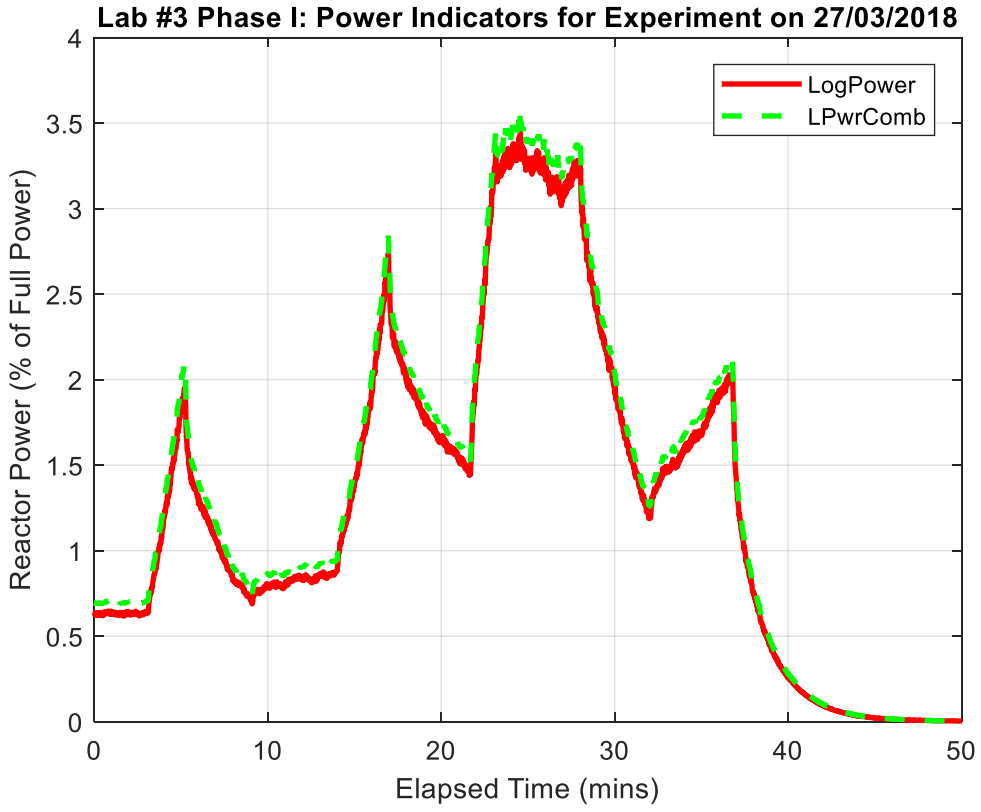
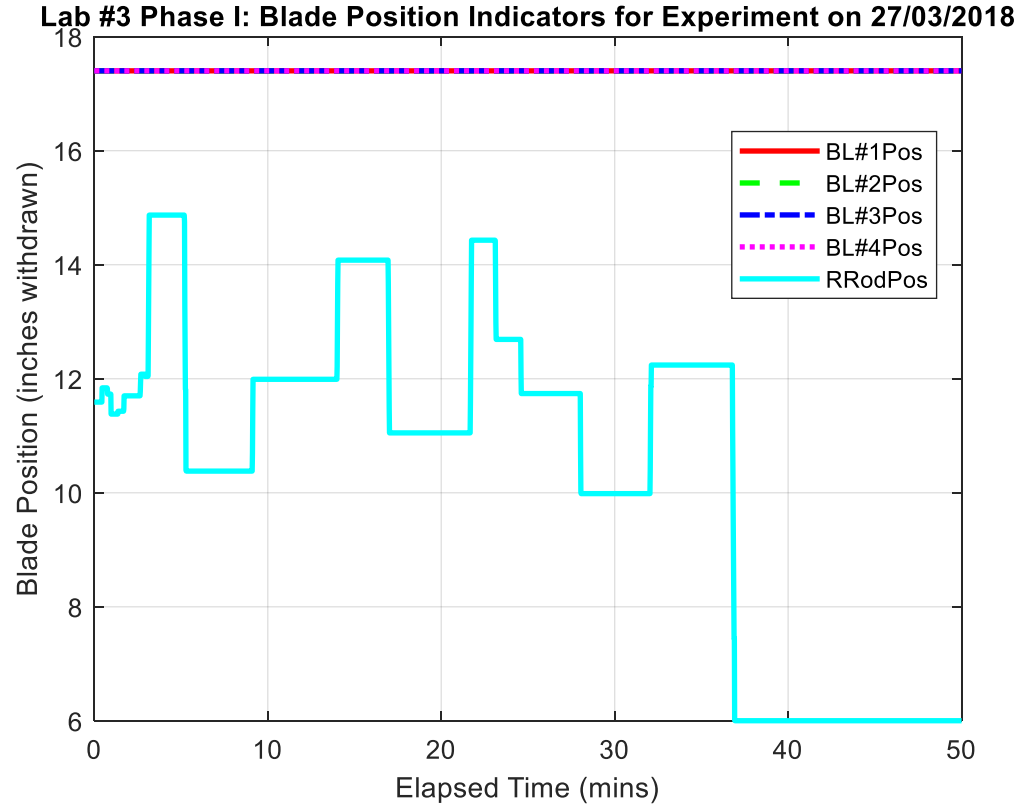
