

# Results for plateA36\_0.98 : Crack Propagation Plate Thru Center Flaw

Author: edit this in file makereport2

Affiliation:

Thu Aug 29 12:39:14 EDT 2013

Simulation input data:

**B**= 10.0 mm

**W**= 70.0 mm

**a<sub>0</sub>**= 1.5 mm

#MATERIAL= merged\_a36\_fitted.html

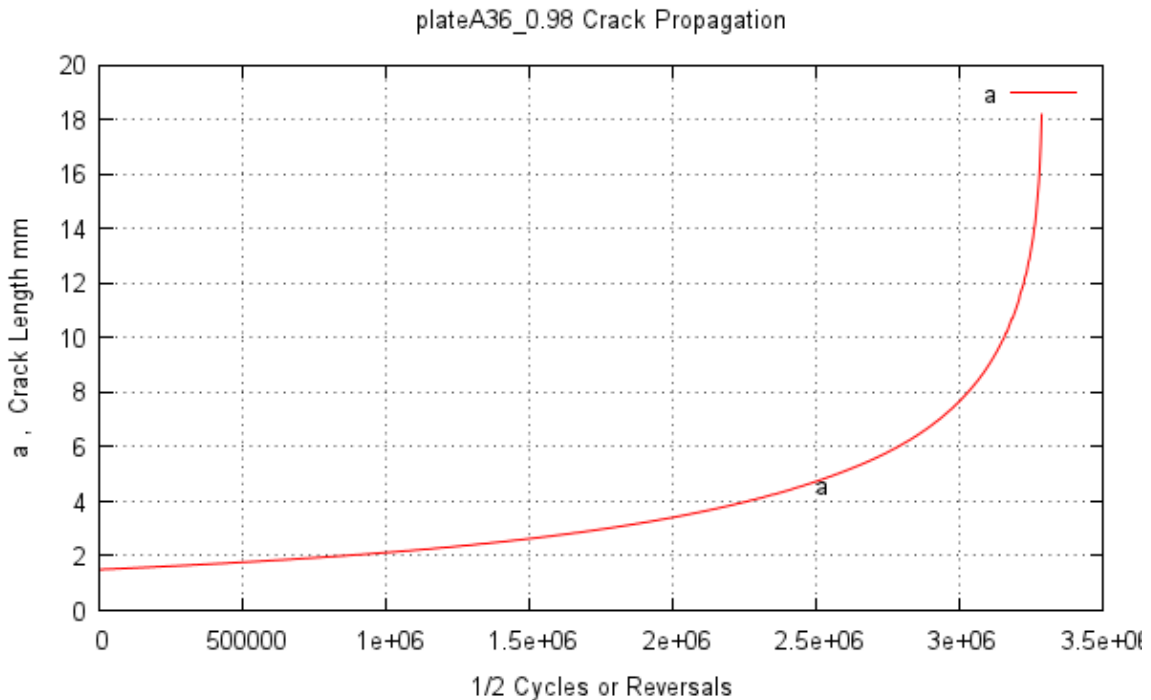
#TYPE= plate\_thru\_flaw

\_\_\_\_\_ #ACTIVATE\_fw= 1

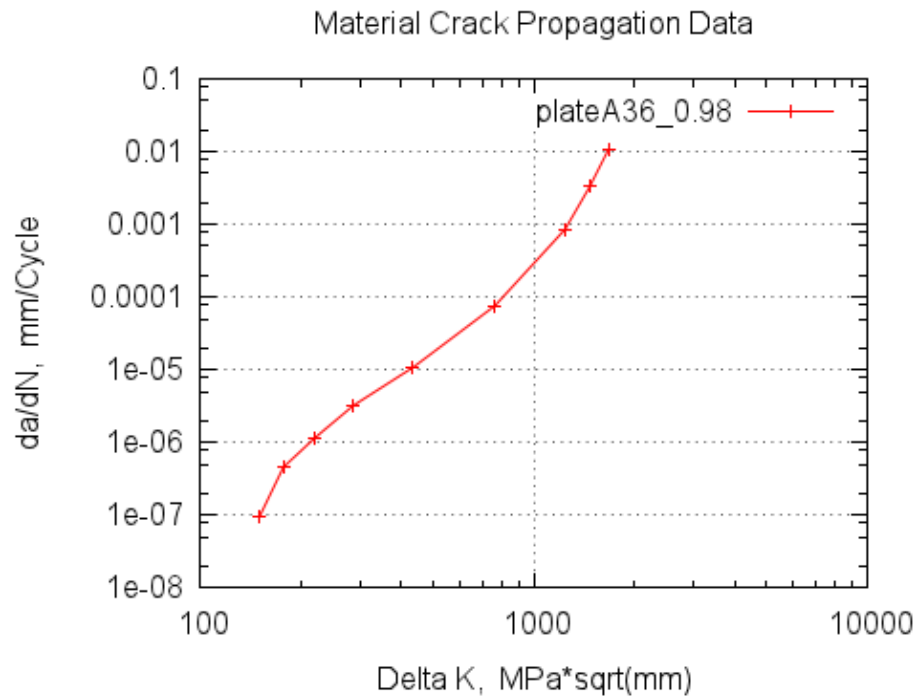
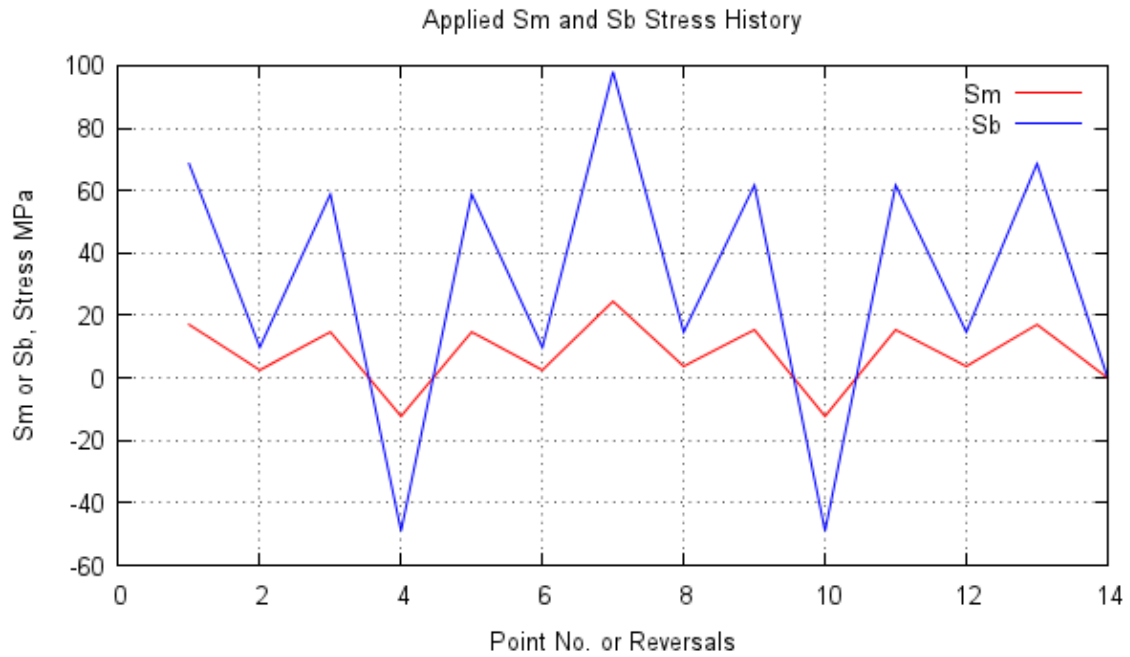
Crack Propagation Results:

( #plateThruFlaw.f vers. 3.07 )

