Results for filteredExample1.5 : Crack Propagation Plate Surface Flaw

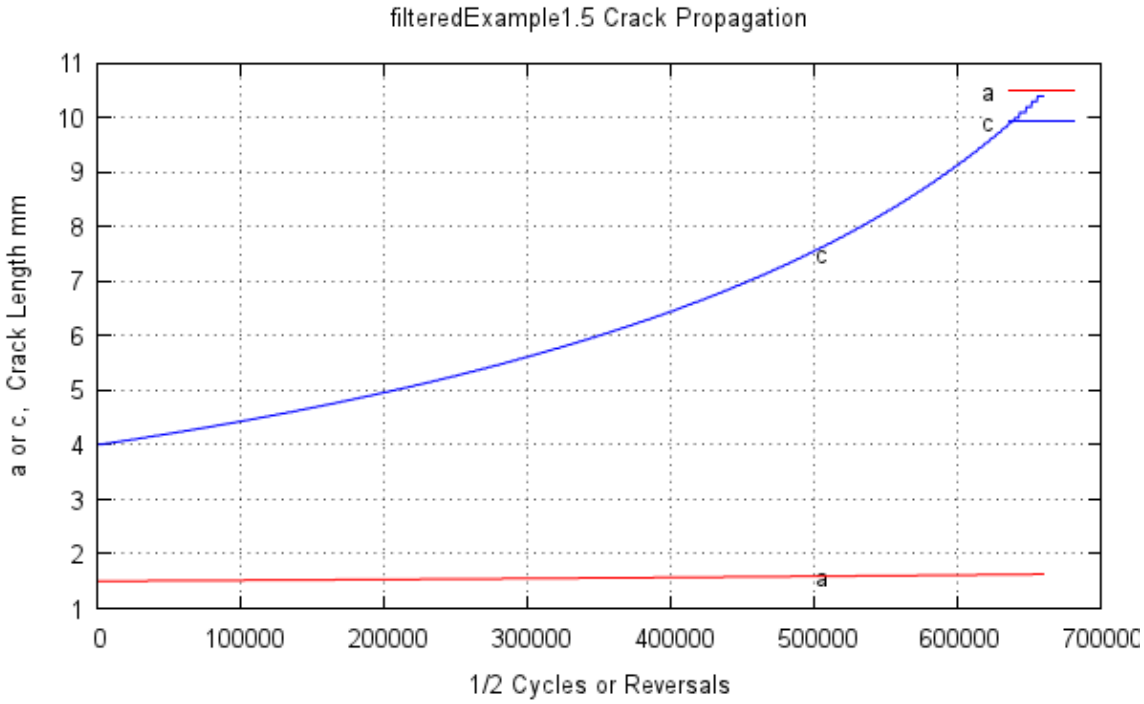
Author: A. Conle
Affiliation: Univ. of Windsor ON Canada
Sat Nov 2 17:26:10 EDT 2013

Simulation input data:
B= 10.0 mm
W= 70.0 mm
a_0= 1.5 mm
c_0= 4.0 mm
L= 10. mm

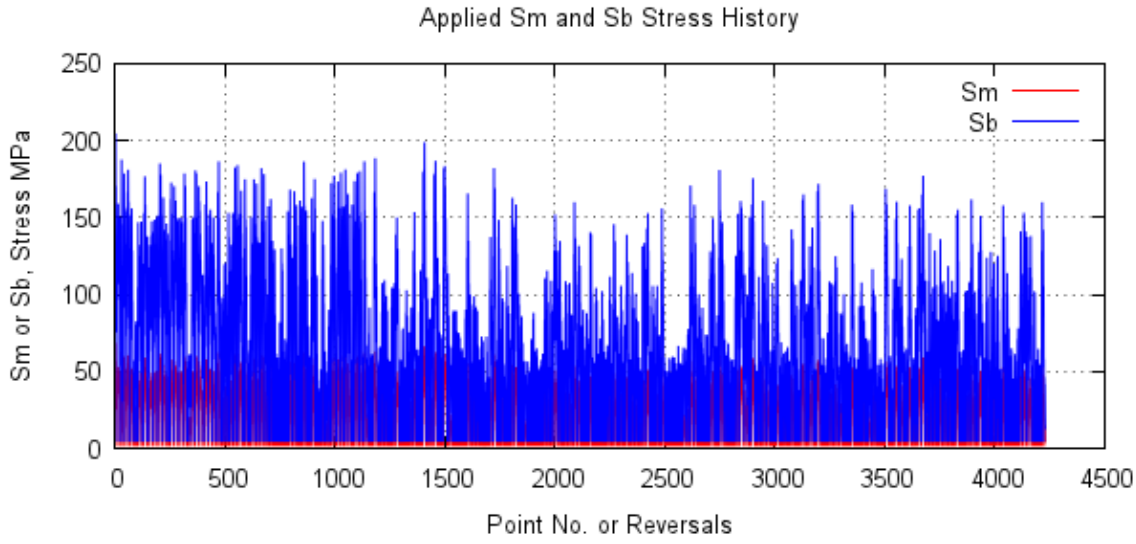
#MATERIAL= merged_a36_fitted.html
#TYPE= plate_surface_flaw
#ACTIVATE_MmMb= 1 _____#ACTIVATE_MkmMkb= 1 _____#ACTIVATE_fw= 1

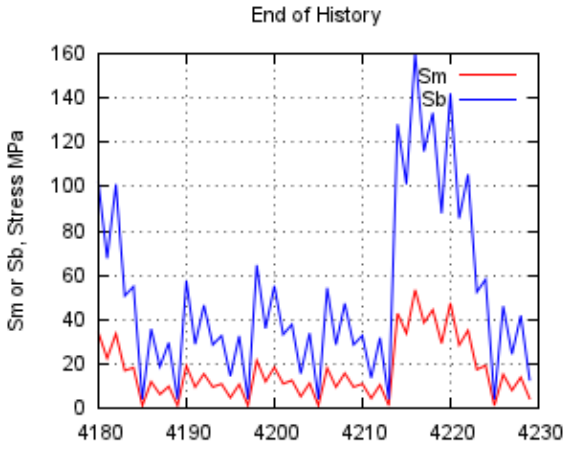
Crack Propagation Results:
(*# plateWeldflaw.f vers. 3.10 # makereport1 vers. 2.1*)

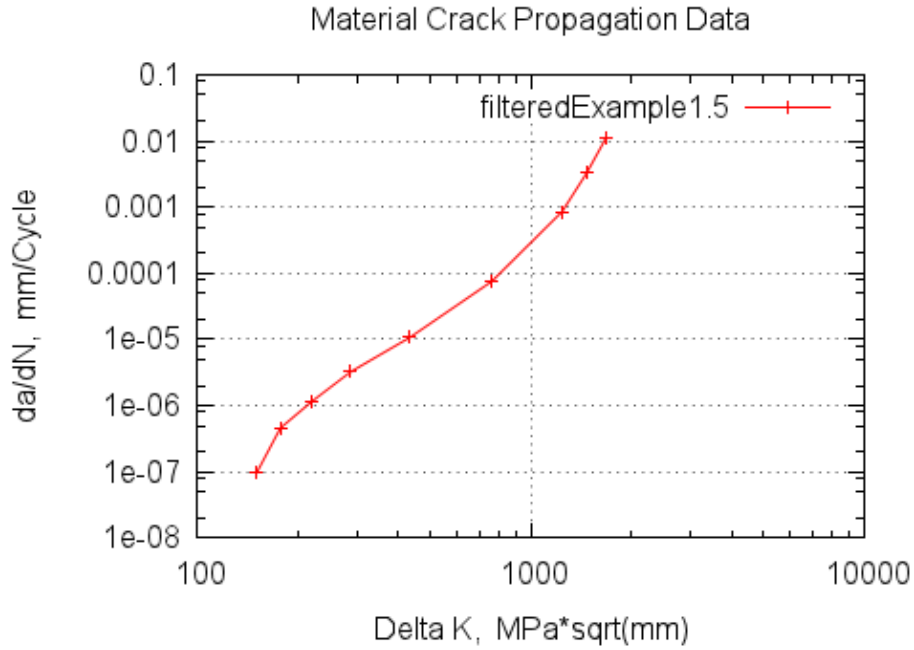
- No. of Reversals= 659881 revs. or 329940 cycles
- Final _____ **a** = 0.163E+01 mm
- Final _____ **c** = 0.104E+02 mm
- No. of History Reps.= 157 reps. + 1 revs.
- No. records = 659882 in random access data file