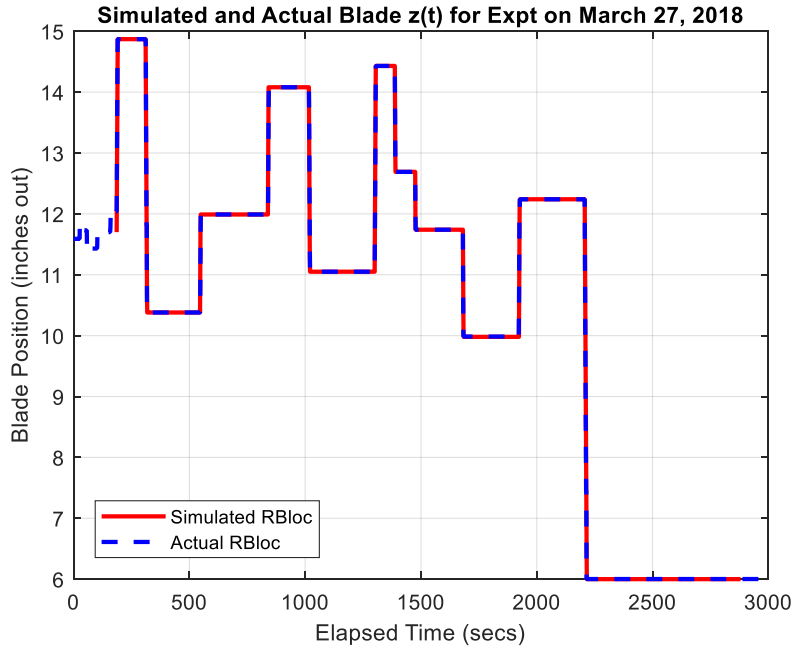
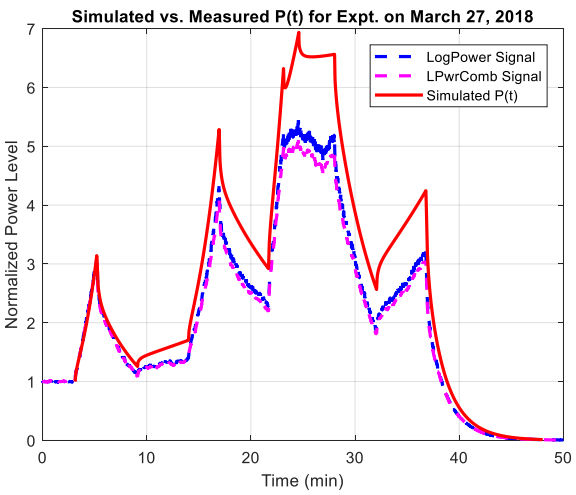

