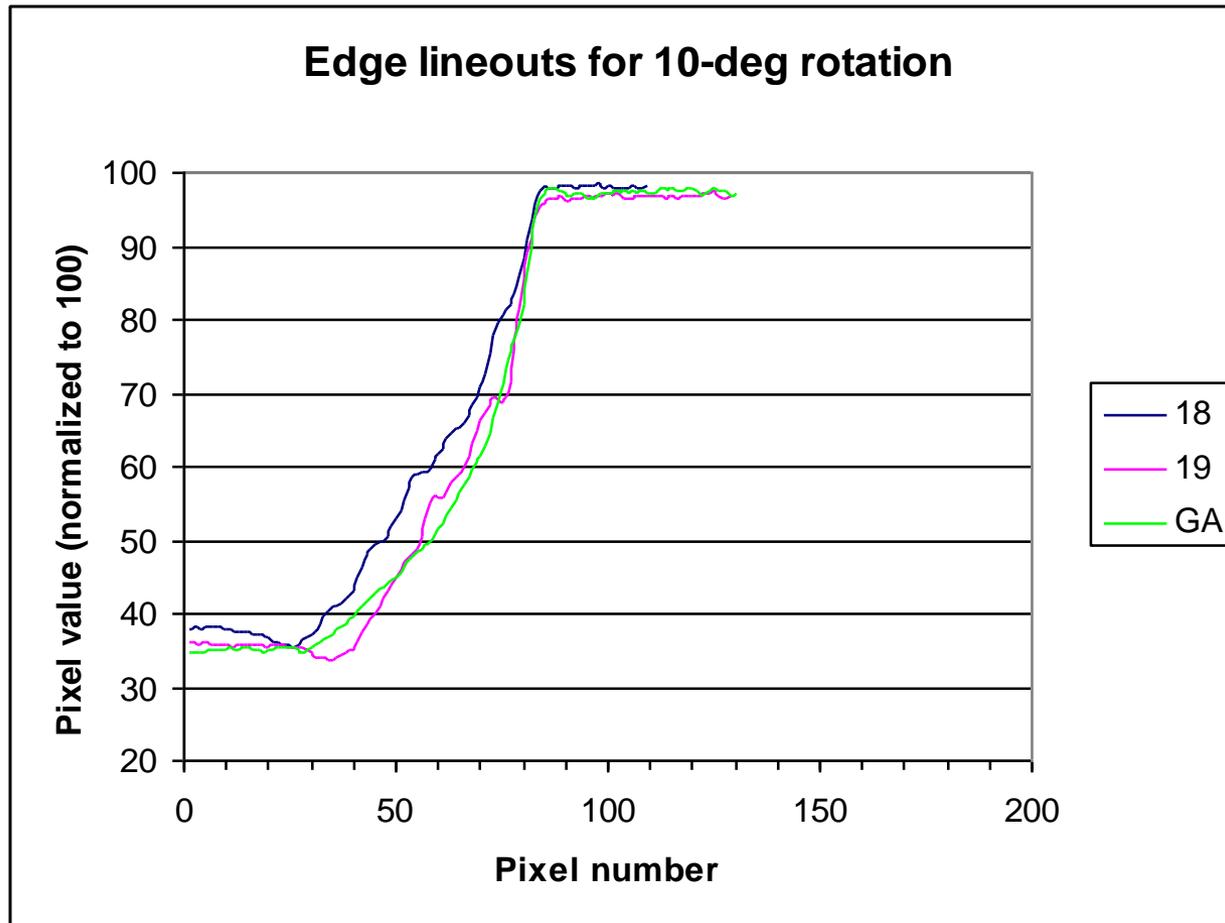
Lineout data for an edge of the feature within each target was plotted.