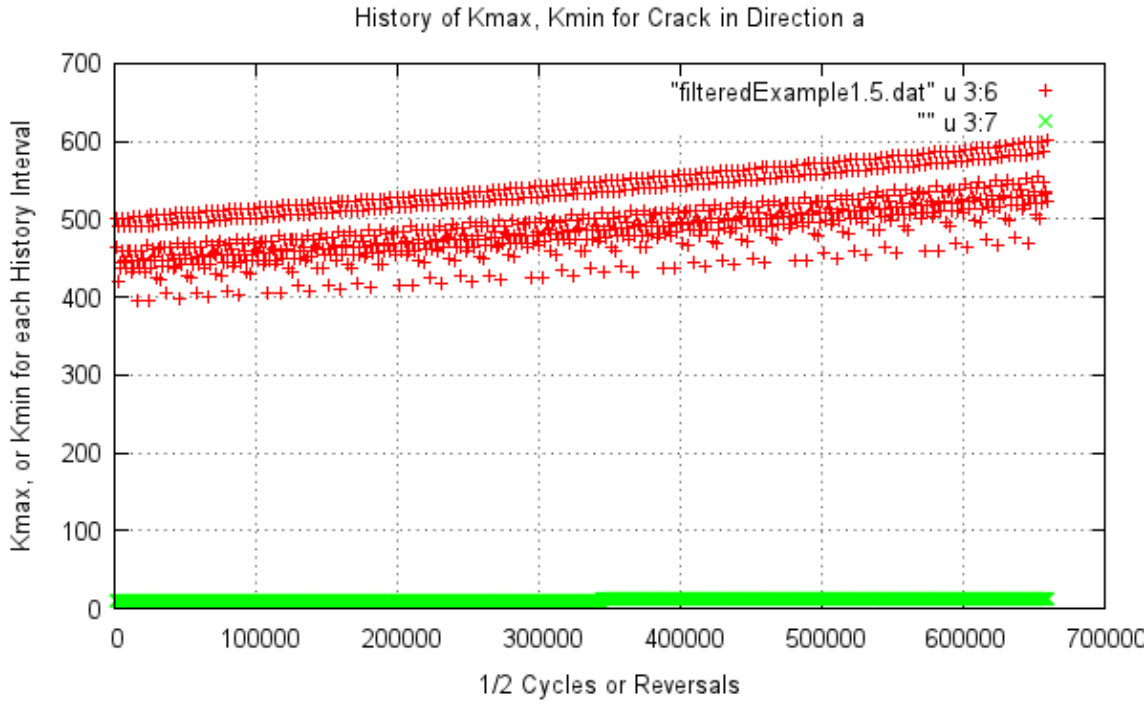


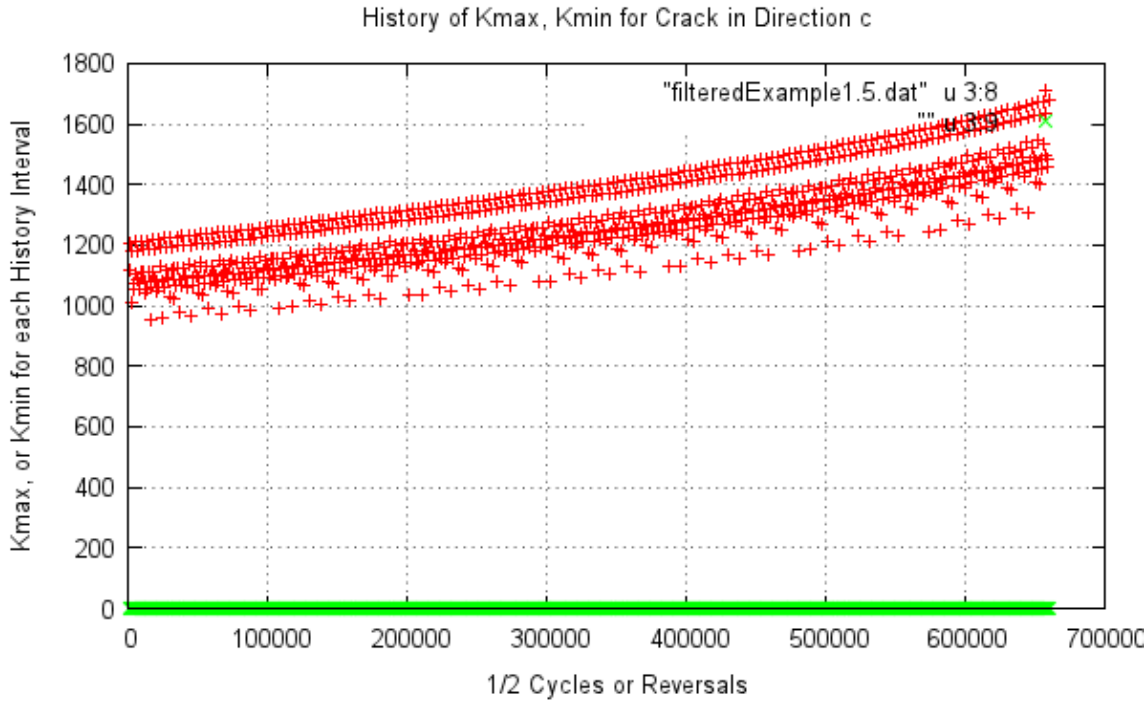
Results for filteredExample1.5 : Crack Propagation Plate Surface Flaw