Lab #3 Phase I: Power Indicators for Experiment on 27/03/2018
LogPower
LPwrComb
Reactor Power (% of Full Power)
Elapsed Time (mins)
0
0.5
1
1.5
2
2.5
3
3.5
4
0
10
20
30
40
50

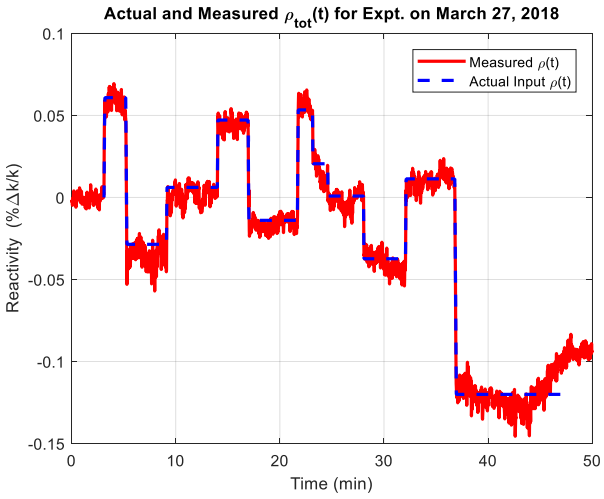

Lab #3 Phase I: Blade Position Indicators for Experiment on 27/03/2018
BL#1Pos
BL#2Pos
BL#3Pos
BL#4Pos
RRodPos
Blade Position (inches withdrawn)
Elapsed Time (mins)
6
8
10
12
14
16
18
0
10
20
30
40
50

The following simulation results use the RegBlade curve from January 2018…

Also, as apparent from the blade position vs. time curve, this set of results used exactly the same z(t) as recorded during the reactor run.

