

Results for filtExample_3.5 : Crack Propagation Int. Pipe Surface Flaw

Author: edit file makereport3 to change

Affiliation:

Sat Nov 2 12:42:56 EDT 2013

Simulation input data:

B= 10.0 mm

r_i= 50. mm

a₀= 0.5 mm

c₀= 4.0 mm

#MATERIAL= merged_a36_fitted.html

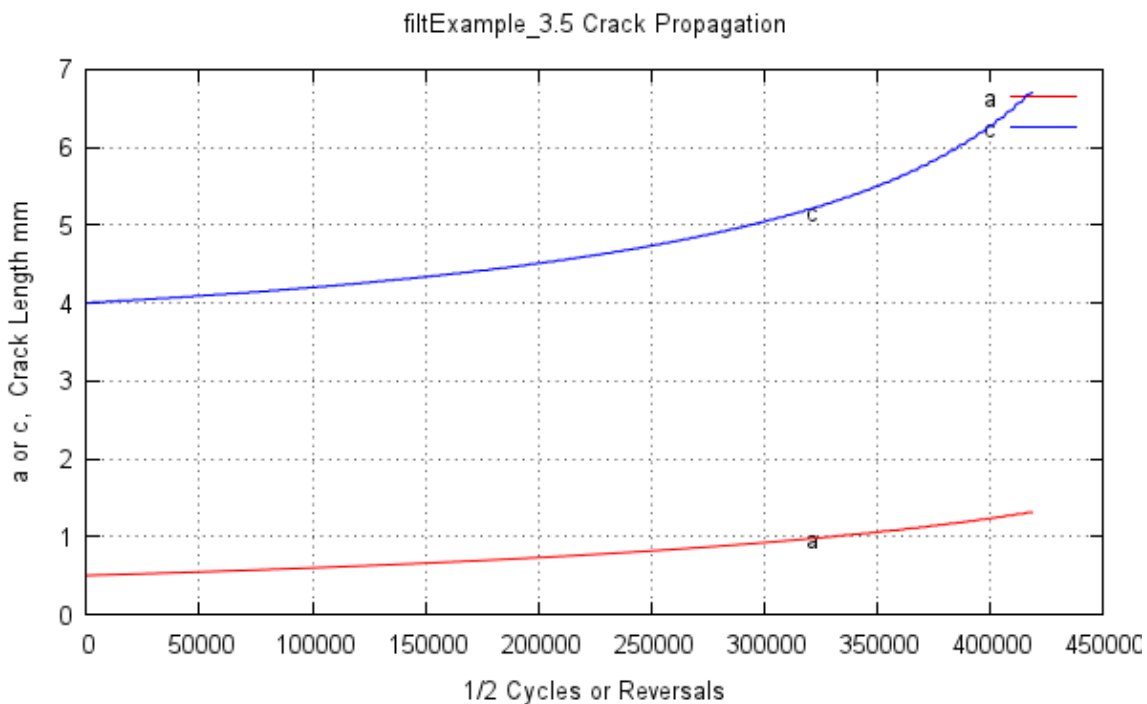
#TYPE= pipe_inside_surface_flaw

#ACTIVATE_MmMb= 1 _____#ACTIVATE_MkmMkb= 0 _____#ACTIVATE_fw= 0

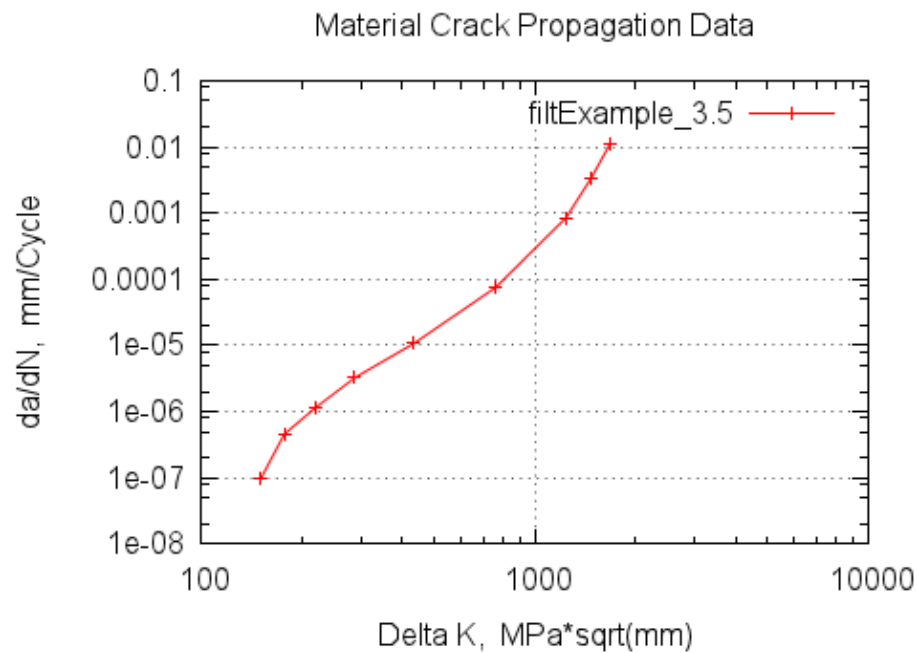
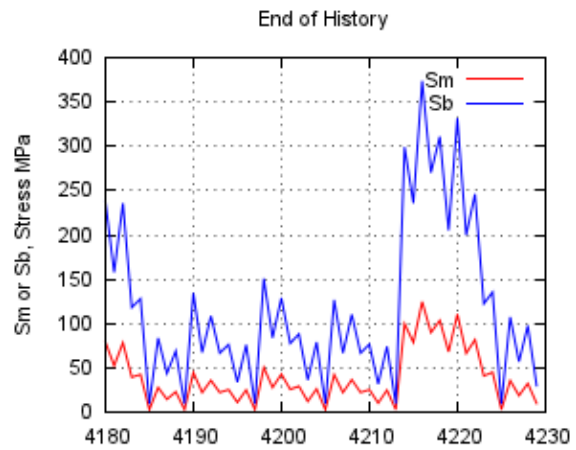
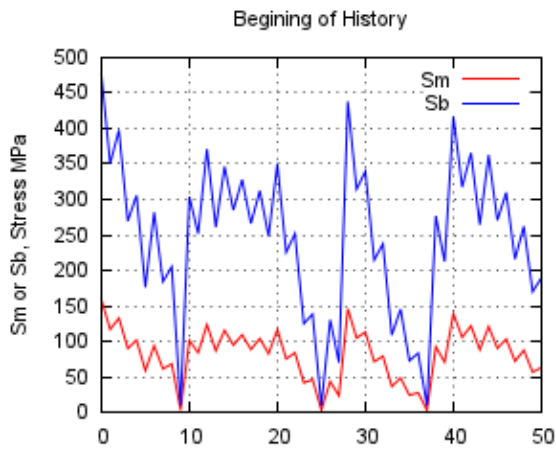
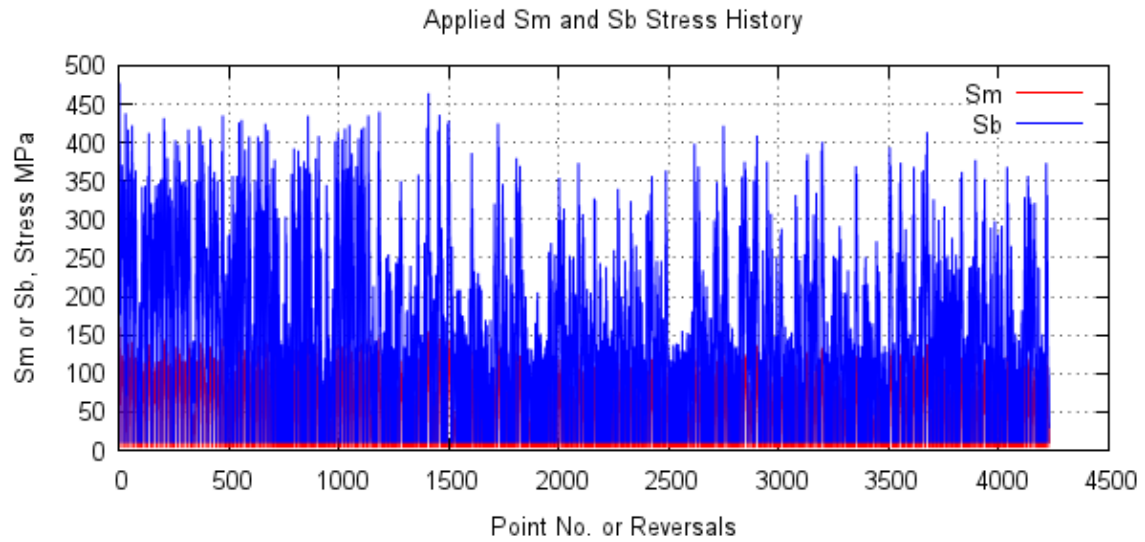
Crack Propagation Results:

(# pipeIntSurfFlaw.f vers. 3.10 # makereport1 vers. 2.1

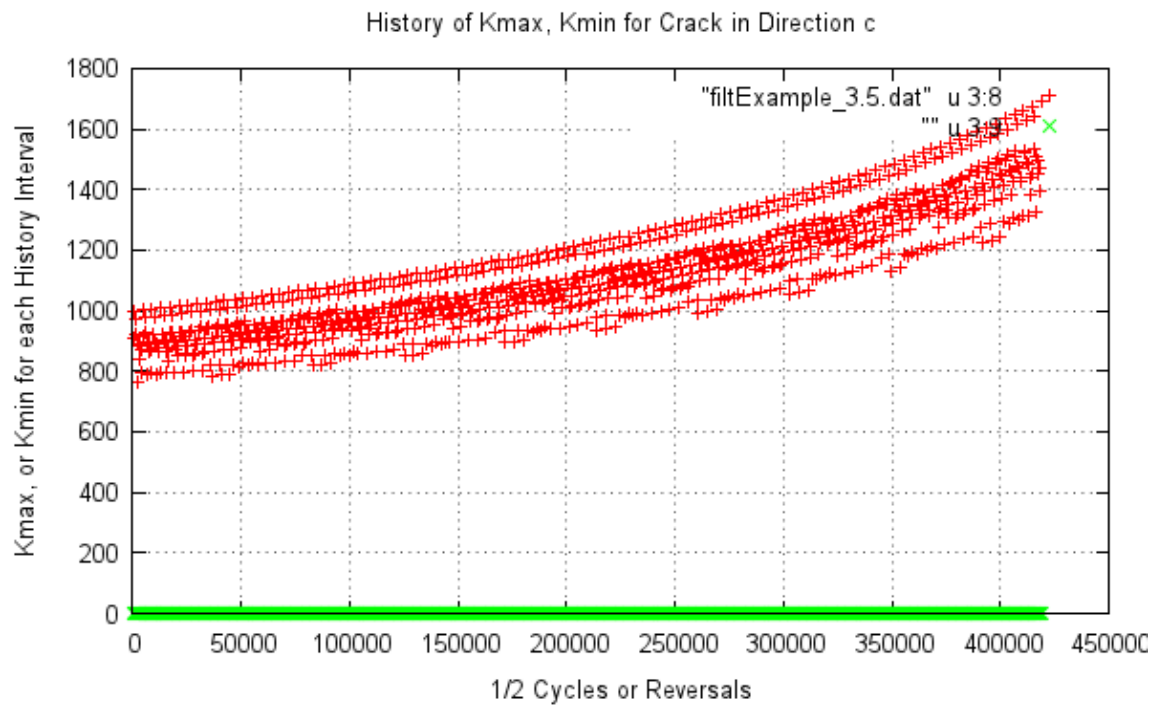
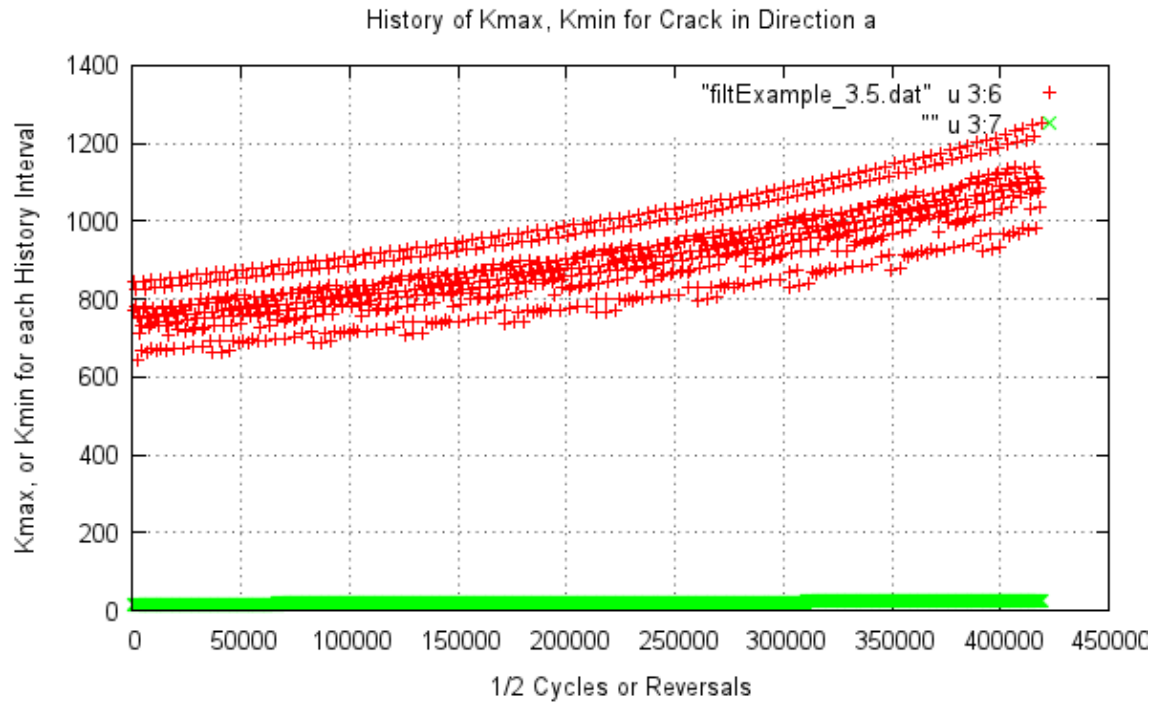
- No. of Reversals= 418771 revs. or 209386 cycles
- Final _____ **a** = 0.131E+01 mm
- Final _____ **c** = 0.670E+01 mm
- No. of History Reprs.= 100 reps. + 1 revs.
- No. records = 418772 in random access data file



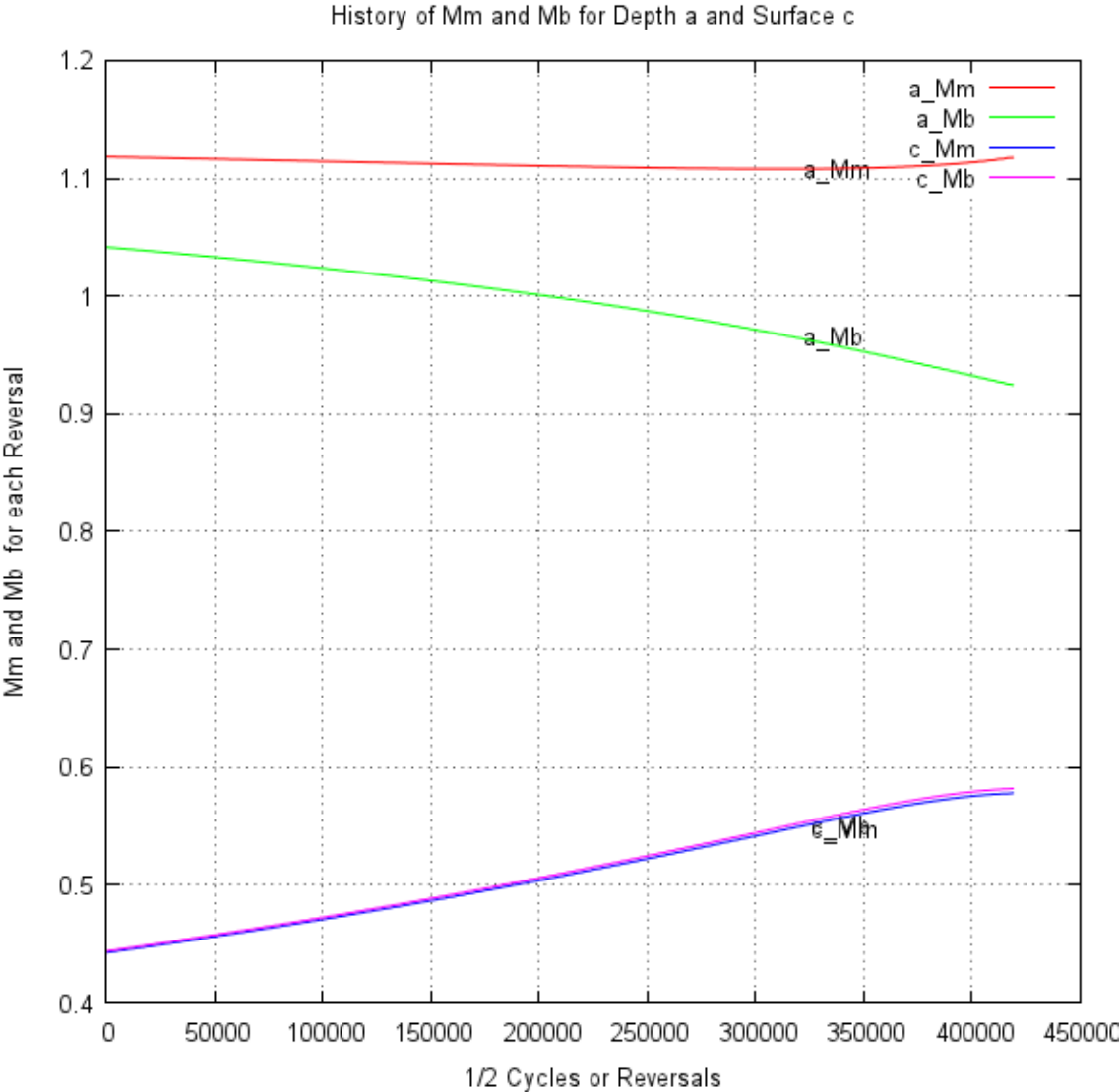
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Results for filtExample_3.5 : Crack Propagation Int. Pipe Surface Flaw

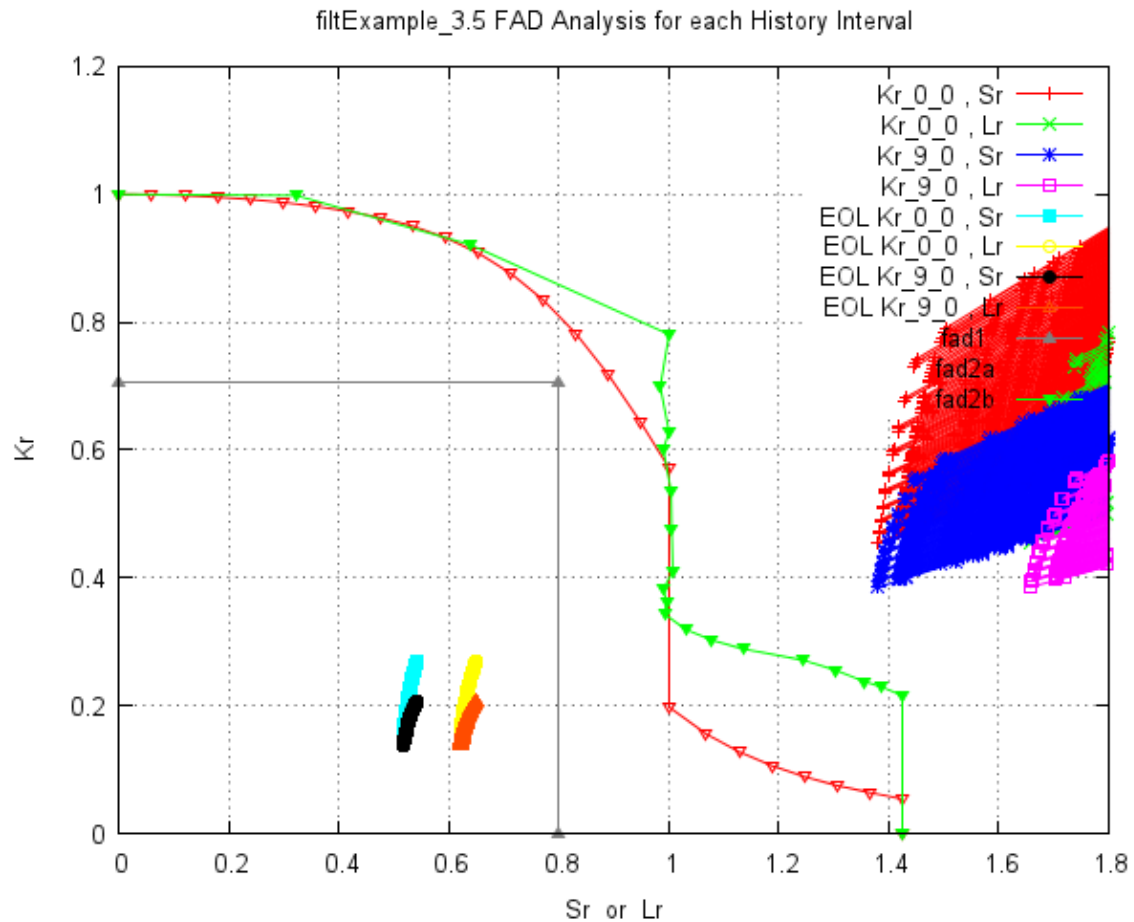


FAD Results for filtExample_3.5

#TensileFile= a36_Mattos_mono_engrSS_FLAT.txt

#PmEOL= 70. #PbEOL= 100.

#Kmat= 1675.