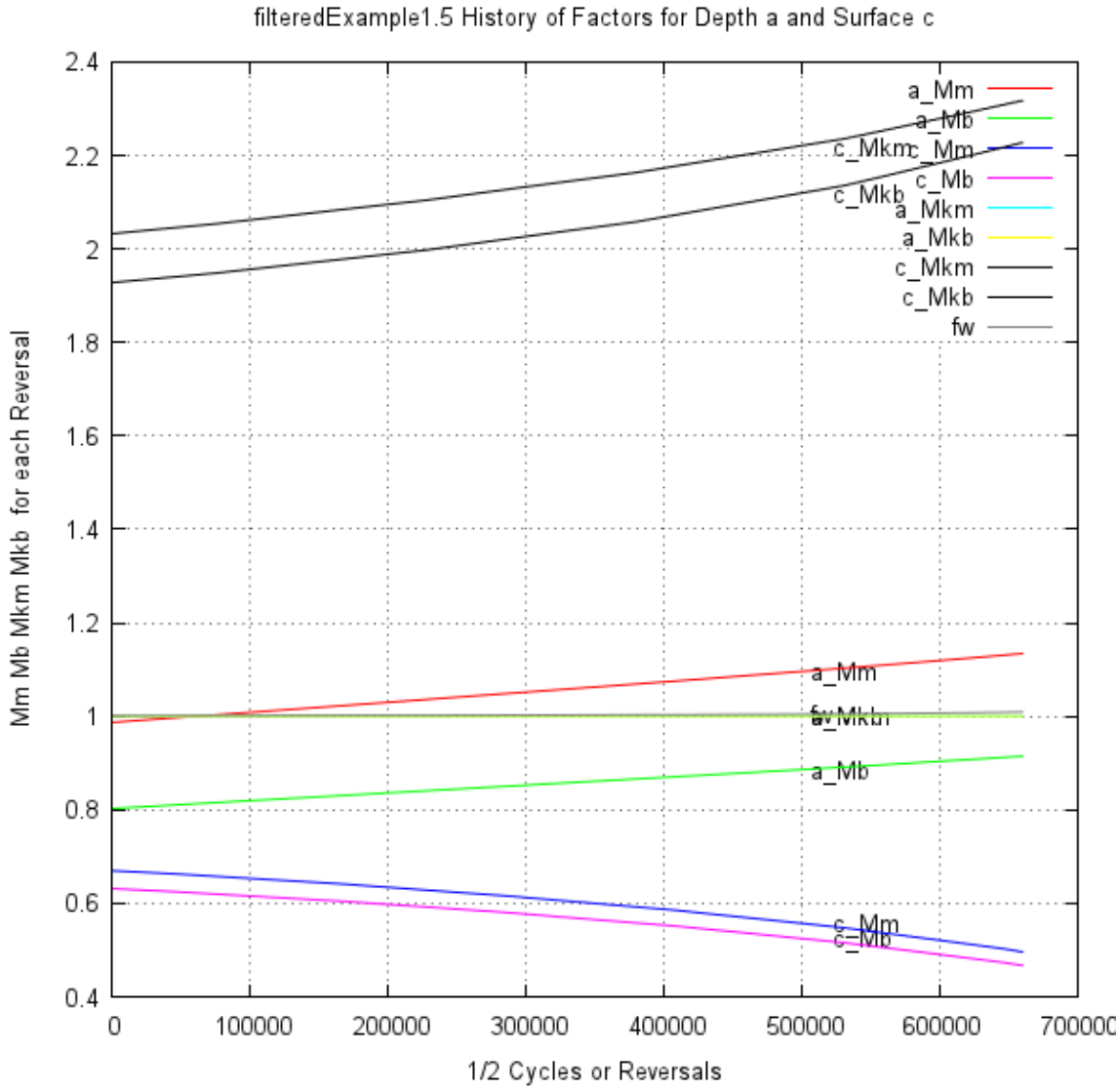






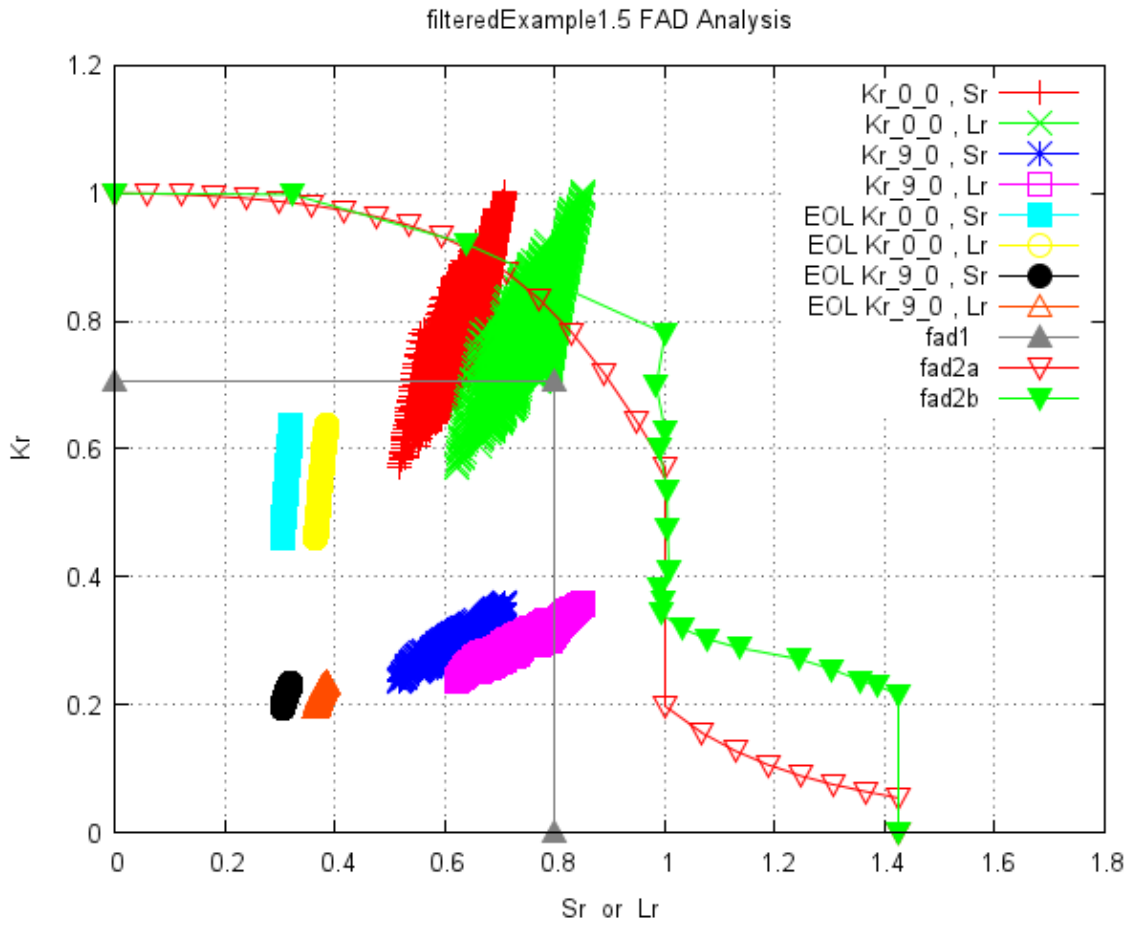

History of Kmax, Kmin for Crack in Direction a
"filteredExample1.5.dat" u 3:6
"" u 3:7
Kmax, or Kmin for each History Interval
1/2 Cycles or Reversals
0
100
200
300
400
500
600
700
0
100000
200000
300000
400000
500000
600000
700000


History of Kmax, Kmin for Crack in Direction c
"filteredExample1.5.dat" u 3:8
Kmax, or Kmin for each History Interval
1/2 Cycles or Reversals
0
200
400
600
800
1000
1200
1400
1600
1800
0
100000
200000
300000
400000
500000
600000
700000


filteredExample1.5 History of Factors for Depth a and Surface c
Mm Mb Mkm Mkb for each Reversal
1/2 Cycles or Reversals
a_Mm
a_Mb
c_Mm
c_Mb
a_Mkm
a_Mkb
c_Mkm
c_Mkb
fw
2.4
2.2
2
1.8
1.6
1.4
1.2
1
0.8
0.6
0.4
0
100000
200000
300000
400000
500000
600000
700000

FAD Results for filteredExample1.5 #TensileFile= a36_Mattos_mono_engrSS_FLAT.txt

#PmEOL= 70. #PbEOL= 100.
#Kmat= 1675.
#PinJoint= 0



Crack Initiation Life Results for filteredExample1.5 (Assume Kt= 1.8 for welds)

Files Used:

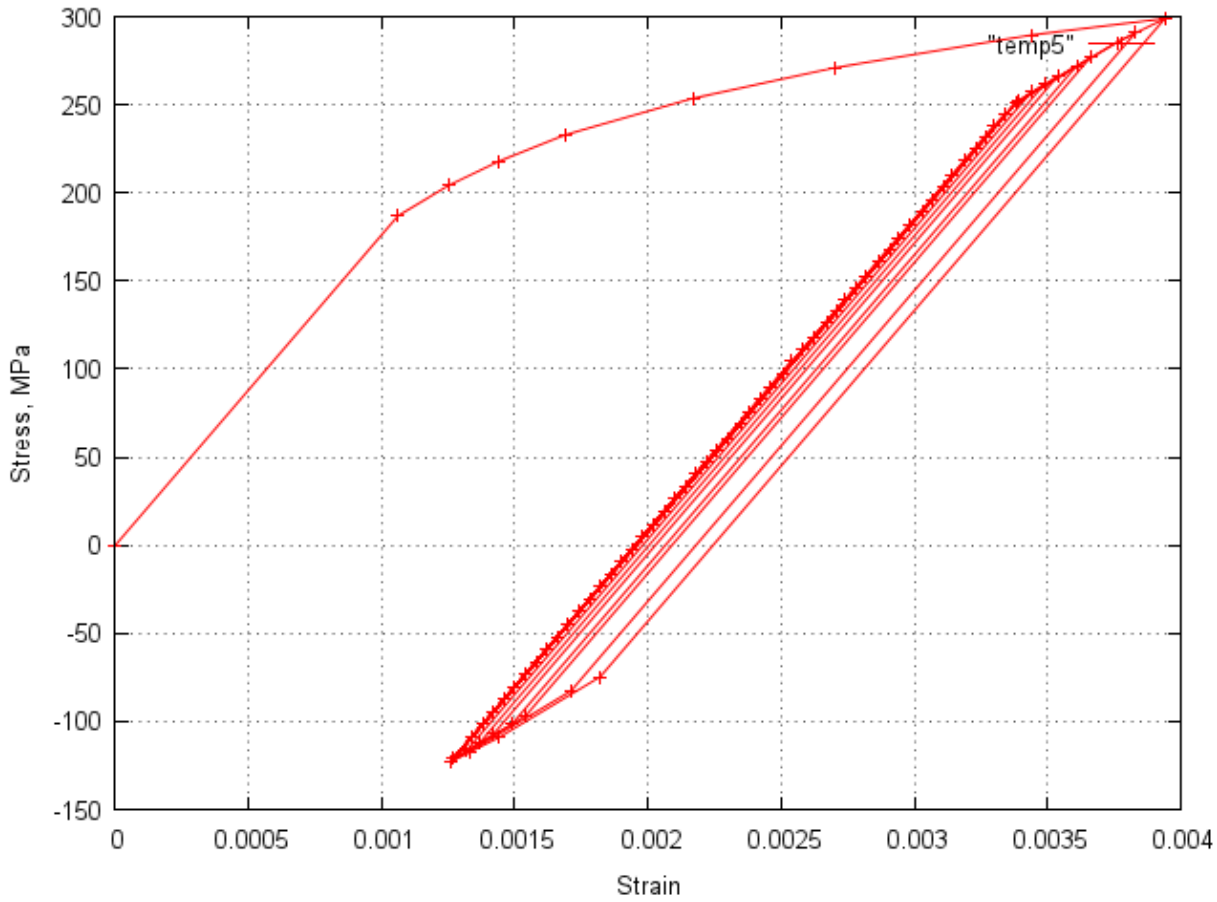
- Stress History (Sb+Sm)
- Rainflow File
- Material File

Predicted History Repetitions to Initiation:

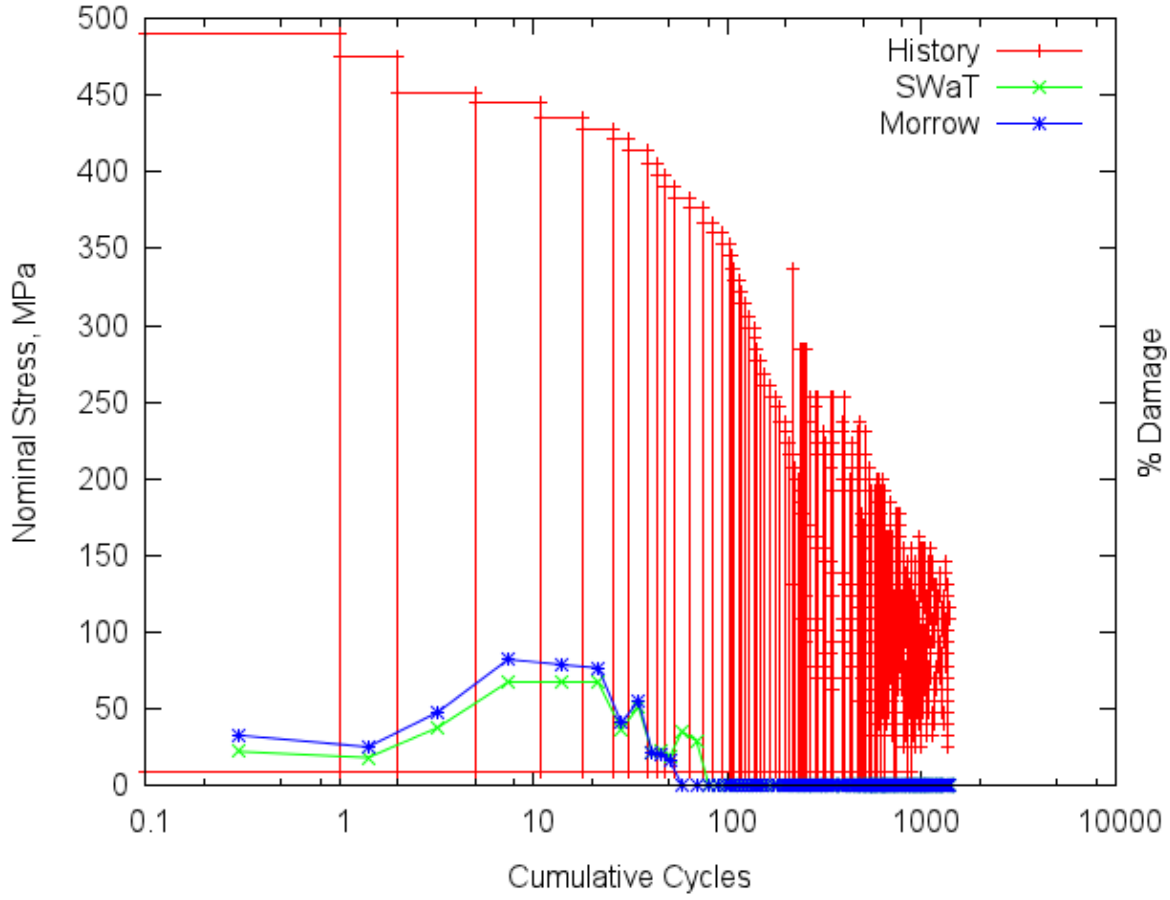
StrainLife_Reps	SWaT_Life_Reps	StressLife_Reps	Morrow_Reps	Goodman_Reps
42394.4	10666.6	42394.4	13660.1	6141.1

(Reps= Repetions)

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	%Morr
1	489.6	9.7	1.0	299.	-123.	422.	0.00394	0.00126	0.00268	6.0	4.5	6.0	6.6
2	475.2	9.7	1.0	291.	-123.	414.	0.00383	0.00126	0.00257	4.9	3.7	4.9	5.1
3	451.8	9.7	3.0	277.	-123.	400.	0.00366	0.00126	0.00240	10.2	7.6	10.2	9.6
4	444.6	9.7	6.0	272.	-123.	395.	0.00361	0.00126	0.00235	18.1	13.6	18.1	16.5
5	435.6	9.7	7.0	267.	-123.	389.	0.00354	0.00126	0.00229	18.2	13.6	18.2	15.8
6	428.4	9.7	8.0	262.	-123.	385.	0.00349	0.00126	0.00224	18.3	13.6	18.3	15.4
7	421.2	9.7	5.0	257.	-123.	380.	0.00344	0.00126	0.00219	10.1	7.4	10.1	8.2
8	414.0	9.7	8.0	253.	-123.	375.	0.00339	0.00126	0.00214	14.2	10.3	14.2	11.1
9	405.0	9.7	4.0	245.	-123.	368.	0.00334	0.00126	0.00209	0.0	4.3	0.0	4.3
10	397.8	9.7	5.0	238.	-123.	361.	0.00330	0.00126	0.00205	0.0	4.5	0.0	4.2
11	390.6	9.7	5.0	232.	-123.	354.	0.00327	0.00126	0.00201	0.0	3.8	0.0	3.3
12	383.4	9.7	11.0	225.	-123.	348.	0.00323	0.00126	0.00197	0.0	7.1	0.0	0.0
13	376.2	9.7	11.0	218.	-123.	341.	0.00319	0.00126	0.00193	0.0	5.9	0.0	0.0
14	367.2	9.7	9.0	210.	-123.	333.	0.00314	0.00126	0.00189	0.0	0.0	0.0	0.0
15	360.0	9.7	11.0	203.	-123.	326.	0.00311	0.00126	0.00185	0.0	0.0	0.0	0.0
16	352.8	9.7	8.0	196.	-123.	319.	0.00307	0.00126	0.00181	0.0	0.0	0.0	0.0
17	345.6	9.7	2.0	190.	-123.	313.	0.00303	0.00126	0.00177	0.0	0.0	0.0	0.0
18	336.6	9.7	3.0	181.	-123.	304.	0.00298	0.00126	0.00173	0.0	0.0	0.0	0.0
19	329.4	9.7	6.0	175.	-123.	297.	0.00294	0.00126	0.00169	0.0	0.0	0.0	0.0
20	322.2	9.7	4.0	168.	-123.	291.	0.00291	0.00126	0.00165	0.0	0.0	0.0	0.0
21	315.0	9.7	6.0	161.	-123.	284.	0.00287	0.00126	0.00161	0.0	0.0	0.0	0.0