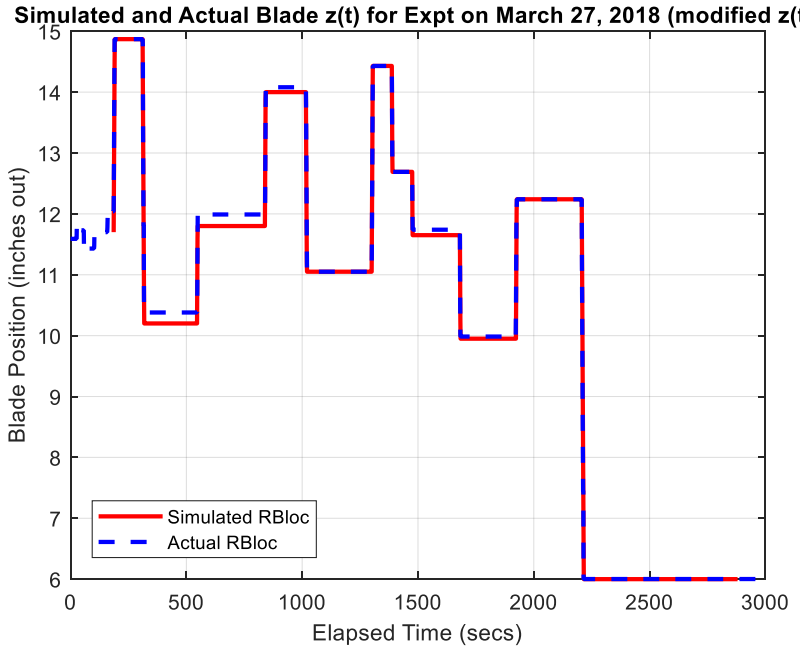


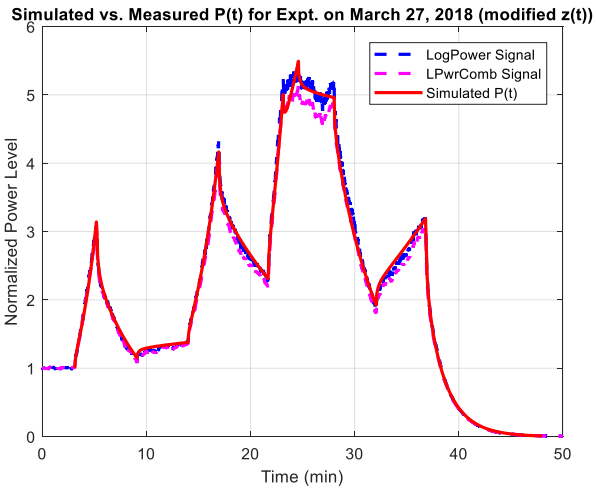


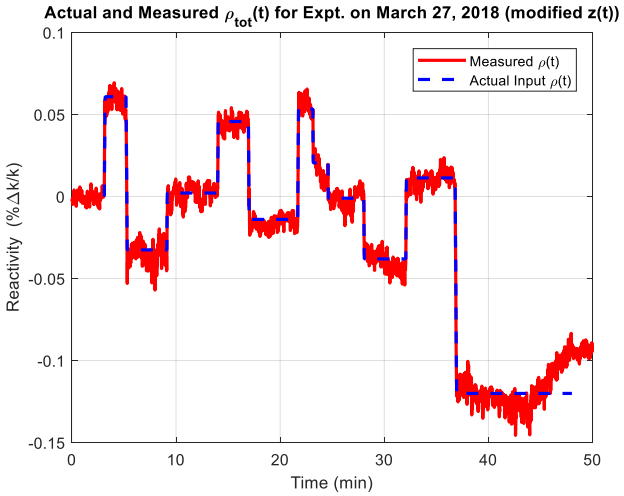


The following simulation results use the RegBlade curve from January 2018…

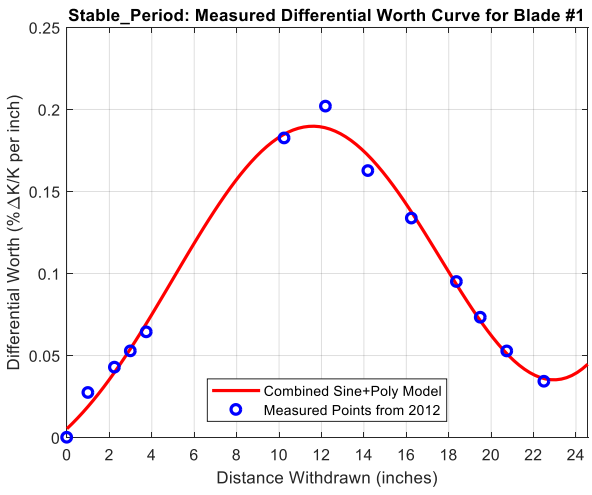
Also, as seen in the blade position vs. time curve, this set of results used a slightly modified z(t) which was chosen to give better P(t) and ρ(t) comparisons.