Crack Initiation Life Results for filtExample_3.5 (Assume $K_t = 1.8$ for welds)

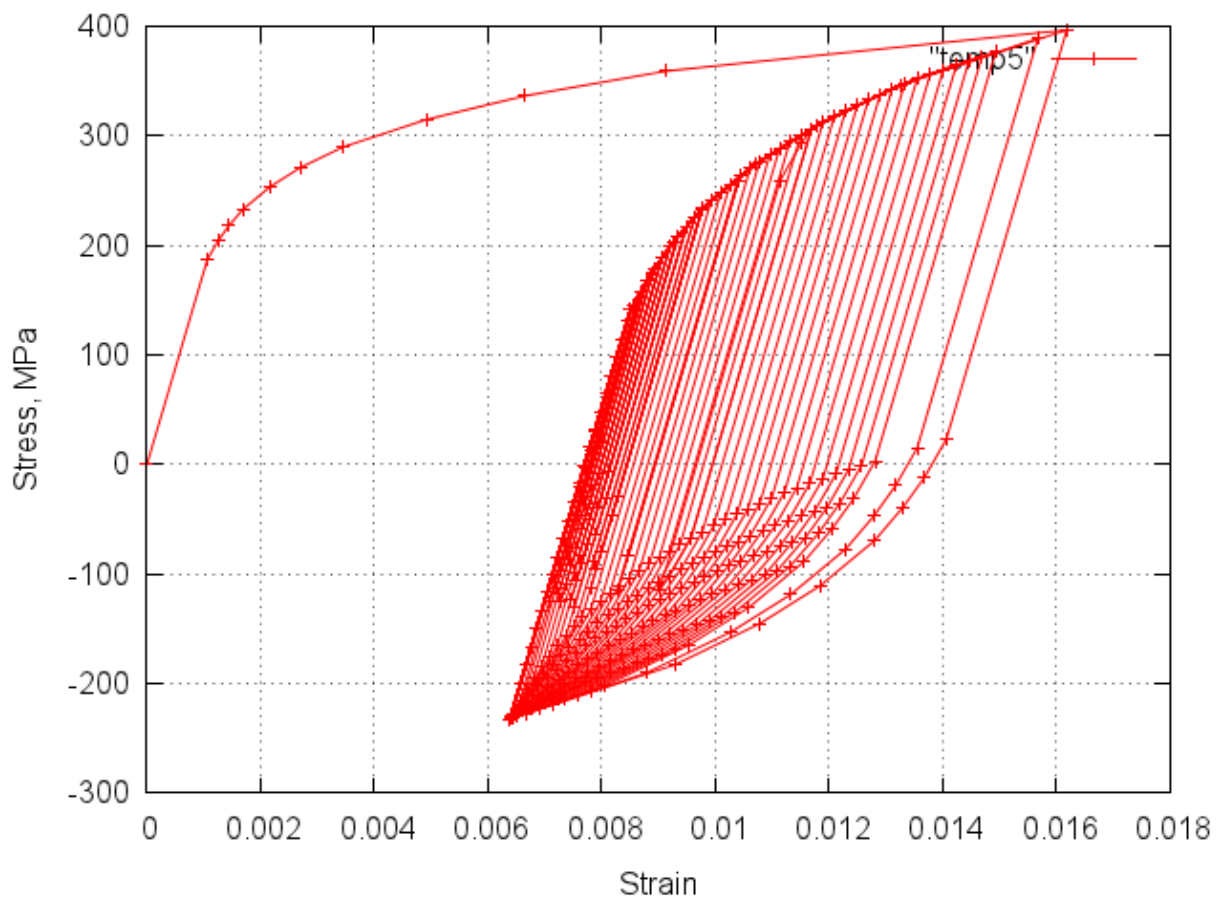
Files Used:

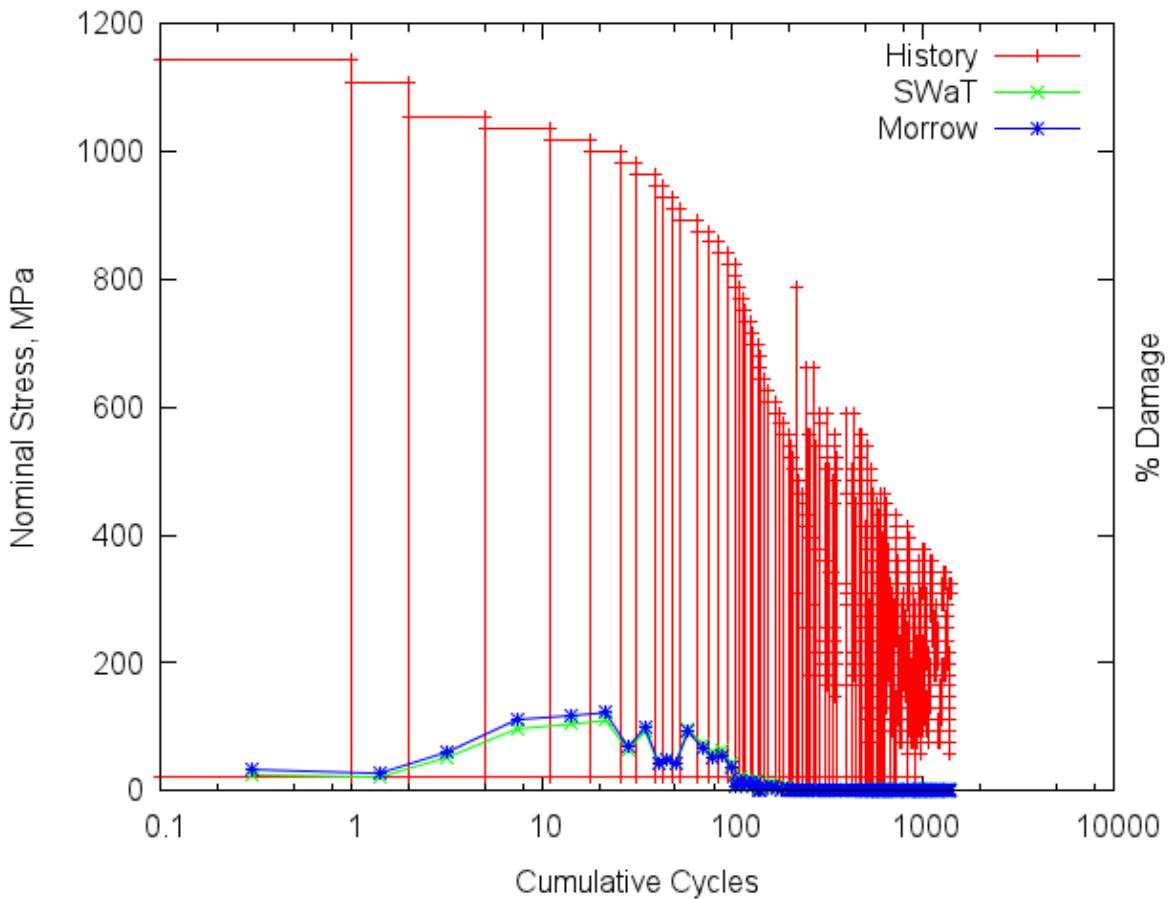
- Stress History (Sb+Sm)
- Rainflow File
- Material File

Predicted History Repetitions to Initiation:

| StrainLife_Reps | SWaT_Life_Reps | StressLife_Reps | Morrow_Reps | Goodman_Reps | (Reps= Repetitions) |
|-----------------|----------------|-----------------|-------------|--------------|---------------------|
| 194.5 | 136.1 | 194.5 | 89.1 | 49.4 | |

Local Stress and Strain Response:



Cumulative Cycle Plot of History and Damage:

(Rectangles are Rainflow Cycle Sets: Sorted by Range: largest on Left)

Detailed Damage for each Rainflow Cycle Set:

| Loop | Smax | Smin | N | Sigmax | Sigmin | Delta | Epsmax | Epsmin | DeltaEps | %Eps | %SWaT | %Sts | %Morrow |
|------|--------|------|------|--------|--------|-------|---------|---------|----------|------|-------|------|---------|
| 1 | 1143.0 | 22.7 | 1.0 | 397. | -233. | 629. | 0.01618 | 0.00638 | 0.00980 | 1.9 | 2.1 | 1.9 | 2.8 |
| 2 | 1107.0 | 22.7 | 1.0 | 389. | -233. | 621. | 0.01567 | 0.00638 | 0.00929 | 1.7 | 1.8 | 1.7 | 2.3 |
| 3 | 1053.0 | 22.7 | 3.0 | 377. | -233. | 610. | 0.01493 | 0.00638 | 0.00855 | 4.1 | 4.4 | 4.1 | 5.1 |
| 4 | 1035.0 | 22.7 | 6.0 | 373. | -233. | 605. | 0.01469 | 0.00638 | 0.00831 | 7.6 | 8.1 | 7.6 | 9.3 |
| 5 | 1017.0 | 22.7 | 7.0 | 369. | -233. | 601. | 0.01446 | 0.00638 | 0.00808 | 8.2 | 8.7 | 8.2 | 9.8 |
| 6 | 1000.8 | 22.7 | 8.0 | 365. | -233. | 598. | 0.01424 | 0.00638 | 0.00786 | 8.7 | 9.2 | 8.7 | 10.2 |
| 7 | 982.8 | 22.7 | 5.0 | 361. | -233. | 593. | 0.01401 | 0.00638 | 0.00763 | 5.1 | 5.3 | 5.1 | 5.7 |
| 8 | 964.8 | 22.7 | 8.0 | 357. | -233. | 589. | 0.01378 | 0.00638 | 0.00740 | 7.5 | 7.8 | 7.5 | 8.3 |
| 9 | 946.8 | 22.7 | 4.0 | 352. | -233. | 585. | 0.01355 | 0.00638 | 0.00717 | 3.5 | 3.6 | 3.5 | 3.7 |
| 10 | 928.8 | 22.7 | 5.0 | 348. | -233. | 580. | 0.01333 | 0.00638 | 0.00695 | 4.0 | 4.1 | 4.0 | 4.1 |
| 11 | 910.8 | 22.7 | 5.0 | 343. | -233. | 576. | 0.01311 | 0.00638 | 0.00673 | 3.7 | 3.7 | 3.7 | 3.6 |
| 12 | 892.8 | 22.7 | 12.0 | 338. | -233. | 571. | 0.01290 | 0.00638 | 0.00652 | 8.0 | 8.0 | 8.0 | 7.7 |
| 13 | 874.8 | 22.7 | 10.0 | 333. | -233. | 566. | 0.01269 | 0.00638 | 0.00631 | 6.1 | 6.1 | 6.1 | 5.6 |
| 14 | 858.6 | 22.7 | 9.0 | 328. | -233. | 561. | 0.01250 | 0.00638 | 0.00612 | 5.0 | 5.0 | 5.0 | 4.4 |
| 15 | 840.6 | 22.7 | 11.0 | 323. | -233. | 556. | 0.01229 | 0.00638 | 0.00591 | 5.6 | 5.4 | 5.6 | 4.7 |
| 16 | 822.6 | 22.7 | 8.0 | 318. | -233. | 550. | 0.01209 | 0.00638 | 0.00571 | 3.7 | 3.5 | 3.7 | 3.0 |
| 17 | 804.6 | 22.7 | 2.0 | 312. | -233. | 545. | 0.01189 | 0.00638 | 0.00551 | 0.8 | 0.8 | 0.8 | 0.6 |
| 18 | 786.6 | 22.7 | 3.0 | 307. | -233. | 539. | 0.01169 | 0.00638 | 0.00531 | 1.1 | 1.0 | 1.1 | 0.8 |
| 19 | 768.6 | 22.7 | 6.0 | 301. | -233. | 533. | 0.01150 | 0.00638 | 0.00512 | 2.0 | 1.8 | 2.0 | 1.4 |
| 20 | 750.6 | 22.7 | 4.0 | 295. | -233. | 527. | 0.01131 | 0.00638 | 0.00493 | 1.2 | 1.1 | 1.2 | 0.8 |
| 21 | 732.6 | 22.7 | 6.0 | 289. | -233. | 521. | 0.01113 | 0.00638 | 0.00475 | 1.6 | 1.4 | 1.6 | 1.0 |