22	306.0	9.7	5.0	153.	-123.	276.	0.00282	0.00126	0.00156	0.0	0.0	0.0	0.0
23	298.8	9.7	8.0	146.	-123.	269.	0.00278	0.00126	0.00153	0.0	0.0	0.0	0.0
24	291.6	9.7	2.0	140.	-123.	262.	0.00274	0.00126	0.00149	0.0	0.0	0.0	0.0
25	284.4	9.7	2.0	133.	-123.	256.	0.00271	0.00126	0.00145	0.0	0.0	0.0	0.0
26	277.2	9.7	6.0	126.	-123.	249.	0.00267	0.00126	0.00141	0.0	0.0	0.0	0.0
27	268.2	9.7	7.0	118.	-123.	241.	0.00262	0.00126	0.00136	0.0	0.0	0.0	0.0
28	261.0	9.7	12.0	111.	-123.	234.	0.00258	0.00126	0.00133	0.0	0.0	0.0	0.0
29	253.8	9.7	13.0	104.	-123.	227.	0.00254	0.00126	0.00129	0.0	0.0	0.0	0.0
30	246.6	9.7	7.0	98.	-123.	220.	0.00251	0.00126	0.00125	0.0	0.0	0.0	0.0
31	237.6	9.7	14.0	89.	-123.	212.	0.00246	0.00126	0.00120	0.0	0.0	0.0	0.0
32	230.4	9.7	1.0	83.	-123.	205.	0.00242	0.00126	0.00116	0.0	0.0	0.0	0.0
33	223.2	9.7	7.0	76.	-123.	199.	0.00238	0.00126	0.00113	0.0	0.0	0.0	0.0
34	216.0	9.7	8.0	69.	-123.	192.	0.00235	0.00126	0.00109	0.0	0.0	0.0	0.0
35	336.6	131.6	1.0	181.	-9.	191.	0.00298	0.00190	0.00108	0.0	0.0	0.0	0.0
36	207.0	9.7	8.0	61.	-123.	184.	0.00230	0.00126	0.00104	0.0	0.0	0.0	0.0
37	199.8	9.7	6.0	54.	-123.	177.	0.00226	0.00126	0.00100	0.0	0.0	0.0	0.0
38	192.6	9.7	4.0	47.	-123.	170.	0.00222	0.00126	0.00097	0.0	0.0	0.0	0.0
39	185.4	9.7	6.0	41.	-123.	163.	0.00218	0.00126	0.00093	0.0	0.0	0.0	0.0
40	284.4	108.7	1.0	133.	-31.	163.	0.00271	0.00178	0.00093	0.0	0.0	0.0	0.0
41	177.3	9.7	10.0	33.	-123.	156.	0.00214	0.00126	0.00088	0.0	0.0	0.0	0.0
42	284.4	124.0	1.0	133.	-16.	149.	0.00271	0.00186	0.00085	0.0	0.0	0.0	0.0
43	253.8	93.4	2.0	104.	-45.	149.	0.00254	0.00170	0.00085	0.0	0.0	0.0	0.0
44	169.7	9.7	12.0	26.	-123.	149.	0.00210	0.00126	0.00084	0.0	0.0	0.0	0.0
45	237.6	78.3	2.0	89.	-59.	148.	0.00246	0.00162	0.00084	0.0	0.0	0.0	0.0
46	253.8	101.2	1.0	104.	-38.	142.	0.00254	0.00174	0.00081	0.0	0.0	0.0	0.0
47	162.0	9.7	13.0	19.	-123.	142.	0.00206	0.00126	0.00080	0.0	0.0	0.0	0.0
48	230.4	78.3	3.0	83.	-59.	142.	0.00242	0.00162	0.00080	0.0	0.0	0.0	0.0
49	246.6	101.2	1.0	98.	-38.	135.	0.00251	0.00174	0.00077	0.0	0.0	0.0	0.0
50	216.0	70.7	1.0	69.	-66.	135.	0.00235	0.00158	0.00077	0.0	0.0	0.0	0.0
51	253.8	108.7	2.0	104.	-31.	135.	0.00254	0.00178	0.00077	0.0	0.0	0.0	0.0
52	223.2	78.3	1.0	76.	-59.	135.	0.00238	0.00162	0.00076	0.0	0.0	0.0	0.0
53	154.4	9.7	22.0	12.	-123.	135.	0.00202	0.00126	0.00076	0.0	0.0	0.0	0.0
54	230.4	85.9	2.0	83.	-52.	134.	0.00242	0.00166	0.00076	0.0	0.0	0.0	0.0
55	216.0	78.3	5.0	69.	-59.	128.	0.00235	0.00162	0.00073	0.0	0.0	0.0	0.0
56	223.2	85.9	2.0	76.	-52.	128.	0.00238	0.00166	0.00072	0.0	0.0	0.0	0.0
57	146.9	9.7	17.0	5.	-123.	128.	0.00198	0.00126	0.00072	0.0	0.0	0.0	0.0
58	230.4	93.4	1.0	83.	-45.	127.	0.00242	0.00170	0.00072	0.0	0.0	0.0	0.0
59	207.0	70.7	3.0	61.	-66.	127.	0.00230	0.00158	0.00072	0.0	0.0	0.0	0.0
60	216.0	85.9	4.0	69.	-52.	121.	0.00235	0.00166	0.00069	0.0	0.0	0.0	0.0
61	253.8	124.0	1.0	104.	-16.	121.	0.00254	0.00186	0.00069	0.0	0.0	0.0	0.0
62	223.2	93.4	3.0	76.	-45.	121.	0.00238	0.00170	0.00069	0.0	0.0	0.0	0.0
63	192.6	63.0	1.0	47.	-73.	121.	0.00222	0.00154	0.00068	0.0	0.0	0.0	0.0
64	139.1	9.7	41.0	-2.	-123.	120.	0.00194	0.00126	0.00068	0.0	0.0	0.0	0.0
65	230.4	101.2	2.0	83.	-38.	120.	0.00242	0.00174	0.00068	0.0	0.0	0.0	0.0
66	199.8	70.7	1.0	54.	-66.	120.	0.00226	0.00158	0.00068	0.0	0.0	0.0	0.0
67	237.6	108.7	1.0	89.	-31.	120.	0.00246	0.00178	0.00068	0.0	0.0	0.0	0.0
68	216.0	93.4	2.0	69.	-45.	114.	0.00235	0.00170	0.00065	0.0	0.0	0.0	0.0
69	253.8	131.6	1.0	104.	-9.	114.	0.00254	0.00190	0.00065	0.0	0.0	0.0	0.0
70	192.6	70.7	2.0	47.	-66.	113.	0.00222	0.00158	0.00064	0.0	0.0	0.0	0.0
71	131.6	9.7	31.0	-9.	-123.	113.	0.00190	0.00126	0.00064	0.0	0.0	0.0	0.0
72	199.8	78.3	6.0	54.	-59.	113.	0.00226	0.00162	0.00064	0.0	0.0	0.0	0.0
73	207.0	85.9	2.0	61.	-52.	113.	0.00230	0.00166	0.00064	0.0	0.0	0.0	0.0
74	216.0	101.2	1.0	69.	-38.	107.	0.00235	0.00174	0.00061	0.0	0.0	0.0	0.0
75	223.2	108.7	1.0	76.	-31.	107.	0.00238	0.00178	0.00060	0.0	0.0	0.0	0.0
76	124.0	9.7	29.0	-16.	-123.	106.	0.00186	0.00126	0.00060	0.0	0.0	0.0	0.0
77	192.6	78.3	4.0	47.	-59.	106.	0.00222	0.00162	0.00060	0.0	0.0	0.0	0.0
78	230.4	116.3	2.0	83.	-24.	106.	0.00242	0.00182	0.00060	0.0	0.0	0.0	0.0
79	199.8	85.9	1.0	54.	-52.	106.	0.00226	0.00166	0.00060	0.0	0.0	0.0	0.0
80	237.6	124.0	1.0	89.	-16.	106.	0.00246	0.00186	0.00060	0.0	0.0	0.0	0.0
81	162.0	55.4	1.0	19.	-80.	99.	0.00206	0.00150	0.00056	0.0	0.0	0.0	0.0
82	116.3	9.7	14.0	-24.	-123.	99.	0.00182	0.00126	0.00056	0.0	0.0	0.0	0.0
83	177.3	70.7	3.0	33.	-66.	99.	0.00214	0.00158	0.00056	0.0	0.0	0.0	0.0