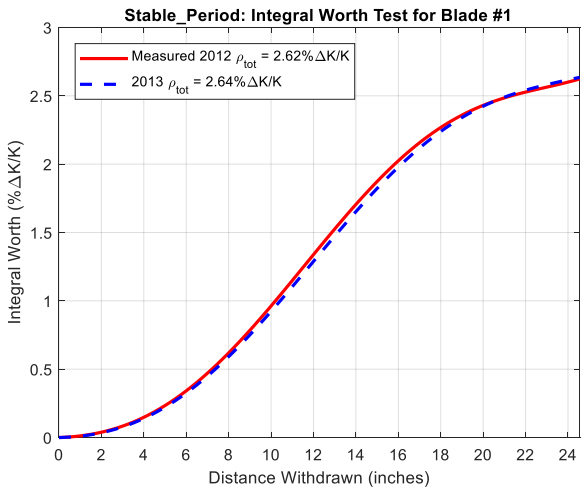






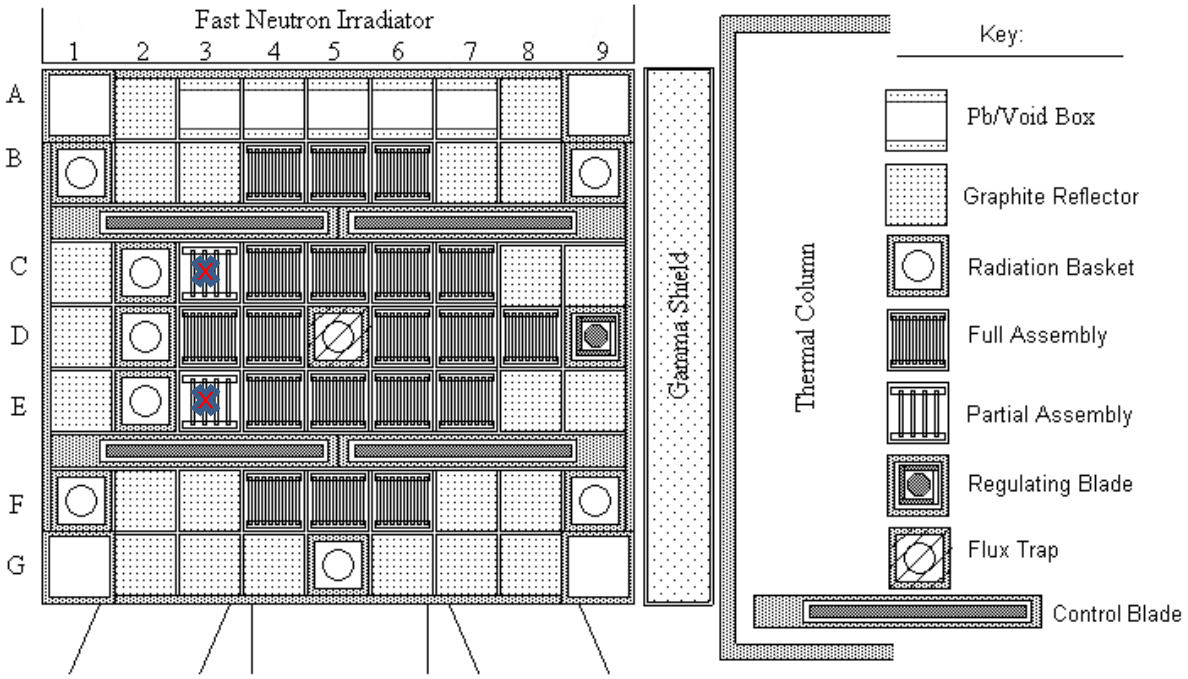
```
>> bw1_stable_period_post2012

  Raw Measured + Computed Data from March 2012
    Initial Ht.      Final Ht.    Doubling Time     Midpoint     Diff. Worth
       (in)            (in)          (sec)           (in)      (%Dk/k per in)
       0.00            0.00           0.0            0.00         0.0000
       0.00            2.00         102.9            1.00         0.0273
       1.00            3.50          43.2            2.25         0.0427
       2.00            4.00          44.1            3.00         0.0527
       3.00            4.50          49.9            3.75         0.0643
      10.00           10.50          53.7           10.25         0.1825
      12.00           12.40          63.1           12.20         0.2019
      14.00           14.40          83.2           14.20         0.1626
      16.00           16.50          80.4           16.25         0.1336
      18.00           18.75          74.2           18.38         0.0950
      19.00           20.00          71.7           19.50         0.0732
      20.00           21.50          65.0           20.75         0.0526
      21.50           23.50          78.2           22.50         0.0342

  Coeffs for Combined Poly-Sinusoid Differential Worth Model:
      8.6947e-02   1.2239e-02  -1.2951e-03   3.5100e-05  -8.1554e-02

  Curve fit coeff of determination (r-squared):              0.9912
  Total worth based on curve fit using 2012 data (%Dk/k):    2.6229
  2013 total worth of Blade 1 (%Dk/k):                       2.6350
  Jan2018 total worth of Blade 1 (%Dk/k):                    2.8488
```