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| | | | | | | | | | | | | | |
|----|-------|-------|------|------|-------|------|---------|---------|---------|-----|-----|-----|-----|
| 22 | 716.4 | 22.7 | 5.0 | 283. | -233. | 516. | 0.01096 | 0.00638 | 0.00458 | 1.2 | 1.0 | 1.2 | 0.7 |
| 23 | 698.4 | 22.7 | 8.0 | 277. | -233. | 510. | 0.01078 | 0.00638 | 0.00440 | 1.6 | 1.4 | 1.6 | 1.0 |
| 24 | 680.4 | 22.7 | 2.0 | 270. | -233. | 503. | 0.01061 | 0.00638 | 0.00423 | 0.4 | 0.3 | 0.4 | 0.2 |
| 25 | 662.4 | 22.7 | 2.0 | 263. | -233. | 496. | 0.01043 | 0.00638 | 0.00405 | 0.3 | 0.2 | 0.3 | 0.2 |
| 26 | 644.4 | 22.7 | 5.0 | 256. | -233. | 489. | 0.01026 | 0.00638 | 0.00389 | 0.6 | 0.5 | 0.6 | 0.3 |
| 27 | 626.4 | 22.7 | 8.0 | 249. | -233. | 481. | 0.01010 | 0.00638 | 0.00372 | 0.9 | 0.7 | 0.9 | 0.5 |
| 28 | 608.4 | 22.7 | 15.0 | 242. | -233. | 474. | 0.00993 | 0.00638 | 0.00355 | 1.4 | 1.0 | 1.4 | 0.7 |
| 29 | 590.4 | 22.7 | 10.0 | 234. | -233. | 467. | 0.00977 | 0.00638 | 0.00339 | 0.8 | 0.6 | 0.8 | 0.4 |
| 30 | 574.2 | 22.7 | 7.0 | 226. | -233. | 459. | 0.00964 | 0.00638 | 0.00326 | 0.5 | 0.3 | 0.5 | 0.2 |
| 31 | 556.2 | 22.7 | 14.0 | 217. | -233. | 450. | 0.00949 | 0.00638 | 0.00311 | 0.8 | 0.5 | 0.8 | 0.3 |
| 32 | 538.2 | 22.7 | 1.0 | 208. | -233. | 441. | 0.00934 | 0.00638 | 0.00296 | 0.0 | 0.0 | 0.0 | 0.0 |
| 33 | 520.2 | 22.7 | 7.0 | 199. | -233. | 431. | 0.00920 | 0.00638 | 0.00282 | 0.2 | 0.1 | 0.2 | 0.1 |
| 34 | 502.2 | 22.7 | 8.0 | 189. | -233. | 421. | 0.00906 | 0.00638 | 0.00268 | 0.2 | 0.1 | 0.2 | 0.1 |
| 35 | 786.6 | 307.8 | 1.0 | 307. | -114. | 421. | 0.01169 | 0.00902 | 0.00267 | 0.0 | 0.1 | 0.0 | 0.0 |
| 36 | 484.2 | 22.7 | 8.0 | 179. | -233. | 411. | 0.00892 | 0.00638 | 0.00254 | 0.2 | 0.1 | 0.2 | 0.1 |
| 37 | 466.2 | 22.7 | 6.0 | 168. | -233. | 400. | 0.00879 | 0.00638 | 0.00241 | 0.1 | 0.0 | 0.1 | 0.0 |
| 38 | 450.0 | 22.7 | 4.0 | 158. | -233. | 390. | 0.00868 | 0.00638 | 0.00230 | 0.0 | 0.0 | 0.0 | 0.0 |
| 39 | 432.0 | 22.7 | 7.0 | 146. | -233. | 379. | 0.00855 | 0.00638 | 0.00217 | 0.1 | 0.0 | 0.1 | 0.0 |
| 40 | 662.4 | 253.8 | 1.0 | 263. | -115. | 378. | 0.01043 | 0.00827 | 0.00217 | 0.0 | 0.0 | 0.0 | 0.0 |
| 41 | 414.0 | 22.7 | 9.0 | 132. | -233. | 364. | 0.00845 | 0.00638 | 0.00207 | 0.0 | 0.0 | 0.0 | 0.0 |
| 42 | 556.2 | 181.8 | 2.0 | 217. | -131. | 348. | 0.00949 | 0.00751 | 0.00198 | 0.0 | 0.0 | 0.0 | 0.0 |
| 43 | 396.0 | 22.7 | 12.0 | 115. | -233. | 347. | 0.00835 | 0.00638 | 0.00197 | 0.0 | 0.0 | 0.0 | 0.0 |
| 44 | 662.4 | 289.8 | 1.0 | 263. | -83. | 347. | 0.01043 | 0.00847 | 0.00197 | 0.0 | 0.0 | 0.0 | 0.0 |
| 45 | 590.4 | 217.8 | 2.0 | 234. | -113. | 347. | 0.00977 | 0.00781 | 0.00197 | 0.0 | 0.0 | 0.0 | 0.0 |
| 46 | 538.2 | 181.8 | 3.0 | 208. | -123. | 332. | 0.00934 | 0.00746 | 0.00188 | 0.0 | 0.0 | 0.0 | 0.0 |
| 47 | 378.0 | 22.7 | 13.0 | 98. | -233. | 331. | 0.00826 | 0.00638 | 0.00188 | 0.0 | 0.0 | 0.0 | 0.0 |
| 48 | 590.4 | 235.8 | 1.0 | 234. | -96. | 330. | 0.00977 | 0.00790 | 0.00187 | 0.0 | 0.0 | 0.0 | 0.0 |
| 49 | 574.2 | 235.8 | 1.0 | 226. | -89. | 315. | 0.00964 | 0.00785 | 0.00179 | 0.0 | 0.0 | 0.0 | 0.0 |
| 50 | 538.2 | 199.8 | 2.0 | 208. | -107. | 315. | 0.00934 | 0.00755 | 0.00179 | 0.0 | 0.0 | 0.0 | 0.0 |
| 51 | 360.0 | 22.7 | 22.0 | 81. | -233. | 314. | 0.00816 | 0.00638 | 0.00178 | 0.0 | 0.0 | 0.0 | 0.0 |
| 52 | 502.2 | 164.9 | 1.0 | 189. | -125. | 314. | 0.00906 | 0.00728 | 0.00178 | 0.0 | 0.0 | 0.0 | 0.0 |
| 53 | 590.4 | 253.8 | 2.0 | 234. | -79. | 313. | 0.00977 | 0.00800 | 0.00178 | 0.0 | 0.0 | 0.0 | 0.0 |
| 54 | 538.2 | 217.8 | 1.0 | 208. | -90. | 298. | 0.00934 | 0.00765 | 0.00169 | 0.0 | 0.0 | 0.0 | 0.0 |
| 55 | 520.2 | 199.8 | 3.0 | 199. | -99. | 298. | 0.00920 | 0.00751 | 0.00169 | 0.0 | 0.0 | 0.0 | 0.0 |
| 56 | 502.2 | 181.8 | 5.0 | 189. | -109. | 298. | 0.00906 | 0.00737 | 0.00169 | 0.0 | 0.0 | 0.0 | 0.0 |
| 57 | 342.0 | 22.7 | 17.0 | 65. | -233. | 297. | 0.00807 | 0.00638 | 0.00169 | 0.0 | 0.0 | 0.0 | 0.0 |
| 58 | 484.2 | 164.9 | 3.0 | 179. | -118. | 297. | 0.00892 | 0.00724 | 0.00169 | 0.0 | 0.0 | 0.0 | 0.0 |
| 59 | 450.0 | 147.1 | 1.0 | 158. | -124. | 282. | 0.00868 | 0.00708 | 0.00160 | 0.0 | 0.0 | 0.0 | 0.0 |
| 60 | 556.2 | 253.8 | 1.0 | 217. | -64. | 281. | 0.00949 | 0.00789 | 0.00160 | 0.0 | 0.0 | 0.0 | 0.0 |
| 61 | 538.2 | 235.8 | 2.0 | 208. | -73. | 281. | 0.00934 | 0.00774 | 0.00160 | 0.0 | 0.0 | 0.0 | 0.0 |
| 62 | 520.2 | 217.8 | 3.0 | 199. | -83. | 281. | 0.00920 | 0.00760 | 0.00160 | 0.0 | 0.0 | 0.0 | 0.0 |
| 63 | 502.2 | 199.8 | 4.0 | 189. | -92. | 281. | 0.00906 | 0.00746 | 0.00160 | 0.0 | 0.0 | 0.0 | 0.0 |
| 64 | 324.0 | 22.7 | 41.0 | 48. | -233. | 280. | 0.00797 | 0.00638 | 0.00159 | 0.0 | 0.0 | 0.0 | 0.0 |
| 65 | 466.2 | 164.9 | 1.0 | 168. | -112. | 280. | 0.00879 | 0.00720 | 0.00159 | 0.0 | 0.0 | 0.0 | 0.0 |
| 66 | 590.4 | 289.8 | 1.0 | 234. | -46. | 280. | 0.00977 | 0.00819 | 0.00159 | 0.0 | 0.0 | 0.0 | 0.0 |
| 67 | 307.8 | 22.7 | 31.0 | 33. | -233. | 265. | 0.00788 | 0.00638 | 0.00151 | 0.0 | 0.0 | 0.0 | 0.0 |
| 68 | 450.0 | 164.9 | 2.0 | 158. | -108. | 265. | 0.00868 | 0.00717 | 0.00151 | 0.0 | 0.0 | 0.0 | 0.0 |
| 69 | 502.2 | 217.8 | 2.0 | 189. | -76. | 265. | 0.00906 | 0.00756 | 0.00150 | 0.0 | 0.0 | 0.0 | 0.0 |
| 70 | 484.2 | 199.8 | 2.0 | 179. | -86. | 265. | 0.00892 | 0.00742 | 0.00150 | 0.0 | 0.0 | 0.0 | 0.0 |
| 71 | 466.2 | 181.8 | 5.0 | 168. | -97. | 265. | 0.00879 | 0.00729 | 0.00150 | 0.0 | 0.0 | 0.0 | 0.0 |
| 72 | 590.4 | 307.8 | 1.0 | 234. | -29. | 263. | 0.00977 | 0.00828 | 0.00149 | 0.0 | 0.0 | 0.0 | 0.0 |
| 73 | 450.0 | 181.8 | 3.0 | 158. | -92. | 250. | 0.00868 | 0.00726 | 0.00142 | 0.0 | 0.0 | 0.0 | 0.0 |
| 74 | 289.8 | 22.7 | 29.0 | 16. | -233. | 249. | 0.00779 | 0.00638 | 0.00141 | 0.0 | 0.0 | 0.0 | 0.0 |
| 75 | 556.2 | 289.8 | 1.0 | 217. | -31. | 248. | 0.00949 | 0.00808 | 0.00141 | 0.0 | 0.0 | 0.0 | 0.0 |
| 76 | 538.2 | 271.8 | 2.0 | 208. | -40. | 248. | 0.00934 | 0.00793 | 0.00141 | 0.0 | 0.0 | 0.0 | 0.0 |
| 77 | 520.2 | 253.8 | 1.0 | 199. | -49. | 248. | 0.00920 | 0.00779 | 0.00141 | 0.0 | 0.0 | 0.0 | 0.0 |
| 78 | 502.2 | 235.8 | 1.0 | 189. | -59. | 248. | 0.00906 | 0.00765 | 0.00141 | 0.0 | 0.0 | 0.0 | 0.0 |
| 79 | 466.2 | 199.8 | 2.0 | 168. | -80. | 248. | 0.00879 | 0.00739 | 0.00141 | 0.0 | 0.0 | 0.0 | 0.0 |
| 80 | 450.0 | 199.8 | 1.0 | 158. | -75. | 233. | 0.00868 | 0.00736 | 0.00132 | 0.0 | 0.0 | 0.0 | 0.0 |
| 81 | 414.0 | 164.9 | 3.0 | 132. | -100. | 232. | 0.00845 | 0.00713 | 0.00132 | 0.0 | 0.0 | 0.0 | 0.0 |
| 82 | 271.8 | 22.7 | 15.0 | -1. | -233. | 232. | 0.00769 | 0.00638 | 0.00132 | 0.0 | 0.0 | 0.0 | 0.0 |
| 83 | 378.0 | 129.2 | 1.0 | 98. | -133. | 231. | 0.00826 | 0.00694 | 0.00131 | 0.0 | 0.0 | 0.0 | 0.0 |