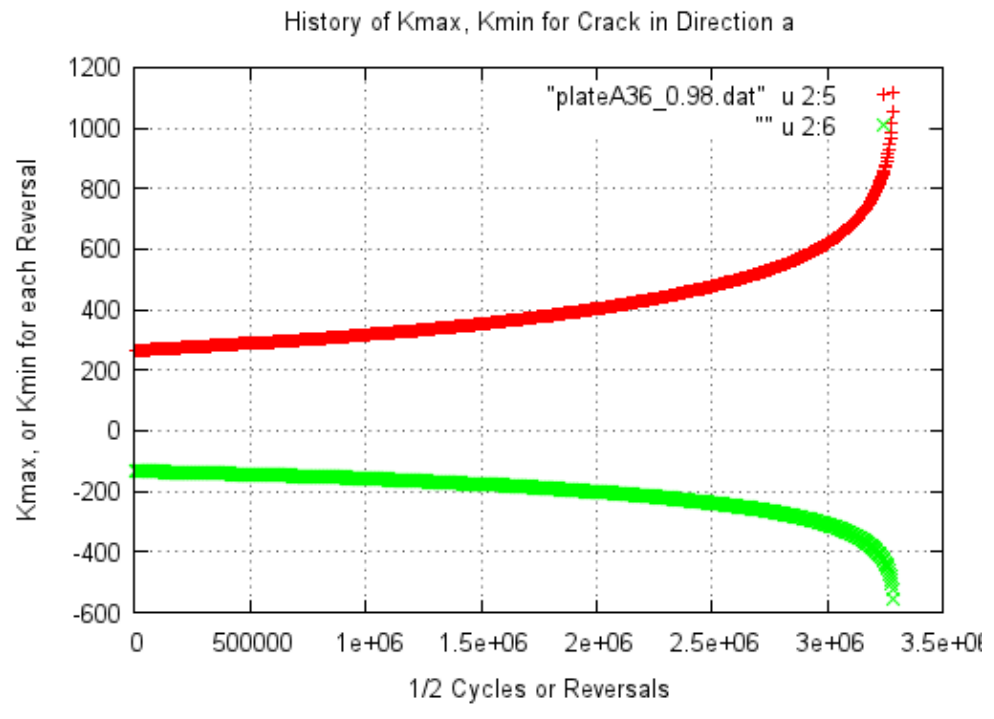
- No. of Reversals= 3286972 revs. or 1643486 cycles
- Final \_\_\_\_\_ **a** = 0.182E+02 mm
- No. of History Reps.= 234784 reps. + 10 revs.