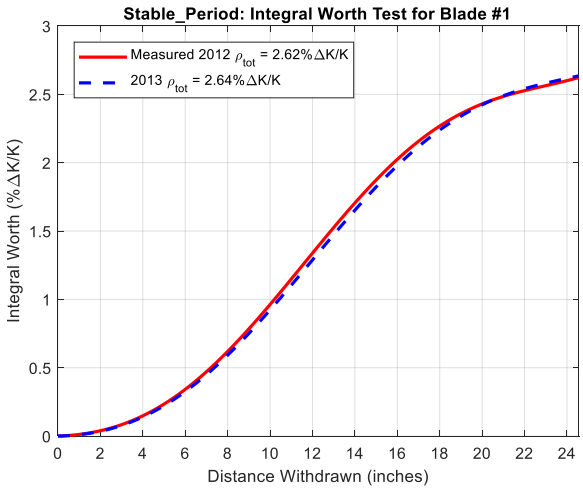
Note: The UMLRR staff started using the inverse kinetics method in 2013 to do the blade calibrations. Therefore, the last time the Stable Period Method was used was in 2012. Here we compare the Blade 1 integral worth curves from 2012 using the Stable Period Method with the 2013 curve generated with the Inverse Kinetics Method. In 2012 and 2013 the M-2-5 core configuration was the given core layout.

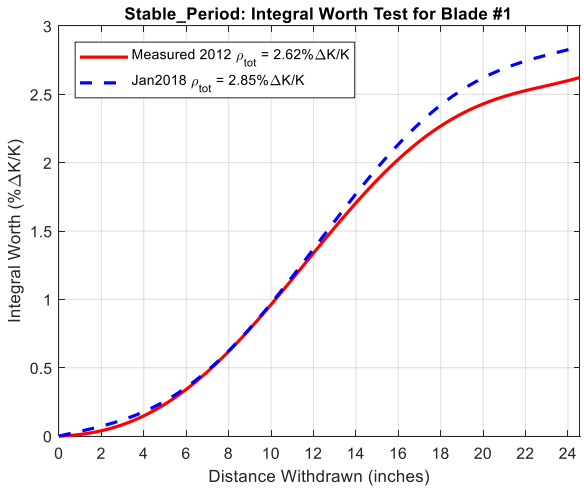
A similar comparison is made below to the current (2018) Blade 1 curves for the M-5-8 core, but here the core configuration is different, so it is expected that the total worth will be different (expected to be greater since the two partial elements in C3 and E3 have been replaced with full fuel elements).



Rough sketch of the M-2-5 core configuration for the UMLRR.

Note that, for the M-5-8 core, the two partial full elements are now full fuel assemblies.





```
>> critical_height(h,c)
```