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| | | | | | | | | | | | | | |
|-----|-------|-------|------|-------|-------|------|---------|---------|---------|-----|-----|-----|-----|
| 84 | 414.0 | 181.8 | 1.0 | 132. | -85. | 216. | 0.00845 | 0.00722 | 0.00123 | 0.0 | 0.0 | 0.0 | 0.0 |
| 85 | 396.0 | 164.9 | 2.0 | 115. | -100. | 215. | 0.00835 | 0.00713 | 0.00122 | 0.0 | 0.0 | 0.0 | 0.0 |
| 86 | 253.8 | 22.7 | 10.0 | -18. | -233. | 215. | 0.00760 | 0.00638 | 0.00122 | 0.0 | 0.0 | 0.0 | 0.0 |
| 87 | 538.2 | 307.8 | 1.0 | 208. | -6. | 214. | 0.00934 | 0.00812 | 0.00122 | 0.0 | 0.0 | 0.0 | 0.0 |
| 88 | 484.2 | 253.8 | 3.0 | 179. | -36. | 214. | 0.00892 | 0.00771 | 0.00122 | 0.0 | 0.0 | 0.0 | 0.0 |
| 89 | 466.2 | 235.8 | 1.0 | 168. | -46. | 214. | 0.00879 | 0.00758 | 0.00122 | 0.0 | 0.0 | 0.0 | 0.0 |
| 90 | 342.0 | 111.6 | 1.0 | 65. | -150. | 214. | 0.00807 | 0.00685 | 0.00122 | 0.0 | 0.0 | 0.0 | 0.0 |
| 91 | 289.8 | 76.0 | 1.0 | 16. | -183. | 199. | 0.00779 | 0.00666 | 0.00113 | 0.0 | 0.0 | 0.0 | 0.0 |
| 92 | 235.8 | 22.7 | 16.0 | -34. | -233. | 198. | 0.00750 | 0.00638 | 0.00113 | 0.0 | 0.0 | 0.0 | 0.0 |
| 93 | 360.0 | 147.1 | 2.0 | 81. | -117. | 198. | 0.00816 | 0.00704 | 0.00112 | 0.0 | 0.0 | 0.0 | 0.0 |
| 94 | 342.0 | 129.2 | 3.0 | 65. | -133. | 198. | 0.00807 | 0.00694 | 0.00112 | 0.0 | 0.0 | 0.0 | 0.0 |
| 95 | 502.2 | 289.8 | 1.0 | 189. | -9. | 198. | 0.00906 | 0.00794 | 0.00112 | 0.0 | 0.0 | 0.0 | 0.0 |
| 96 | 484.2 | 271.8 | 1.0 | 179. | -19. | 198. | 0.00892 | 0.00780 | 0.00112 | 0.0 | 0.0 | 0.0 | 0.0 |
| 97 | 466.2 | 253.8 | 2.0 | 168. | -30. | 198. | 0.00879 | 0.00767 | 0.00112 | 0.0 | 0.0 | 0.0 | 0.0 |
| 98 | 450.0 | 253.8 | 3.0 | 158. | -25. | 183. | 0.00868 | 0.00764 | 0.00104 | 0.0 | 0.0 | 0.0 | 0.0 |
| 99 | 414.0 | 217.8 | 2.0 | 132. | -51. | 183. | 0.00845 | 0.00741 | 0.00104 | 0.0 | 0.0 | 0.0 | 0.0 |
| 100 | 396.0 | 199.8 | 1.0 | 115. | -68. | 183. | 0.00835 | 0.00731 | 0.00104 | 0.0 | 0.0 | 0.0 | 0.0 |
| 101 | 378.0 | 181.8 | 1.0 | 98. | -85. | 183. | 0.00826 | 0.00722 | 0.00104 | 0.0 | 0.0 | 0.0 | 0.0 |
| 102 | 217.8 | 22.7 | 18.0 | -51. | -233. | 182. | 0.00741 | 0.00638 | 0.00103 | 0.0 | 0.0 | 0.0 | 0.0 |
| 103 | 342.0 | 147.1 | 2.0 | 65. | -117. | 181. | 0.00807 | 0.00704 | 0.00103 | 0.0 | 0.0 | 0.0 | 0.0 |
| 104 | 324.0 | 129.2 | 4.0 | 48. | -133. | 181. | 0.00797 | 0.00694 | 0.00103 | 0.0 | 0.0 | 0.0 | 0.0 |
| 105 | 307.8 | 129.2 | 3.0 | 33. | -133. | 166. | 0.00788 | 0.00694 | 0.00094 | 0.0 | 0.0 | 0.0 | 0.0 |
| 106 | 450.0 | 271.8 | 1.0 | 158. | -8. | 166. | 0.00868 | 0.00774 | 0.00094 | 0.0 | 0.0 | 0.0 | 0.0 |
| 107 | 432.0 | 253.8 | 3.0 | 146. | -20. | 166. | 0.00855 | 0.00761 | 0.00094 | 0.0 | 0.0 | 0.0 | 0.0 |
| 108 | 414.0 | 235.8 | 1.0 | 132. | -34. | 166. | 0.00845 | 0.00750 | 0.00094 | 0.0 | 0.0 | 0.0 | 0.0 |
| 109 | 396.0 | 217.8 | 1.0 | 115. | -51. | 166. | 0.00835 | 0.00741 | 0.00094 | 0.0 | 0.0 | 0.0 | 0.0 |
| 110 | 289.8 | 111.6 | 2.0 | 16. | -150. | 166. | 0.00779 | 0.00685 | 0.00094 | 0.0 | 0.0 | 0.0 | 0.0 |
| 111 | 271.8 | 93.8 | 2.0 | -1. | -166. | 166. | 0.00769 | 0.00676 | 0.00094 | 0.0 | 0.0 | 0.0 | 0.0 |
| 112 | 253.8 | 76.0 | 1.0 | -18. | -183. | 165. | 0.00760 | 0.00666 | 0.00094 | 0.0 | 0.0 | 0.0 | 0.0 |
| 113 | 342.0 | 164.9 | 1.0 | 65. | -100. | 165. | 0.00807 | 0.00713 | 0.00093 | 0.0 | 0.0 | 0.0 | 0.0 |
| 114 | 199.8 | 22.7 | 7.0 | -68. | -233. | 165. | 0.00731 | 0.00638 | 0.00093 | 0.0 | 0.0 | 0.0 | 0.0 |
| 115 | 324.0 | 147.1 | 2.0 | 48. | -117. | 165. | 0.00797 | 0.00704 | 0.00093 | 0.0 | 0.0 | 0.0 | 0.0 |
| 116 | 466.2 | 289.8 | 2.0 | 168. | 4. | 164. | 0.00879 | 0.00786 | 0.00093 | 0.0 | 0.0 | 0.0 | 0.0 |
| 117 | 450.0 | 289.8 | 3.0 | 158. | 9. | 149. | 0.00868 | 0.00783 | 0.00085 | 0.0 | 0.0 | 0.0 | 0.0 |
| 118 | 432.0 | 271.8 | 1.0 | 146. | -3. | 149. | 0.00855 | 0.00771 | 0.00085 | 0.0 | 0.0 | 0.0 | 0.0 |
| 119 | 414.0 | 253.8 | 4.0 | 132. | -18. | 149. | 0.00845 | 0.00760 | 0.00085 | 0.0 | 0.0 | 0.0 | 0.0 |
| 120 | 396.0 | 235.8 | 3.0 | 115. | -34. | 149. | 0.00835 | 0.00750 | 0.00085 | 0.0 | 0.0 | 0.0 | 0.0 |
| 121 | 378.0 | 217.8 | 1.0 | 98. | -51. | 149. | 0.00826 | 0.00741 | 0.00085 | 0.0 | 0.0 | 0.0 | 0.0 |
| 122 | 342.0 | 181.8 | 1.0 | 65. | -85. | 149. | 0.00807 | 0.00722 | 0.00085 | 0.0 | 0.0 | 0.0 | 0.0 |
| 123 | 271.8 | 111.6 | 3.0 | -1. | -150. | 149. | 0.00769 | 0.00685 | 0.00085 | 0.0 | 0.0 | 0.0 | 0.0 |
| 124 | 253.8 | 93.8 | 4.0 | -18. | -166. | 149. | 0.00760 | 0.00676 | 0.00084 | 0.0 | 0.0 | 0.0 | 0.0 |
| 125 | 324.0 | 164.9 | 2.0 | 48. | -100. | 148. | 0.00797 | 0.00713 | 0.00084 | 0.0 | 0.0 | 0.0 | 0.0 |
| 126 | 181.8 | 22.7 | 5.0 | -85. | -233. | 148. | 0.00722 | 0.00638 | 0.00084 | 0.0 | 0.0 | 0.0 | 0.0 |
| 127 | 466.2 | 307.8 | 3.0 | 168. | 21. | 147. | 0.00879 | 0.00796 | 0.00084 | 0.0 | 0.0 | 0.0 | 0.0 |
| 128 | 307.8 | 164.9 | 5.0 | 33. | -100. | 133. | 0.00788 | 0.00713 | 0.00075 | 0.0 | 0.0 | 0.0 | 0.0 |
| 129 | 289.8 | 147.1 | 1.0 | 16. | -117. | 133. | 0.00779 | 0.00704 | 0.00075 | 0.0 | 0.0 | 0.0 | 0.0 |
| 130 | 271.8 | 129.2 | 2.0 | -1. | -133. | 133. | 0.00769 | 0.00694 | 0.00075 | 0.0 | 0.0 | 0.0 | 0.0 |
| 131 | 450.0 | 307.8 | 7.0 | 158. | 25. | 132. | 0.00868 | 0.00793 | 0.00075 | 0.0 | 0.0 | 0.0 | 0.0 |
| 132 | 432.0 | 289.8 | 3.0 | 146. | 14. | 132. | 0.00855 | 0.00780 | 0.00075 | 0.0 | 0.0 | 0.0 | 0.0 |
| 133 | 396.0 | 253.8 | 4.0 | 115. | -18. | 132. | 0.00835 | 0.00760 | 0.00075 | 0.0 | 0.0 | 0.0 | 0.0 |
| 134 | 378.0 | 235.8 | 6.0 | 98. | -34. | 132. | 0.00826 | 0.00750 | 0.00075 | 0.0 | 0.0 | 0.0 | 0.0 |
| 135 | 360.0 | 217.8 | 4.0 | 81. | -51. | 132. | 0.00816 | 0.00741 | 0.00075 | 0.0 | 0.0 | 0.0 | 0.0 |
| 136 | 342.0 | 199.8 | 5.0 | 65. | -68. | 132. | 0.00807 | 0.00731 | 0.00075 | 0.0 | 0.0 | 0.0 | 0.0 |
| 137 | 324.0 | 181.8 | 7.0 | 48. | -85. | 132. | 0.00797 | 0.00722 | 0.00075 | 0.0 | 0.0 | 0.0 | 0.0 |
| 138 | 253.8 | 111.6 | 3.0 | -18. | -150. | 132. | 0.00760 | 0.00685 | 0.00075 | 0.0 | 0.0 | 0.0 | 0.0 |
| 139 | 164.9 | 22.7 | 6.0 | -100. | -233. | 132. | 0.00713 | 0.00638 | 0.00075 | 0.0 | 0.0 | 0.0 | 0.0 |
| 140 | 235.8 | 93.8 | 7.0 | -34. | -166. | 132. | 0.00750 | 0.00676 | 0.00075 | 0.0 | 0.0 | 0.0 | 0.0 |
| 141 | 307.8 | 181.8 | 8.0 | 33. | -85. | 117. | 0.00788 | 0.00722 | 0.00067 | 0.0 | 0.0 | 0.0 | 0.0 |
| 142 | 289.8 | 164.9 | 5.0 | 16. | -100. | 116. | 0.00779 | 0.00713 | 0.00066 | 0.0 | 0.0 | 0.0 | 0.0 |
| 143 | 271.8 | 147.1 | 7.0 | -1. | -117. | 116. | 0.00769 | 0.00704 | 0.00066 | 0.0 | 0.0 | 0.0 | 0.0 |
| 144 | 147.1 | 22.7 | 8.0 | -117. | -233. | 116. | 0.00704 | 0.00638 | 0.00066 | 0.0 | 0.0 | 0.0 | 0.0 |
| 145 | 432.0 | 307.8 | 3.0 | 146. | 31. | 116. | 0.00855 | 0.00790 | 0.00066 | 0.0 | 0.0 | 0.0 | 0.0 |