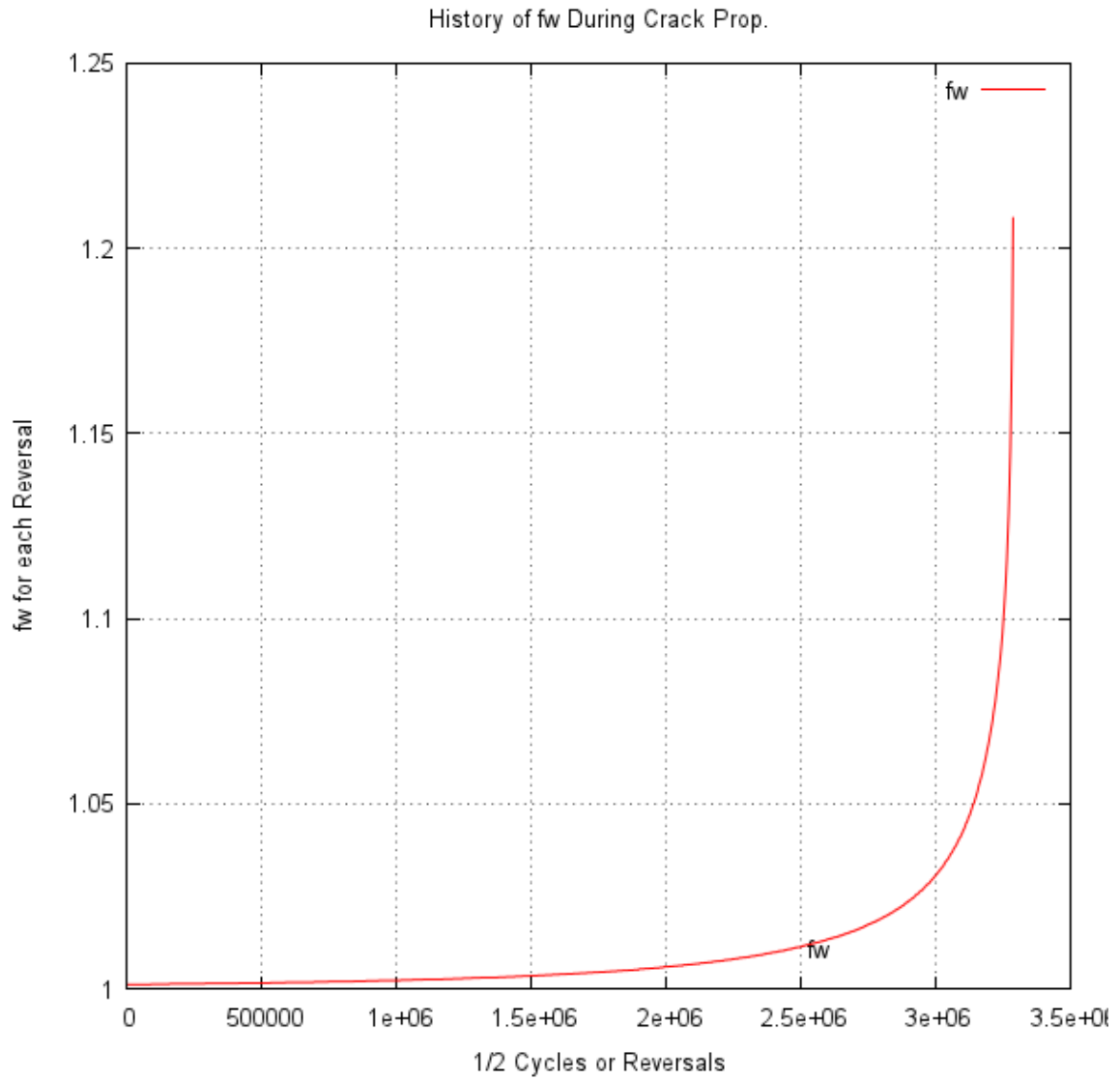
Results for plateA36\_0.98 : Crack Propagation Plate Thru Center Flaw