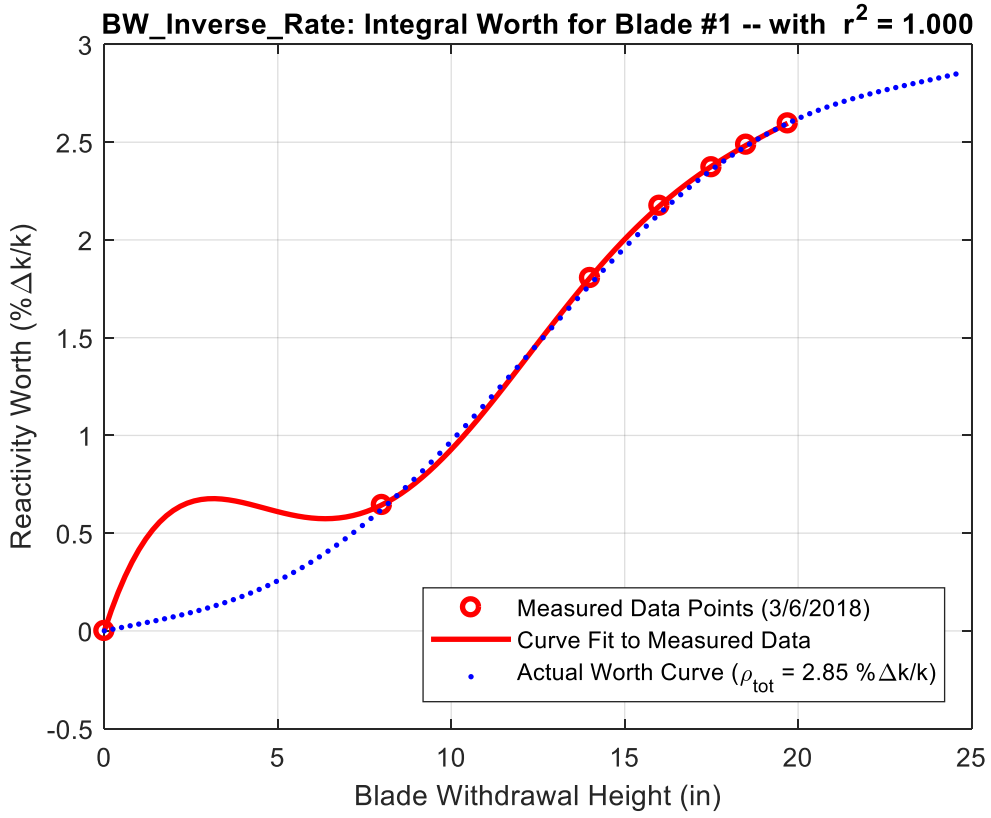
Post analysis data from umlrr_data GUI…

Summary Data for 1/M Plot and Estimate of Critical Height

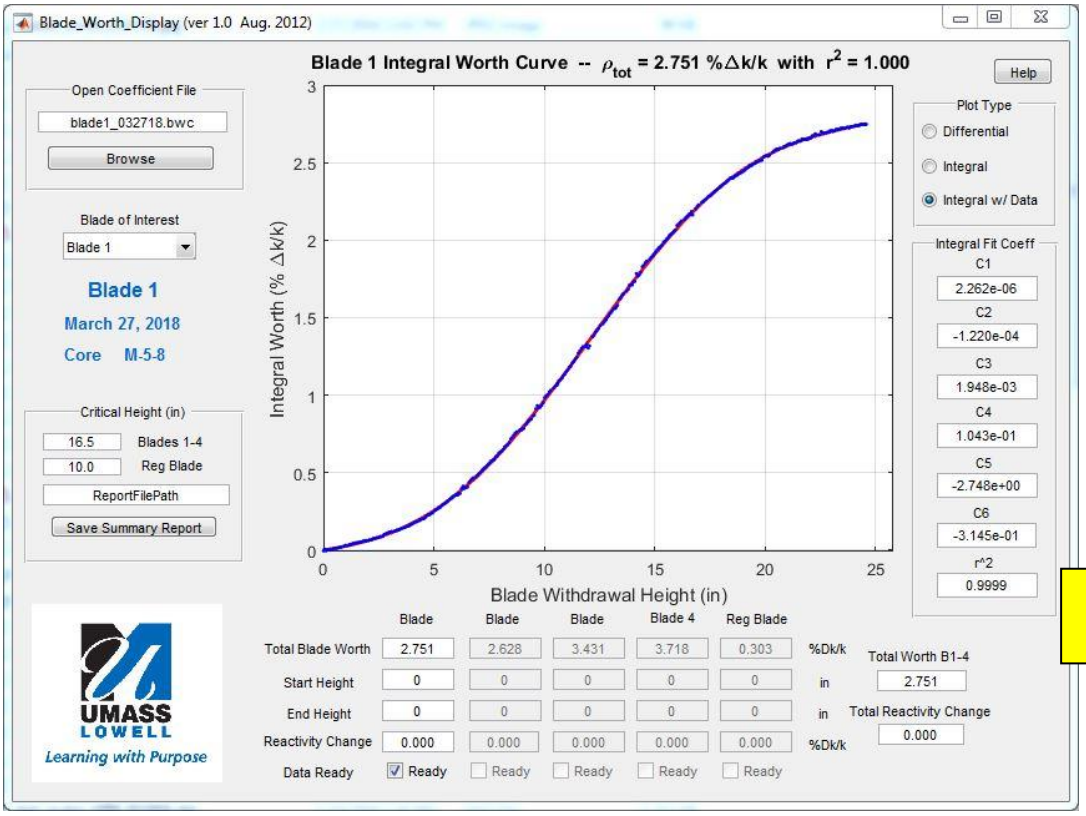
Expt. Pt	Blade Pos. (inches out)	Count Rate (cps)	M = Ci/Co	1/M	Est. Crit. Ht. (inches out)
0	0.000	19	1.00	1.000	
1	8.000	25	1.32	0.760	33.333
2	14.000	59	3.11	0.322	18.412
3	16.000	100	5.26	0.190	18.878
4	17.500	163	8.58	0.117	19.881
5	18.500	258	13.58	0.074	20.216
6	19.700	575	30.26	0.033	20.677