Results for filtExample_3.5 : Crack Propagation Int. Pipe Surface Flaw

| | | | | | | | | | | | | | |
|-----|-------|-------|------|-------|-------|------|---------|---------|---------|-----|-----|-----|----|
| 146 | 414.0 | 289.8 | 6.0 | 132. | 16. | 116. | 0.00845 | 0.00779 | 0.00066 | 0.0 | 0.0 | 0.0 | 0. |
| 147 | 396.0 | 271.8 | 1.0 | 115. | -1. | 116. | 0.00835 | 0.00769 | 0.00066 | 0.0 | 0.0 | 0.0 | 0. |
| 148 | 378.0 | 253.8 | 3.0 | 98. | -18. | 116. | 0.00826 | 0.00760 | 0.00066 | 0.0 | 0.0 | 0.0 | 0. |
| 149 | 360.0 | 235.8 | 5.0 | 81. | -34. | 116. | 0.00816 | 0.00750 | 0.00066 | 0.0 | 0.0 | 0.0 | 0. |
| 150 | 342.0 | 217.8 | 3.0 | 65. | -51. | 116. | 0.00807 | 0.00741 | 0.00066 | 0.0 | 0.0 | 0.0 | 0. |
| 151 | 324.0 | 199.8 | 7.0 | 48. | -68. | 116. | 0.00797 | 0.00731 | 0.00066 | 0.0 | 0.0 | 0.0 | 0. |
| 152 | 235.8 | 111.6 | 5.0 | -34. | -150. | 116. | 0.00750 | 0.00685 | 0.00066 | 0.0 | 0.0 | 0.0 | 0. |
| 153 | 217.8 | 93.8 | 12.0 | -51. | -166. | 115. | 0.00741 | 0.00676 | 0.00065 | 0.0 | 0.0 | 0.0 | 0. |
| 154 | 199.8 | 76.0 | 8.0 | -68. | -183. | 115. | 0.00731 | 0.00666 | 0.00065 | 0.0 | 0.0 | 0.0 | 0. |
| 155 | 289.8 | 181.8 | 15.0 | 16. | -85. | 100. | 0.00779 | 0.00722 | 0.00057 | 0.0 | 0.0 | 0.0 | 0. |
| 156 | 307.8 | 199.8 | 11.0 | 33. | -68. | 100. | 0.00788 | 0.00731 | 0.00057 | 0.0 | 0.0 | 0.0 | 0. |
| 157 | 271.8 | 164.9 | 16.0 | -1. | -100. | 99. | 0.00769 | 0.00713 | 0.00056 | 0.0 | 0.0 | 0.0 | 0. |
| 158 | 253.8 | 147.1 | 13.0 | -18. | -117. | 99. | 0.00760 | 0.00704 | 0.00056 | 0.0 | 0.0 | 0.0 | 0. |
| 159 | 164.9 | 58.1 | 1.0 | -100. | -200. | 99. | 0.00713 | 0.00657 | 0.00056 | 0.0 | 0.0 | 0.0 | 0. |
| 160 | 129.2 | 22.7 | 6.0 | -133. | -233. | 99. | 0.00694 | 0.00638 | 0.00056 | 0.0 | 0.0 | 0.0 | 0. |
| 161 | 235.8 | 129.2 | 6.0 | -34. | -133. | 99. | 0.00750 | 0.00694 | 0.00056 | 0.0 | 0.0 | 0.0 | 0. |
| 162 | 414.0 | 307.8 | 1.0 | 132. | 33. | 99. | 0.00845 | 0.00788 | 0.00056 | 0.0 | 0.0 | 0.0 | 0. |
| 163 | 396.0 | 289.8 | 2.0 | 115. | 16. | 99. | 0.00835 | 0.00779 | 0.00056 | 0.0 | 0.0 | 0.0 | 0. |
| 164 | 378.0 | 271.8 | 1.0 | 98. | -1. | 99. | 0.00826 | 0.00769 | 0.00056 | 0.0 | 0.0 | 0.0 | 0. |
| 165 | 324.0 | 217.8 | 7.0 | 48. | -51. | 99. | 0.00797 | 0.00741 | 0.00056 | 0.0 | 0.0 | 0.0 | 0. |
| 166 | 360.0 | 253.8 | 1.0 | 81. | -18. | 99. | 0.00816 | 0.00760 | 0.00056 | 0.0 | 0.0 | 0.0 | 0. |
| 167 | 342.0 | 235.8 | 4.0 | 65. | -34. | 99. | 0.00807 | 0.00750 | 0.00056 | 0.0 | 0.0 | 0.0 | 0. |
| 168 | 217.8 | 111.6 | 4.0 | -51. | -150. | 99. | 0.00741 | 0.00685 | 0.00056 | 0.0 | 0.0 | 0.0 | 0. |
| 169 | 199.8 | 93.8 | 15.0 | -68. | -166. | 99. | 0.00731 | 0.00676 | 0.00056 | 0.0 | 0.0 | 0.0 | 0. |
| 170 | 181.8 | 76.0 | 13.0 | -85. | -183. | 98. | 0.00722 | 0.00666 | 0.00056 | 0.0 | 0.0 | 0.0 | 0. |
| 171 | 307.8 | 217.8 | 4.0 | 33. | -51. | 84. | 0.00788 | 0.00741 | 0.00048 | 0.0 | 0.0 | 0.0 | 0. |
| 172 | 271.8 | 181.8 | 8.0 | -1. | -85. | 84. | 0.00769 | 0.00722 | 0.00048 | 0.0 | 0.0 | 0.0 | 0. |
| 173 | 289.8 | 199.8 | 5.0 | 16. | -68. | 84. | 0.00779 | 0.00731 | 0.00048 | 0.0 | 0.0 | 0.0 | 0. |
| 174 | 253.8 | 164.9 | 14.0 | -18. | -100. | 83. | 0.00760 | 0.00713 | 0.00047 | 0.0 | 0.0 | 0.0 | 0. |
| 175 | 111.6 | 22.7 | 2.0 | -150. | -233. | 83. | 0.00685 | 0.00638 | 0.00047 | 0.0 | 0.0 | 0.0 | 0. |
| 176 | 147.1 | 58.1 | 1.0 | -117. | -200. | 83. | 0.00704 | 0.00657 | 0.00047 | 0.0 | 0.0 | 0.0 | 0. |
| 177 | 164.9 | 76.0 | 16.0 | -100. | -183. | 83. | 0.00713 | 0.00666 | 0.00047 | 0.0 | 0.0 | 0.0 | 0. |
| 178 | 235.8 | 147.1 | 8.0 | -34. | -117. | 83. | 0.00750 | 0.00704 | 0.00047 | 0.0 | 0.0 | 0.0 | 0. |
| 179 | 217.8 | 129.2 | 6.0 | -51. | -133. | 82. | 0.00741 | 0.00694 | 0.00047 | 0.0 | 0.0 | 0.0 | 0. |
| 180 | 360.0 | 271.8 | 2.0 | 81. | -1. | 82. | 0.00816 | 0.00769 | 0.00047 | 0.0 | 0.0 | 0.0 | 0. |
| 181 | 324.0 | 235.8 | 2.0 | 48. | -34. | 82. | 0.00797 | 0.00750 | 0.00047 | 0.0 | 0.0 | 0.0 | 0. |
| 182 | 342.0 | 253.8 | 3.0 | 65. | -18. | 82. | 0.00807 | 0.00760 | 0.00047 | 0.0 | 0.0 | 0.0 | 0. |
| 183 | 199.8 | 111.6 | 3.0 | -68. | -150. | 82. | 0.00731 | 0.00685 | 0.00047 | 0.0 | 0.0 | 0.0 | 0. |
| 184 | 181.8 | 93.8 | 5.0 | -85. | -166. | 82. | 0.00722 | 0.00676 | 0.00046 | 0.0 | 0.0 | 0.0 | 0. |
| 185 | 289.8 | 217.8 | 2.0 | 16. | -51. | 67. | 0.00779 | 0.00741 | 0.00038 | 0.0 | 0.0 | 0.0 | 0. |
| 186 | 253.8 | 181.8 | 4.0 | -18. | -85. | 67. | 0.00760 | 0.00722 | 0.00038 | 0.0 | 0.0 | 0.0 | 0. |
| 187 | 307.8 | 235.8 | 4.0 | 33. | -34. | 67. | 0.00788 | 0.00750 | 0.00038 | 0.0 | 0.0 | 0.0 | 0. |
| 188 | 129.2 | 58.1 | 2.0 | -133. | -200. | 66. | 0.00694 | 0.00657 | 0.00038 | 0.0 | 0.0 | 0.0 | 0. |
| 189 | 147.1 | 76.0 | 4.0 | -117. | -183. | 66. | 0.00704 | 0.00666 | 0.00038 | 0.0 | 0.0 | 0.0 | 0. |
| 190 | 164.9 | 93.8 | 8.0 | -100. | -166. | 66. | 0.00713 | 0.00676 | 0.00038 | 0.0 | 0.0 | 0.0 | 0. |
| 191 | 235.8 | 164.9 | 3.0 | -34. | -100. | 66. | 0.00750 | 0.00713 | 0.00037 | 0.0 | 0.0 | 0.0 | 0. |
| 192 | 217.8 | 147.1 | 7.0 | -51. | -117. | 66. | 0.00741 | 0.00704 | 0.00037 | 0.0 | 0.0 | 0.0 | 0. |
| 193 | 199.8 | 129.2 | 10.0 | -68. | -133. | 66. | 0.00731 | 0.00694 | 0.00037 | 0.0 | 0.0 | 0.0 | 0. |
| 194 | 378.0 | 307.8 | 3.0 | 98. | 33. | 65. | 0.00826 | 0.00788 | 0.00037 | 0.0 | 0.0 | 0.0 | 0. |
| 195 | 324.0 | 253.8 | 1.0 | 48. | -18. | 65. | 0.00797 | 0.00760 | 0.00037 | 0.0 | 0.0 | 0.0 | 0. |
| 196 | 360.0 | 289.8 | 3.0 | 81. | 16. | 65. | 0.00816 | 0.00779 | 0.00037 | 0.0 | 0.0 | 0.0 | 0. |
| 197 | 342.0 | 271.8 | 2.0 | 65. | -1. | 65. | 0.00807 | 0.00769 | 0.00037 | 0.0 | 0.0 | 0.0 | 0. |
| 198 | 181.8 | 111.6 | 8.0 | -85. | -150. | 65. | 0.00722 | 0.00685 | 0.00037 | 0.0 | 0.0 | 0.0 | 0. |
| 199 | 378.0 | 324.0 | 4.0 | 98. | 48. | 50. | 0.00826 | 0.00797 | 0.00029 | 0.0 | 0.0 | 0.0 | 0. |
| 200 | 235.8 | 181.8 | 3.0 | -34. | -85. | 50. | 0.00750 | 0.00722 | 0.00029 | 0.0 | 0.0 | 0.0 | 0. |
| 201 | 289.8 | 235.8 | 9.0 | 16. | -34. | 50. | 0.00779 | 0.00750 | 0.00029 | 0.0 | 0.0 | 0.0 | 0. |
| 202 | 307.8 | 253.8 | 4.0 | 33. | -18. | 50. | 0.00788 | 0.00760 | 0.00029 | 0.0 | 0.0 | 0.0 | 0. |
| 203 | 271.8 | 217.8 | 4.0 | -1. | -51. | 50. | 0.00769 | 0.00741 | 0.00029 | 0.0 | 0.0 | 0.0 | 0. |
| 204 | 253.8 | 199.8 | 3.0 | -18. | -68. | 50. | 0.00760 | 0.00731 | 0.00029 | 0.0 | 0.0 | 0.0 | 0. |
| 205 | 147.1 | 93.8 | 10.0 | -117. | -166. | 50. | 0.00704 | 0.00676 | 0.00028 | 0.0 | 0.0 | 0.0 | 0. |
| 206 | 129.2 | 76.0 | 2.0 | -133. | -183. | 50. | 0.00694 | 0.00666 | 0.00028 | 0.0 | 0.0 | 0.0 | 0. |
| 207 | 164.9 | 111.6 | 15.0 | -100. | -150. | 50. | 0.00713 | 0.00685 | 0.00028 | 0.0 | 0.0 | 0.0 | 0. |