Results for plateA36\_0.98 : Crack Propagation Plate Thru Center Flaw



Results for plateA36\_0.98 : Crack Propagation Plate Thru Center Flaw



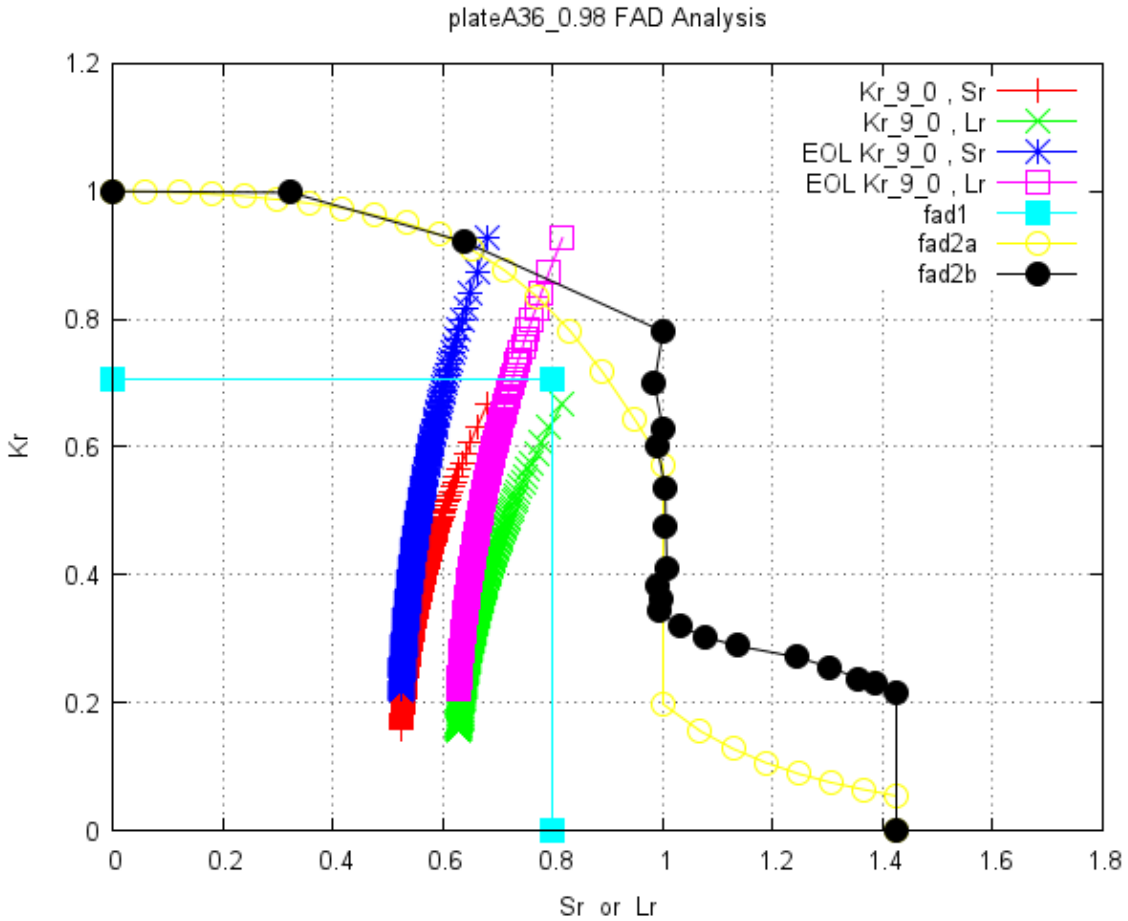
# FAD Results for plateA36\_0.98

#TensileFile= a36\_Mattos\_mono\_engrSS\_FLAT.txt

#PmEOL= 70. #PbEOL= 100.

#Kmat= 1675.

#PinJoint= 0



## Crack Initiation Life Results for plateA36\_0.98 (Assume $K_t= 1.8$ for welds)

Files Used:

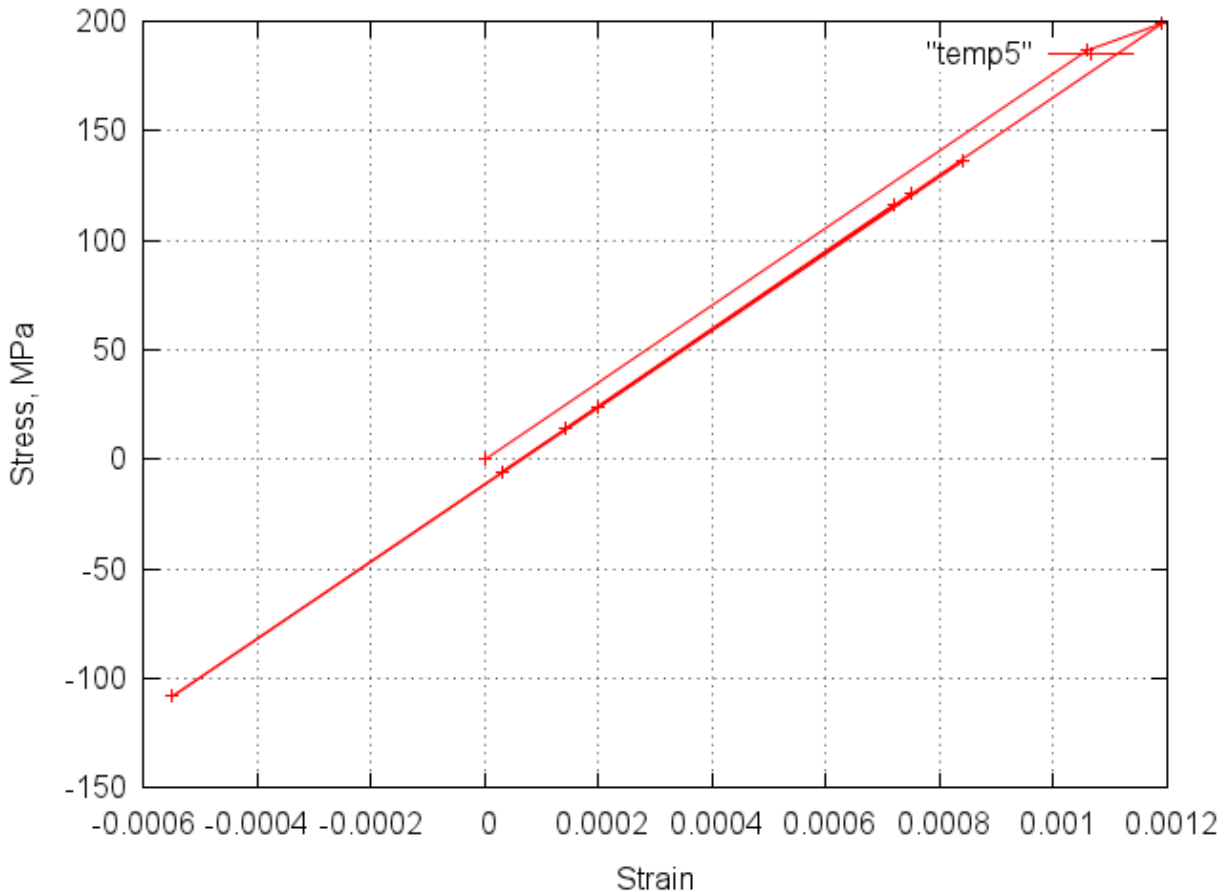
- Stress History (Sb+Sm)
- Rainflow File
- Material File

Loop	Smax	Smin	N	Sigmax	Sigmin	Delta	Epsmax	Epsmin	DeltaEps	%Eps	%SWaT	%Sts	%Morr
1	219.6	-110.3	1.0	199.	-108.	307.	0.00119	-.00055	0.00174	0.0	0.0	0.0	0.0
2	152.3	-110.3	1.0	136.	-108.	244.	0.00084	-.00055	0.00139	0.0	0.0	0.0	0.0
3	152.3	-0.1	1.0	136.	-6.	142.	0.00084	0.00003	0.00080	0.0	0.0	0.0	0.0
4	131.2	20.9	2.0	117.	14.	103.	0.00072	0.00014	0.00058	0.0	0.0	0.0	0.0
5	136.4	31.5	2.0	121.	24.	98.	0.00075	0.00020	0.00055	0.0	0.0	0.0	0.0