Columns 2 and 3 in the above table (from the Approach to Critical Lab on March 6, 2018) were used to generate the partial blade worth curve using the Inverse Count Rate Method.

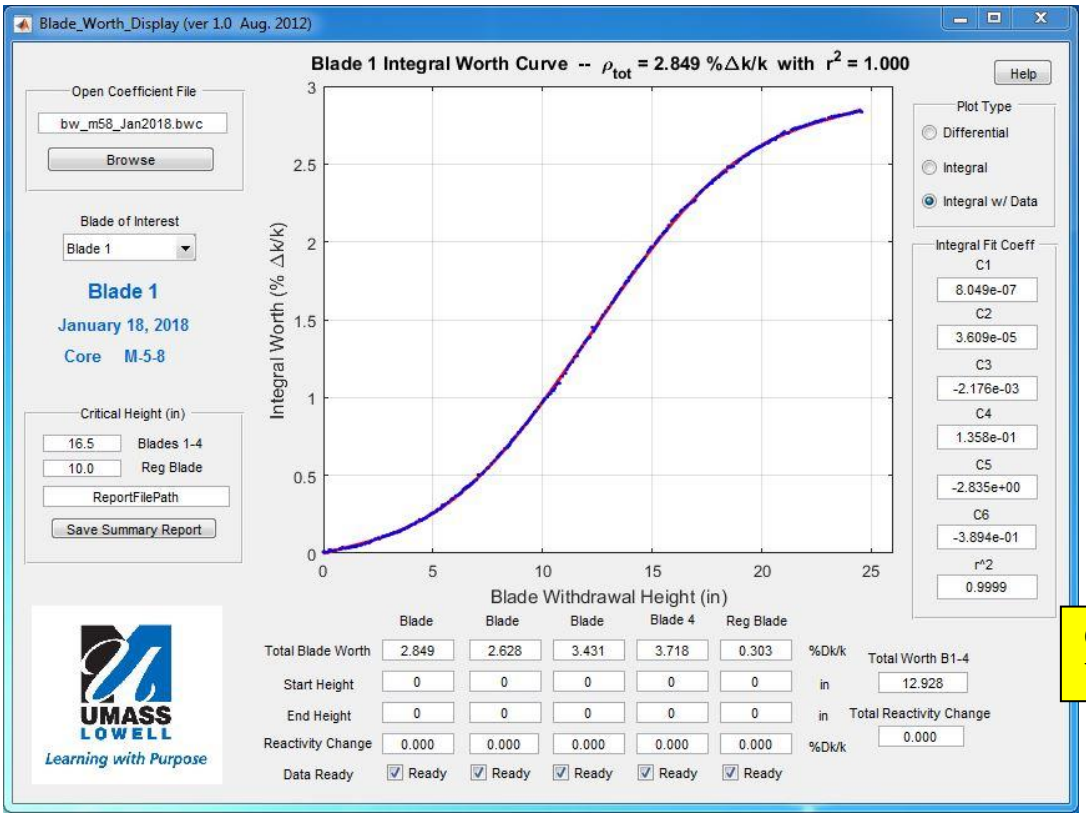
The following comparison uses the measured full Blade 1 curve from January 2018…



Clearly, the poor comparison towards the lower end of the curve suggests that an additional point or two are needed in the 0 – 8-inch range. Also, if this profile was to be used in practice, then the upper part of the blade traverse would also be needed to complete the full integral blade worth curve using the Inverse Count Rate Method…



Current Experiment



Current Blade Worth Curves