Results for filtExample_3.5 : Crack Propagation Int. Pipe Surface Flaw

| | | | | | | | | | | | | | |
|-----|-------|-------|------|-------|-------|-----|---------|---------|---------|-----|-----|-----|----|
| 208 | 217.8 | 164.9 | 2.0 | -51. | -100. | 49. | 0.00741 | 0.00713 | 0.00028 | 0.0 | 0.0 | 0.0 | 0. |
| 209 | 199.8 | 147.1 | 6.0 | -68. | -117. | 49. | 0.00731 | 0.00704 | 0.00028 | 0.0 | 0.0 | 0.0 | 0. |
| 210 | 181.8 | 129.2 | 5.0 | -85. | -133. | 49. | 0.00722 | 0.00694 | 0.00028 | 0.0 | 0.0 | 0.0 | 0. |
| 211 | 360.0 | 307.8 | 9.0 | 81. | 33. | 49. | 0.00816 | 0.00788 | 0.00028 | 0.0 | 0.0 | 0.0 | 0. |
| 212 | 324.0 | 271.8 | 10.0 | 48. | -1. | 49. | 0.00797 | 0.00769 | 0.00028 | 0.0 | 0.0 | 0.0 | 0. |
| 213 | 342.0 | 289.8 | 4.0 | 65. | 16. | 49. | 0.00807 | 0.00779 | 0.00028 | 0.0 | 0.0 | 0.0 | 0. |
| 214 | 360.0 | 324.0 | 5.0 | 81. | 48. | 33. | 0.00816 | 0.00797 | 0.00019 | 0.0 | 0.0 | 0.0 | 0. |
| 215 | 307.8 | 271.8 | 15.0 | 33. | -1. | 33. | 0.00788 | 0.00769 | 0.00019 | 0.0 | 0.0 | 0.0 | 0. |
| 216 | 271.8 | 235.8 | 19.0 | -1. | -34. | 33. | 0.00769 | 0.00750 | 0.00019 | 0.0 | 0.0 | 0.0 | 0. |
| 217 | 217.8 | 181.8 | 13.0 | -51. | -85. | 33. | 0.00741 | 0.00722 | 0.00019 | 0.0 | 0.0 | 0.0 | 0. |
| 218 | 289.8 | 253.8 | 21.0 | 16. | -18. | 33. | 0.00779 | 0.00760 | 0.00019 | 0.0 | 0.0 | 0.0 | 0. |
| 219 | 235.8 | 199.8 | 10.0 | -34. | -68. | 33. | 0.00750 | 0.00731 | 0.00019 | 0.0 | 0.0 | 0.0 | 0. |
| 220 | 253.8 | 217.8 | 12.0 | -18. | -51. | 33. | 0.00760 | 0.00741 | 0.00019 | 0.0 | 0.0 | 0.0 | 0. |
| 221 | 111.6 | 76.0 | 6.0 | -150. | -183. | 33. | 0.00685 | 0.00666 | 0.00019 | 0.0 | 0.0 | 0.0 | 0. |
| 222 | 164.9 | 129.2 | 6.0 | -100. | -133. | 33. | 0.00713 | 0.00694 | 0.00019 | 0.0 | 0.0 | 0.0 | 0. |
| 223 | 129.2 | 93.8 | 7.0 | -133. | -166. | 33. | 0.00694 | 0.00676 | 0.00019 | 0.0 | 0.0 | 0.0 | 0. |
| 224 | 147.1 | 111.6 | 17.0 | -117. | -150. | 33. | 0.00704 | 0.00685 | 0.00019 | 0.0 | 0.0 | 0.0 | 0. |
| 225 | 199.8 | 164.9 | 6.0 | -68. | -100. | 32. | 0.00731 | 0.00713 | 0.00018 | 0.0 | 0.0 | 0.0 | 0. |
| 226 | 181.8 | 147.1 | 5.0 | -85. | -117. | 32. | 0.00722 | 0.00704 | 0.00018 | 0.0 | 0.0 | 0.0 | 0. |
| 227 | 324.0 | 289.8 | 21.0 | 48. | 16. | 32. | 0.00797 | 0.00779 | 0.00018 | 0.0 | 0.0 | 0.0 | 0. |
| 228 | 342.0 | 307.8 | 23.0 | 65. | 33. | 32. | 0.00807 | 0.00788 | 0.00018 | 0.0 | 0.0 | 0.0 | 0. |
| 229 | 199.8 | 181.8 | 7.0 | -68. | -85. | 17. | 0.00731 | 0.00722 | 0.00010 | 0.0 | 0.0 | 0.0 | 0. |
| 230 | 271.8 | 253.8 | 12.0 | -1. | -18. | 17. | 0.00769 | 0.00760 | 0.00010 | 0.0 | 0.0 | 0.0 | 0. |
| 231 | 342.0 | 324.0 | 4.0 | 65. | 48. | 17. | 0.00807 | 0.00797 | 0.00010 | 0.0 | 0.0 | 0.0 | 0. |
| 232 | 235.8 | 217.8 | 11.0 | -34. | -51. | 17. | 0.00750 | 0.00741 | 0.00010 | 0.0 | 0.0 | 0.0 | 0. |
| 233 | 289.8 | 271.8 | 11.0 | 16. | -1. | 17. | 0.00779 | 0.00769 | 0.00010 | 0.0 | 0.0 | 0.0 | 0. |
| 234 | 307.8 | 289.8 | 4.0 | 33. | 16. | 17. | 0.00788 | 0.00779 | 0.00010 | 0.0 | 0.0 | 0.0 | 0. |
| 235 | 253.8 | 235.8 | 9.0 | -18. | -34. | 17. | 0.00760 | 0.00750 | 0.00010 | 0.0 | 0.0 | 0.0 | 0. |
| 236 | 217.8 | 199.8 | 8.0 | -51. | -68. | 17. | 0.00741 | 0.00731 | 0.00010 | 0.0 | 0.0 | 0.0 | 0. |
| 237 | 111.6 | 93.8 | 4.0 | -150. | -166. | 17. | 0.00685 | 0.00676 | 0.00009 | 0.0 | 0.0 | 0.0 | 0. |
| 238 | 76.0 | 58.1 | 1.0 | -183. | -200. | 17. | 0.00666 | 0.00657 | 0.00009 | 0.0 | 0.0 | 0.0 | 0. |
| 239 | 93.8 | 76.0 | 1.0 | -166. | -183. | 17. | 0.00676 | 0.00666 | 0.00009 | 0.0 | 0.0 | 0.0 | 0. |
| 240 | 147.1 | 129.2 | 1.0 | -117. | -133. | 17. | 0.00704 | 0.00694 | 0.00009 | 0.0 | 0.0 | 0.0 | 0. |
| 241 | 129.2 | 111.6 | 2.0 | -133. | -150. | 16. | 0.00694 | 0.00685 | 0.00009 | 0.0 | 0.0 | 0.0 | 0. |
| 242 | 181.8 | 164.9 | 12.0 | -85. | -100. | 16. | 0.00722 | 0.00713 | 0.00009 | 0.0 | 0.0 | 0.0 | 0. |
| 243 | 324.0 | 307.8 | 9.0 | 48. | 33. | 15. | 0.00797 | 0.00788 | 0.00009 | 0.0 | 0.0 | 0.0 | 0. |