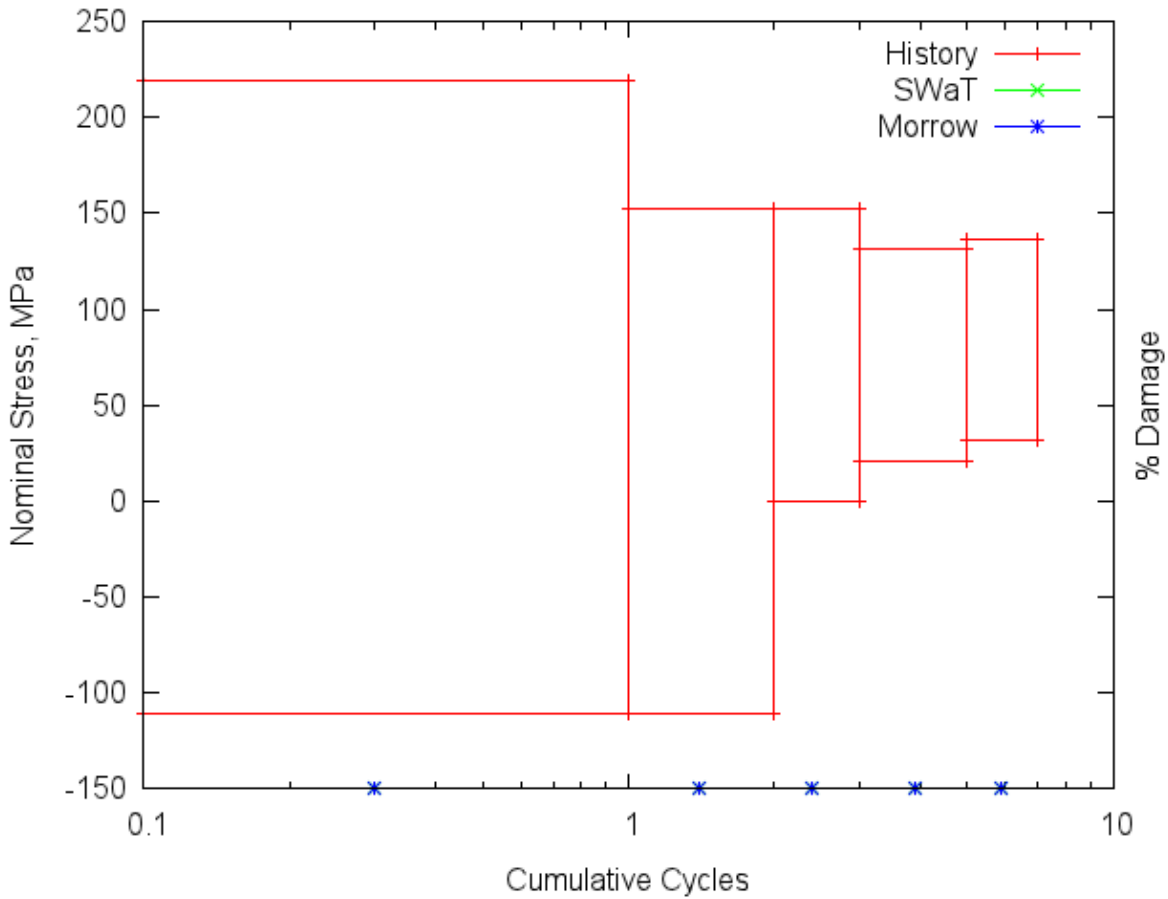
Predicted History Repetitions to Initiation:

StrainLife_Reps	SWaT_Life_Reps	StressLife_Reps	Morrow_Reps	Goodman_Reps (Reps= Repetitions)
Infinity	Infinity	Infinity	Infinity	Infinity

### Local Stress and Strain Response:



## Cumulative Cycle Plot of History and Damage:



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

## 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_thru_flaw      #with or without weld using ACTIVATES:
#       According to BS7910 M=Mm=Mb=1.0 and no welds.
#ACTIVATE_MmMb= 0 # ignored
#ACTIVATE_MkmMkb= 0 # ignored
#ACTIVATE_fw= 1 # Deactivate = 0
#
#       #Other #TYPE= options:
#       # plate_surface_flaw
#       # plate_long_surface_flaw
#       # plate_embedded_flaw
#       # plate_edge_flaw
#
#       # pipe_inside_flaw
#       # pipe_full_inside_flaw
#       # pipe_full_outside_flaw
#
#       # rod_surface_flaw
```

## Results for plateA36\_0.98 : Crack Propagation Plate Thru Center 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=  0.    # Internal diameter if pipe problem. Ignored if not pipe
#azero= 1.5 # initial crack half length
#czero= 0.0 # initial 1/2 crack width at surface (not used for plate_tru_flaw)
#L=  0.    # 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 )
#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 plateA36\_0.98

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
```

## Results for plateA36\_0.98 : Crack Propagation Plate Thru Center Flaw

```

#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
#
#

```