84	169.7	70.7	2.0	26.	-66.	92.	0.00210	0.00158	0.00052	0.0	0.0	0.0	0.0
85	108.7	9.7	11.0	-31.	-123.	92.	0.00178	0.00126	0.00052	0.0	0.0	0.0	0.0
86	177.3	78.3	1.0	33.	-59.	92.	0.00214	0.00162	0.00052	0.0	0.0	0.0	0.0
87	146.9	47.9	1.0	5.	-87.	92.	0.00198	0.00146	0.00052	0.0	0.0	0.0	0.0
88	230.4	131.6	1.0	83.	-9.	92.	0.00242	0.00190	0.00052	0.0	0.0	0.0	0.0
89	199.8	101.2	1.0	54.	-38.	92.	0.00226	0.00174	0.00052	0.0	0.0	0.0	0.0
90	207.0	108.7	3.0	61.	-31.	91.	0.00230	0.00178	0.00052	0.0	0.0	0.0	0.0
91	216.0	124.0	1.0	69.	-16.	86.	0.00235	0.00186	0.00049	0.0	0.0	0.0	0.0
92	124.0	32.6	1.0	-16.	-101.	85.	0.00186	0.00138	0.00048	0.0	0.0	0.0	0.0
93	154.4	63.0	2.0	12.	-73.	85.	0.00202	0.00154	0.00048	0.0	0.0	0.0	0.0
94	101.2	9.7	16.0	-38.	-123.	85.	0.00174	0.00126	0.00048	0.0	0.0	0.0	0.0
95	146.9	55.4	3.0	5.	-80.	85.	0.00198	0.00150	0.00048	0.0	0.0	0.0	0.0
96	199.8	108.7	2.0	54.	-31.	85.	0.00226	0.00178	0.00048	0.0	0.0	0.0	0.0
97	207.0	116.3	1.0	61.	-24.	84.	0.00230	0.00182	0.00048	0.0	0.0	0.0	0.0
98	169.7	85.9	1.0	26.	-52.	78.	0.00210	0.00166	0.00044	0.0	0.0	0.0	0.0
99	192.6	108.7	3.0	47.	-31.	78.	0.00222	0.00178	0.00044	0.0	0.0	0.0	0.0
100	177.3	93.4	2.0	33.	-45.	78.	0.00214	0.00170	0.00044	0.0	0.0	0.0	0.
101	146.9	63.0	2.0	5.	-73.	78.	0.00198	0.00154	0.00044	0.0	0.0	0.0	0.
102	162.0	78.3	1.0	19.	-59.	78.	0.00206	0.00162	0.00044	0.0	0.0	0.0	0.
103	139.1	55.4	4.0	-2.	-80.	78.	0.00194	0.00150	0.00044	0.0	0.0	0.0	0.
104	93.4	9.7	18.0	-45.	-123.	78.	0.00170	0.00126	0.00044	0.0	0.0	0.0	0.
105	185.4	108.7	3.0	41.	-31.	71.	0.00218	0.00178	0.00040	0.0	0.0	0.0	0.
106	169.7	93.4	1.0	26.	-45.	71.	0.00210	0.00170	0.00040	0.0	0.0	0.0	0.
107	192.6	116.3	1.0	47.	-24.	71.	0.00222	0.00182	0.00040	0.0	0.0	0.0	0.
108	85.9	9.7	7.0	-52.	-123.	71.	0.00166	0.00126	0.00040	0.0	0.0	0.0	0.
109	124.0	47.9	2.0	-16.	-87.	71.	0.00186	0.00146	0.00040	0.0	0.0	0.0	0.
110	108.7	32.6	1.0	-31.	-101.	71.	0.00178	0.00138	0.00040	0.0	0.0	0.0	0.
111	139.1	63.0	2.0	-2.	-73.	71.	0.00194	0.00154	0.00040	0.0	0.0	0.0	0.
112	177.3	101.2	1.0	33.	-38.	71.	0.00214	0.00174	0.00040	0.0	0.0	0.0	0.
113	116.3	40.1	1.0	-24.	-94.	71.	0.00182	0.00142	0.00040	0.0	0.0	0.0	0.
114	146.9	70.7	1.0	5.	-66.	71.	0.00198	0.00158	0.00040	0.0	0.0	0.0	0.
115	131.6	55.4	3.0	-9.	-80.	71.	0.00190	0.00150	0.00040	0.0	0.0	0.0	0.
116	199.8	124.0	2.0	54.	-16.	71.	0.00226	0.00186	0.00040	0.0	0.0	0.0	0.
117	185.4	116.3	1.0	41.	-24.	64.	0.00218	0.00182	0.00036	0.0	0.0	0.0	0.
118	169.7	101.2	3.0	26.	-38.	64.	0.00210	0.00174	0.00036	0.0	0.0	0.0	0.
119	108.7	40.1	5.0	-31.	-94.	64.	0.00178	0.00142	0.00036	0.0	0.0	0.0	0.
120	162.0	93.4	1.0	19.	-45.	64.	0.00206	0.00170	0.00036	0.0	0.0	0.0	0.
121	192.6	124.0	3.0	47.	-16.	64.	0.00222	0.00186	0.00036	0.0	0.0	0.0	0.
122	78.3	9.7	5.0	-59.	-123.	64.	0.00162	0.00126	0.00036	0.0	0.0	0.0	0.
123	146.9	78.3	1.0	5.	-59.	64.	0.00198	0.00162	0.00036	0.0	0.0	0.0	0.
124	177.3	108.7	4.0	33.	-31.	64.	0.00214	0.00178	0.00036	0.0	0.0	0.0	0.
125	139.1	70.7	2.0	-2.	-66.	64.	0.00194	0.00158	0.00036	0.0	0.0	0.0	0.
126	116.3	47.9	3.0	-24.	-87.	64.	0.00182	0.00146	0.00036	0.0	0.0	0.0	0.
127	199.8	131.6	3.0	54.	-9.	63.	0.00226	0.00190	0.00036	0.0	0.0	0.0	0.
128	185.4	124.0	3.0	41.	-16.	57.	0.00218	0.00186	0.00032	0.0	0.0	0.0	0.
129	192.6	131.6	7.0	47.	-9.	57.	0.00222	0.00190	0.00032	0.0	0.0	0.0	0.
130	169.7	108.7	4.0	26.	-31.	57.	0.00210	0.00178	0.00032	0.0	0.0	0.0	0.
131	154.4	93.4	4.0	12.	-45.	57.	0.00202	0.00170	0.00032	0.0	0.0	0.0	0.
132	70.7	9.7	6.0	-66.	-123.	57.	0.00158	0.00126	0.00032	0.0	0.0	0.0	0.
133	124.0	63.0	1.0	-16.	-73.	57.	0.00186	0.00154	0.00032	0.0	0.0	0.0	0.
134	101.2	40.1	7.0	-38.	-94.	57.	0.00174	0.00142	0.00032	0.0	0.0	0.0	0.
135	146.9	85.9	5.0	5.	-52.	57.	0.00198	0.00166	0.00032	0.0	0.0	0.0	0.
136	162.0	101.2	6.0	19.	-38.	57.	0.00206	0.00174	0.00032	0.0	0.0	0.0	0.
137	139.1	78.3	7.0	-2.	-59.	57.	0.00194	0.00162	0.00032	0.0	0.0	0.0	0.
138	108.7	47.9	3.0	-31.	-87.	57.	0.00178	0.00146	0.00032	0.0	0.0	0.0	0.
139	116.3	55.4	1.0	-24.	-80.	57.	0.00182	0.00150	0.00032	0.0	0.0	0.0	0.
140	131.6	70.7	5.0	-9.	-66.	57.	0.00190	0.00158	0.00032	0.0	0.0	0.0	0.
141	185.4	131.6	3.0	41.	-9.	50.	0.00218	0.00190	0.00028	0.0	0.0	0.0	0.
142	169.7	116.3	1.0	26.	-24.	50.	0.00210	0.00182	0.00028	0.0	0.0	0.0	0.
143	146.9	93.4	3.0	5.	-45.	50.	0.00198	0.00170	0.00028	0.0	0.0	0.0	0.
144	154.4	101.2	5.0	12.	-38.	50.	0.00202	0.00174	0.00028	0.0	0.0	0.0	0.
145	108.7	55.4	1.0	-31.	-80.	50.	0.00178	0.00150	0.00028	0.0	0.0	0.0	0.