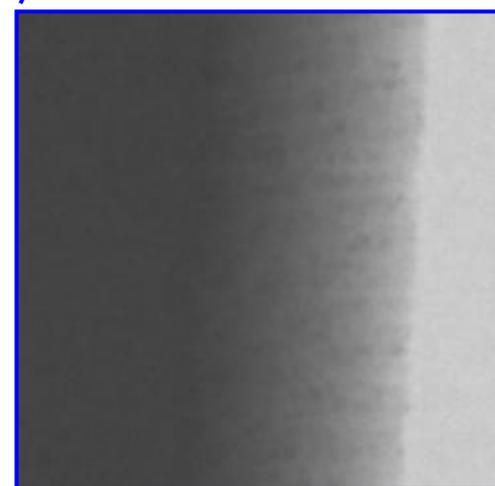
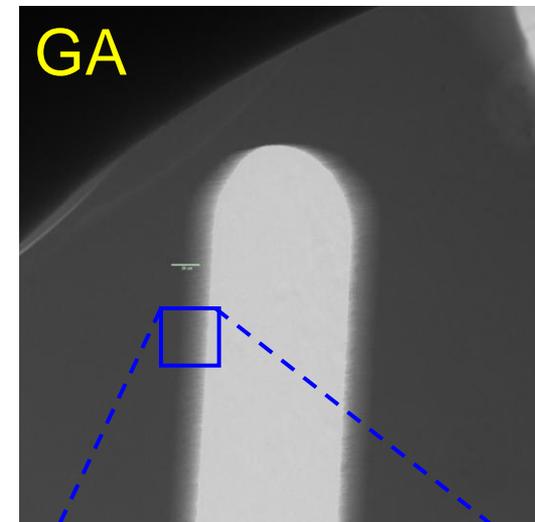
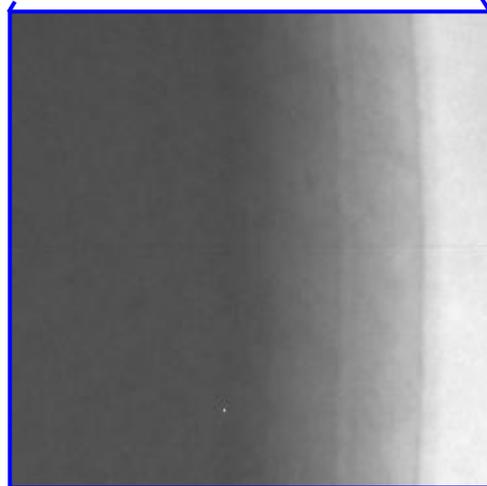
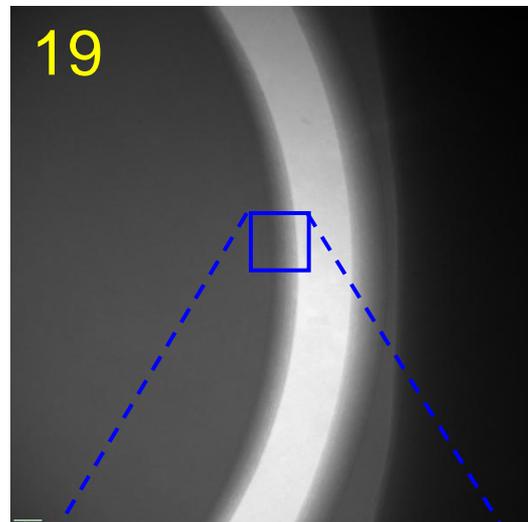
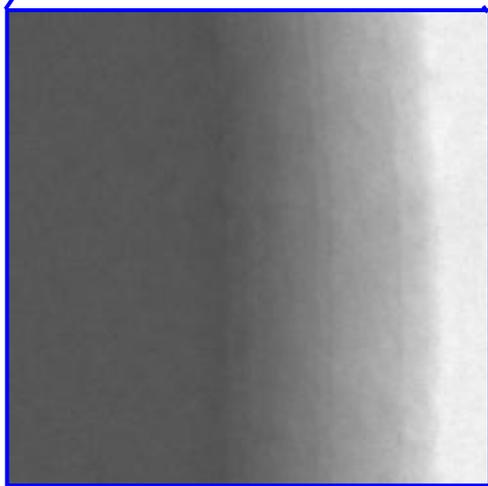
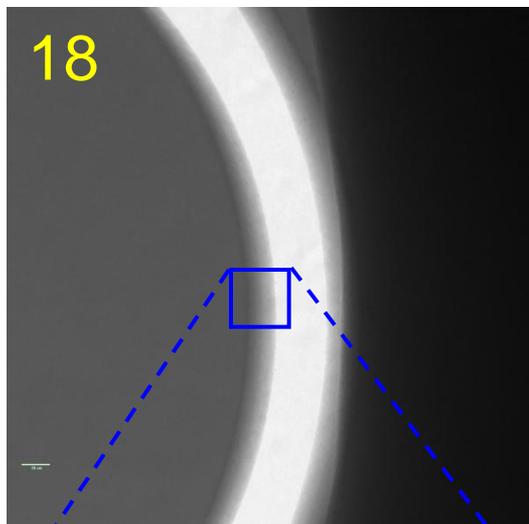
Data was collected for the target face normal rotated at 10 degrees with respect to the x-ray beam.



Lineout data for an edge of the feature within each target was plotted.



Data was collected for the target face normal rotated at 20 degrees with respect to the x-ray beam.



Lineout data for an edge of the feature within each target was plotted.



Summary



- Digital radiography data was collected for three NIF RadHohl 09C targets in order to characterize the edges of the features placed in the tantalum-oxide (Ta_2O_5) target material.
- Radiographs of an edge for each target were compared for each of three target rotations.
- Lineouts of the sample pixel values across each edge in each case were generated and plotted.
- The raw data for the lineouts has been stored in an accompanying Excel file named "20X_FeatureEdgeLineouts.xls".
- Peter Young is performing a more detailed analysis of the data in an effort to make a comparison between the quality of the edges milled by LLNL and laser cut by GA.