Appendix 1: Print of "pdprop.env" Simulation Control file

```
# This file contains the starting filenames, variables etc
# for the Crack Propagation programs. It should be edited by the
# user before each simulation run. It can also be generated from web
# page at: to be determined
#

#TYPE= pipe_inside_surface_flaw      #with or without weld using ACTIVATES:
#ACTIVATE_MmMb= 1 # Deactivate = 0
#ACTIVATE_MkmMkb= 0 # Set to off for inside surf. flaw.( not available )
#ACTIVATE_fw= 0 # Set to off for inside surf. flaw.( fw=1.0 )

#
#                                #TYPE= options:
#                                # plate_surface_flaw
#                                # plate_long_surface_flaw
#                                # plate_tru_flaw
#                                # plate_embedded_flaw
#                                # plate_edge_flaw
#                                #
#                                # pipe_inside_surface_flaw
#                                # pipe_long_inside_surface_flaw
#                                # pipe_full_inside_flaw
#                                # pipe_full_outside_flaw
```

Results for filtExample_3.5 : Crack Propagation Int. Pipe Surface Flaw

```

#
#
# rod_surface_flaw
# rod_full_outside_flaw

#
# These problem types are used to pull in the
# appropriate Fw, Mm, Mb, files etc.

# The factors described in this section may be ignored if not applicable to
# the particular problem type described above.
# (All dimensions in mm)
#B= 10.0 # plate (or pipe wall) thickness
#W= 0.0 # plate width
#ri= 50. # Internal diameter if pipe problem
#azero= 0.5 # initial crack depth
#czero= 4.0 # initial 1/2 crack width at surface
#L= 0. # Weld Feature width. Set to 0.0 if no Mkm or Mkb (weld)

#HISTORYFILE= load1.txt # historyFileName
#
# Adjustments to load file variables:
#
# Note that the MEANADD (below) is added AFTER the MAGFACTOR is applied.
#MAGFACTOR_m= 1.0 # Multiply factor on membrane load. Result should be MPa
#MAGFACTOR_b= 1.0 # Multiply factor on bending load term. Result should be MPa
#MEANADD_m= 0.0 # Mean shift in MPa added to membrane stress.
#MEANADD_b= 0.0 # Mean shift in MPa added to bending stress.

#MAXREPS= 1000000 # Max no. history repeats in simulation.
#
# One repetition or application of the load history is
#
# also called a "block" of cycles.
#
# Normally this would be some large number.
#
#MATERIAL= merged_a36_fitted.html #File name of material fitted data
#
# This file is used to define the cyclic
#
# stress-strain curve, and the Neuber Product curve.
#
#DADN= table # Can be "table" or "Paris"
#DADN_PARIS= 0.0 0.0 0.0 0.0 mpa_mm # Kth a m Kc units (ignored if #DADN= table )
#
# !! specify: mpa_m or ksi_in or mpa_mm
#
# ksi_in: ksi stress, inch crack length, inches in delta_K
#
# mpa_m: mpa stress, m crack length, meters in delta_K
#
# mpa_mm: mpa stress, mm crack length, mm in delta_K
#
# same as N/(mm**(3/2))
#DADN_TABLE= a36+1015.dadn # da/dN digitized da/dN curve for material,
#
# including the threshold, and KIc.
#
# If a threshold exists, put in a vertical line
#
# (with two identical X-axis points).
#
# If the threshold needs to be "turned off" then
#
# do NOT put in a vertical line at low da/dN.
#
# (Ignored when #DADN= PARIS )
#
#FAD Stuff:
#TensileFile= a36_Mattos_mono_engrSS_FLAT.txt #enter "none" if no FAD
#PmEOL= 70. #Set these so that Pm+Pb= 0.82*Syield for default.
#PbEOL= 100.
#Kmat= 1675.
#PinJoint= 0 #Set = 1 if struture is pinJointed (for bending)
#
#BLOCKSKIP= 1.0 percent # At the end of each block check if the previous
#
# two blocks of cycles had similar damage (crack
#
# extension) within this percentage. If TRUE then
#
# simply skip the simulation of the next block,
#
# but just add the expected damage. Continue by
#
# simulating the block after the skip.
#

```

Results for filtExample_3.5 : Crack Propagation Int. Pipe Surface Flaw

```
#
#                                     A value of 0.0 will disallow skipping blocks.
#SAVELEVEL= 0                       #Amount of output saved to disk:
#                                     # 3=lots 2=medium 1=minimal
#                                     # 0= save #crk= data into binary direct access file only
#                                     # No #crk= data will be written into the text logfile.
#                                     # Use for large output files with lots of cycles.
```

Appendix 2: Print of da/dn vs DeltaK Table in file filtExample_3.5

| Delta_K | da/dN | | | | | | |
|---------------|---------------|---------------|----------------|---------------|---------------|--|---|
| 0.1502160E+03 | 0.9620540E-07 | 0.2176716E+01 | -0.7016800E+01 | 0.0000000E+00 | 0.0000000E+00 | | 1 |
| 0.1769830E+03 | 0.4562300E-06 | 0.2247931E+01 | -0.6340816E+01 | 0.7121539E-01 | 0.6759844E+00 | | 2 |
| 0.2202350E+03 | 0.1160170E-05 | 0.2342886E+01 | -0.5935478E+01 | 0.9495497E-01 | 0.4053378E+00 | | 3 |
| 0.2874840E+03 | 0.3224090E-05 | 0.2458614E+01 | -0.5491593E+01 | 0.1157272E+00 | 0.4438853E+00 | | 4 |
| 0.4331670E+03 | 0.1069760E-04 | 0.2636655E+01 | -0.4970714E+01 | 0.1780417E+00 | 0.5208793E+00 | | 5 |
| 0.7637410E+03 | 0.7556810E-04 | 0.2882946E+01 | -0.4121662E+01 | 0.2462907E+00 | 0.8490520E+00 | | 6 |
| 0.1240590E+04 | 0.8520410E-03 | 0.3093628E+01 | -0.3069540E+01 | 0.2106822E+00 | 0.1052122E+01 | | 7 |
| 0.1471680E+04 | 0.3307300E-02 | 0.3167813E+01 | -0.2480526E+01 | 0.7418513E-01 | 0.5890131E+00 | | 8 |
| 0.1675690E+04 | 0.1074680E-01 | 0.3224194E+01 | -0.1968721E+01 | 0.5638027E-01 | 0.5118057E+00 | | 9 |

Appendix 3: Print of Stress-Strain-Init.Life file: "matfile"

#SAE Standard Fatigue Data File format

##

Pick one: #FDE_plot #FDE_fit ##

```
#
#Copyright (C) 2012 F.D.E. Committee
#This data file is free software - you can redistribute it and/or
#modify it under the terms of the GNU General Public License as
#published by the Free Software Foundation; either version 2 of the
#license, or (at your option) any later version.
#This data file is distributed in the hope that it will be useful,
#but WITHOUT ANY WARRANTY - without even the implied warranty of
#MERCHANTABILITY or FITNESS FOR A PARTICULAR PURPOSE. See the
#GNU General Public License for more details.
#You should have received a copy of the GNU General Public License
#along with this program - if not, write to the Free Software
#Foundation, Inc., 59 Temple Place - Suite 330, Boston, MA 02111-1307, USA
#Try also their web site: http://www.gnu.org/copyleft/gpl.html
#
# NOTE: Fitted Data !!
# A36 Steel Merged Data Sets from Refs. 1 and 2:
# Ref.1: P.Dindinger report to Fat.Des.+Eval. Comm. Apr.2012
# Ref.2: G.A.Miller and H.S.Reemsnyder, "Strain-Cycle Fatigue of Sheet and
# Plate Steels I: Test Method Development and Data Presentation,"
# SAE Paper 830175, Detroit MI, Feb28-Mar.4, 1983
#
# NOTE that original test data ends at 2Nf = 1.3million.
#
#FileType= strain_life
#DataType= fitted
#TIMEcol= 0
#NAME= ASTM-A36
```

Results for filtExample_3.5 : Crack Propagation Int. Pipe Surface Flaw

```
#NAME= Structural
#NAME= Steel
#Stress_units= ksi
#Strain_units= strain
#Sy= 38.4 0.2pc offset, 265 mpa
#Su= 69. ksi from Miller/Reemsnyder = 475 mpa
#eu= 0 #strain at Su not reported
#E= 29528. ksi = 203600 mpa
#FractureStrain= 0 not reported
#FractureStress= 0. not reported
#monotonic_K= 0 not reported
#monotonic_n= 0 not reported
#BHN= 138.
#%RA= 0. % not reported
#
#saedigcurve_v2.2.f starts.
# NOTE!! The Following Points are FITTED DATA:#NOTE!! Fitted Stress computed using Exper.
# Total Strain 2Nf Stress Mean Plastic Strain Initial
# Amp Amp Stress Amp Elastic Mod.
0.88485 1 115.3 0. 0.88095 29528. #Fitted_point
0.00914 5000 52.1 0. 0.00737 29528. #Fitted_point
0.00665 10000 48.8 0. 0.00499 29528. #Fitted_point
0.00493 20000 45.7 0. 0.00338 29528. #Fitted_point
0.00344 50000 42.0 0. 0.00202 29528. #Fitted_point
0.00270 100000 39.3 0. 0.00136 29528. #Fitted_point
0.00217 200000 36.8 0. 0.00092 29528. #Fitted_point
0.00169 500000 33.8 0. 0.00055 29528. #Fitted_point
0.00144 1000000 31.6 0. 0.00037 29528. #Fitted_point
#Original test data ends at 2Nf = 1.3million.
#Points below are extrapolation:
0.00125 2000000 29.6 0. 0.00025 29528. #Fitted_point
0.00106 5000000 27.1 0. 0.00014 29528. #Fitted_point
#
#
```