146	85.9	32.6	8.0	-52.	-101.	50.	0.00166	0.00138	0.00028	0.0	0.0	0.0	0.
147	162.0	108.7	3.0	19.	-31.	50.	0.00206	0.00178	0.00028	0.0	0.0	0.0	0.
148	93.4	40.1	12.0	-45.	-94.	50.	0.00170	0.00142	0.00028	0.0	0.0	0.0	0.
149	124.0	70.7	5.0	-16.	-66.	50.	0.00186	0.00158	0.00028	0.0	0.0	0.0	0.
150	63.0	9.7	8.0	-73.	-123.	50.	0.00154	0.00126	0.00028	0.0	0.0	0.0	0.
151	139.1	85.9	7.0	-2.	-52.	50.	0.00194	0.00166	0.00028	0.0	0.0	0.0	0.
152	101.2	47.9	5.0	-38.	-87.	50.	0.00174	0.00146	0.00028	0.0	0.0	0.0	0.
153	177.3	124.0	6.0	33.	-16.	50.	0.00214	0.00186	0.00028	0.0	0.0	0.0	0.
154	116.3	63.0	7.0	-24.	-73.	50.	0.00182	0.00154	0.00028	0.0	0.0	0.0	0.
155	131.6	78.3	9.0	-9.	-59.	50.	0.00190	0.00162	0.00028	0.0	0.0	0.0	0.
156	169.7	124.0	2.0	26.	-16.	43.	0.00210	0.00186	0.00024	0.0	0.0	0.0	0.
157	162.0	116.3	1.0	19.	-24.	43.	0.00206	0.00182	0.00024	0.0	0.0	0.0	0.
158	177.3	131.6	1.0	33.	-9.	43.	0.00214	0.00190	0.00024	0.0	0.0	0.0	0.
159	124.0	78.3	15.0	-16.	-59.	43.	0.00186	0.00162	0.00024	0.0	0.0	0.0	0.
160	108.7	63.0	13.0	-31.	-73.	43.	0.00178	0.00154	0.00024	0.0	0.0	0.0	0.
161	70.7	25.0	1.0	-66.	-109.	43.	0.00158	0.00134	0.00024	0.0	0.0	0.0	0.
162	85.9	40.1	15.0	-52.	-94.	43.	0.00166	0.00142	0.00024	0.0	0.0	0.0	0.
163	154.4	108.7	1.0	12.	-31.	43.	0.00202	0.00178	0.00024	0.0	0.0	0.0	0.
164	139.1	93.4	7.0	-2.	-45.	43.	0.00194	0.00170	0.00024	0.0	0.0	0.0	0.
165	78.3	32.6	13.0	-59.	-101.	43.	0.00162	0.00138	0.00024	0.0	0.0	0.0	0.
166	101.2	55.4	6.0	-38.	-80.	43.	0.00174	0.00150	0.00024	0.0	0.0	0.0	0.
167	55.4	9.7	6.0	-80.	-123.	43.	0.00150	0.00126	0.00024	0.0	0.0	0.0	0.
168	146.9	101.2	4.0	5.	-38.	43.	0.00198	0.00174	0.00024	0.0	0.0	0.0	0.
169	131.6	85.9	10.0	-9.	-52.	43.	0.00190	0.00166	0.00024	0.0	0.0	0.0	0.
170	93.4	47.9	4.0	-45.	-87.	42.	0.00170	0.00146	0.00024	0.0	0.0	0.0	0.
171	116.3	70.7	14.0	-24.	-66.	42.	0.00182	0.00158	0.00024	0.0	0.0	0.0	0.
172	154.4	116.3	2.0	12.	-24.	36.	0.00202	0.00182	0.00020	0.0	0.0	0.0	0.
173	47.9	9.7	2.0	-87.	-123.	36.	0.00146	0.00126	0.00020	0.0	0.0	0.0	0.
174	70.7	32.6	16.0	-66.	-101.	36.	0.00158	0.00138	0.00020	0.0	0.0	0.0	0.
175	101.2	63.0	8.0	-38.	-73.	36.	0.00174	0.00154	0.00020	0.0	0.0	0.0	0.
176	124.0	85.9	5.0	-16.	-52.	36.	0.00186	0.00166	0.00020	0.0	0.0	0.0	0.
177	78.3	40.1	5.0	-59.	-94.	36.	0.00162	0.00142	0.00020	0.0	0.0	0.0	0.
178	131.6	93.4	4.0	-9.	-45.	36.	0.00190	0.00170	0.00020	0.0	0.0	0.0	0.
179	146.9	108.7	3.0	5.	-31.	36.	0.00198	0.00178	0.00020	0.0	0.0	0.0	0.
180	63.0	25.0	1.0	-73.	-109.	35.	0.00154	0.00134	0.00020	0.0	0.0	0.0	0.
181	139.1	101.2	2.0	-2.	-38.	35.	0.00194	0.00174	0.00020	0.0	0.0	0.0	0.
182	108.7	70.7	16.0	-31.	-66.	35.	0.00178	0.00158	0.00020	0.0	0.0	0.0	0.
183	93.4	55.4	6.0	-45.	-80.	35.	0.00170	0.00150	0.00020	0.0	0.0	0.0	0.
184	85.9	47.9	2.0	-52.	-87.	35.	0.00166	0.00146	0.00020	0.0	0.0	0.0	0.
185	116.3	78.3	7.0	-24.	-59.	35.	0.00182	0.00162	0.00020	0.0	0.0	0.0	0.
186	70.7	40.1	8.0	-66.	-94.	28.	0.00158	0.00142	0.00016	0.0	0.0	0.0	0.
187	146.9	116.3	2.0	5.	-24.	28.	0.00198	0.00182	0.00016	0.0	0.0	0.0	0.
188	124.0	93.4	2.0	-16.	-45.	28.	0.00186	0.00170	0.00016	0.0	0.0	0.0	0.
189	162.0	131.6	3.0	19.	-9.	28.	0.00206	0.00190	0.00016	0.0	0.0	0.0	0.
190	108.7	78.3	5.0	-31.	-59.	28.	0.00178	0.00162	0.00016	0.0	0.0	0.0	0.
191	154.4	124.0	3.0	12.	-16.	28.	0.00202	0.00186	0.00016	0.0	0.0	0.0	0.
192	63.0	32.6	4.0	-73.	-101.	28.	0.00154	0.00138	0.00016	0.0	0.0	0.0	0.
193	85.9	55.4	11.0	-52.	-80.	28.	0.00166	0.00150	0.00016	0.0	0.0	0.0	0.
194	55.4	25.0	2.0	-80.	-109.	28.	0.00150	0.00134	0.00016	0.0	0.0	0.0	0.
195	101.2	70.7	3.0	-38.	-66.	28.	0.00174	0.00158	0.00016	0.0	0.0	0.0	0.
196	139.1	108.7	1.0	-2.	-31.	28.	0.00194	0.00178	0.00016	0.0	0.0	0.0	0.
197	93.4	63.0	7.0	-45.	-73.	28.	0.00170	0.00154	0.00016	0.0	0.0	0.0	0.
198	78.3	47.9	8.0	-59.	-87.	28.	0.00162	0.00146	0.00016	0.0	0.0	0.0	0.
199	131.6	101.2	4.0	-9.	-38.	28.	0.00190	0.00174	0.00016	0.0	0.0	0.0	0.
200	154.4	131.6	9.0	12.	-9.	21.	0.00202	0.00190	0.00012	0.0	0.0	0.0	0.
201	139.1	116.3	10.0	-2.	-24.	21.	0.00194	0.00182	0.00012	0.0	0.0	0.0	0.
202	85.9	63.0	5.0	-52.	-73.	21.	0.00166	0.00154	0.00012	0.0	0.0	0.0	0.
203	101.2	78.3	3.0	-38.	-59.	21.	0.00174	0.00162	0.00012	0.0	0.0	0.0	0.
204	108.7	85.9	3.0	-31.	-52.	21.	0.00178	0.00166	0.00012	0.0	0.0	0.0	0.
205	124.0	101.2	9.0	-16.	-38.	21.	0.00186	0.00174	0.00012	0.0	0.0	0.0	0.
206	55.4	32.6	2.0	-80.	-101.	21.	0.00150	0.00138	0.00012	0.0	0.0	0.0	0.
207	63.0	40.1	10.0	-73.	-94.	21.	0.00154	0.00142	0.00012	0.0	0.0	0.0	0.

208	70.7	47.9	14.0	-66.	-87.	21.	0.00158	0.00146	0.00012	0.0	0.0	0.0	0.
209	78.3	55.4	5.0	-59.	-80.	21.	0.00162	0.00150	0.00012	0.0	0.0	0.0	0.
210	116.3	93.4	4.0	-24.	-45.	21.	0.00182	0.00170	0.00012	0.0	0.0	0.0	0.
211	146.9	124.0	4.0	5.	-16.	21.	0.00198	0.00186	0.00012	0.0	0.0	0.0	0.
212	131.6	108.7	4.0	-9.	-31.	21.	0.00190	0.00178	0.00012	0.0	0.0	0.0	0.
213	93.4	70.7	2.0	-45.	-66.	21.	0.00170	0.00158	0.00012	0.0	0.0	0.0	0.
214	154.4	139.1	5.0	12.	-2.	14.	0.00202	0.00194	0.00008	0.0	0.0	0.0	0.
215	146.9	131.6	23.0	5.	-9.	14.	0.00198	0.00190	0.00008	0.0	0.0	0.0	0.
216	47.9	32.6	6.0	-87.	-101.	14.	0.00146	0.00138	0.00008	0.0	0.0	0.0	0.
217	108.7	93.4	12.0	-31.	-45.	14.	0.00178	0.00170	0.00008	0.0	0.0	0.0	0.
218	70.7	55.4	7.0	-66.	-80.	14.	0.00158	0.00150	0.00008	0.0	0.0	0.0	0.
219	55.4	40.1	7.0	-80.	-94.	14.	0.00150	0.00142	0.00008	0.0	0.0	0.0	0.
220	131.6	116.3	15.0	-9.	-24.	14.	0.00190	0.00182	0.00008	0.0	0.0	0.0	0.
221	78.3	63.0	6.0	-59.	-73.	14.	0.00162	0.00154	0.00008	0.0	0.0	0.0	0.
222	124.0	108.7	24.0	-16.	-31.	14.	0.00186	0.00178	0.00008	0.0	0.0	0.0	0.
223	101.2	85.9	10.0	-38.	-52.	14.	0.00174	0.00166	0.00008	0.0	0.0	0.0	0.
224	93.4	78.3	14.0	-45.	-59.	14.	0.00170	0.00162	0.00008	0.0	0.0	0.0	0.
225	139.1	124.0	21.0	-2.	-16.	14.	0.00194	0.00186	0.00008	0.0	0.0	0.0	0.
226	85.9	70.7	6.0	-52.	-66.	14.	0.00166	0.00158	0.00008	0.0	0.0	0.0	0.
227	63.0	47.9	17.0	-73.	-87.	14.	0.00154	0.00146	0.00008	0.0	0.0	0.0	0.
228	116.3	101.2	18.0	-24.	-38.	14.	0.00182	0.00174	0.00008	0.0	0.0	0.0	0.
229	124.0	116.3	8.0	-16.	-24.	7.	0.00186	0.00182	0.00004	0.0	0.0	0.0	0.
230	47.9	40.1	4.0	-87.	-94.	7.	0.00146	0.00142	0.00004	0.0	0.0	0.0	0.
231	101.2	93.4	11.0	-38.	-45.	7.	0.00174	0.00170	0.00004	0.0	0.0	0.0	0.
232	146.9	139.1	4.0	5.	-2.	7.	0.00198	0.00194	0.00004	0.0	0.0	0.0	0.
233	139.1	131.6	9.0	-2.	-9.	7.	0.00194	0.00190	0.00004	0.0	0.0	0.0	0.
234	85.9	78.3	7.0	-52.	-59.	7.	0.00166	0.00162	0.00004	0.0	0.0	0.0	0.
235	108.7	101.2	10.0	-31.	-38.	7.	0.00178	0.00174	0.00004	0.0	0.0	0.0	0.
236	40.1	32.6	1.0	-94.	-101.	7.	0.00142	0.00138	0.00004	0.0	0.0	0.0	0.
237	63.0	55.4	1.0	-73.	-80.	7.	0.00154	0.00150	0.00004	0.0	0.0	0.0	0.
238	32.6	25.0	1.0	-101.	-109.	7.	0.00138	0.00134	0.00004	0.0	0.0	0.0	0.
239	93.4	85.9	7.0	-45.	-52.	7.	0.00170	0.00166	0.00004	0.0	0.0	0.0	0.
240	55.4	47.9	2.0	-80.	-87.	7.	0.00150	0.00146	0.00004	0.0	0.0	0.0	0.
241	78.3	70.7	12.0	-59.	-66.	7.	0.00162	0.00158	0.00004	0.0	0.0	0.0	0.
242	131.6	124.0	4.0	-9.	-16.	7.	0.00190	0.00186	0.00004	0.0	0.0	0.0	0.
243	116.3	108.7	12.0	-24.	-31.	7.	0.00182	0.00178	0.00004	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= plate_surface_flaw     #with or without weld using ACTIVATEs:
#ACTIVATE_MmMb=    1   #  Deactivate  = 0
#ACTIVATE_MkmMkb=  1
#ACTIVATE_fw=      1
#                               #Other      #TYPE=  options:
#                               # plate_long_surface_flaw
#                               # plate_tru_flaw
#                               # plate_embedded_flaw
#                               # plate_edge_flaw
#                               #
#                               # pipe_inside_flaw
#                               # pipe_full_inside_flaw
#                               # pipe_full_outside_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= 70.0   # plate width
#ri= 200.    # Internal diameter if pipe problem. Ignored if not pipe
#azero= 1.5  # initial crack depth
#czero= 4.0  # initial 1/2 crack width at surface
#L= 10.      # Weld Feature width.  Ignored  if ACTIVATE_MkmMkb= 0 (above)

#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.
#
#
#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 none     # 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.
#                                  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 filteredExample1.5

```
   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
#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 Experm.
# 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
#
#
```