

# Results for hs\_A36+POL-Decay\_kt=-2.3.ini : Crack Initiation Using saefcalc2

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Affiliation: where

Tue Jun 3 10:31:30 EDT 2014 saefcalc2.f vers.= 2.1

Simulation input data:

Material file= merged\_a36\_w\_POL\_fitted.html

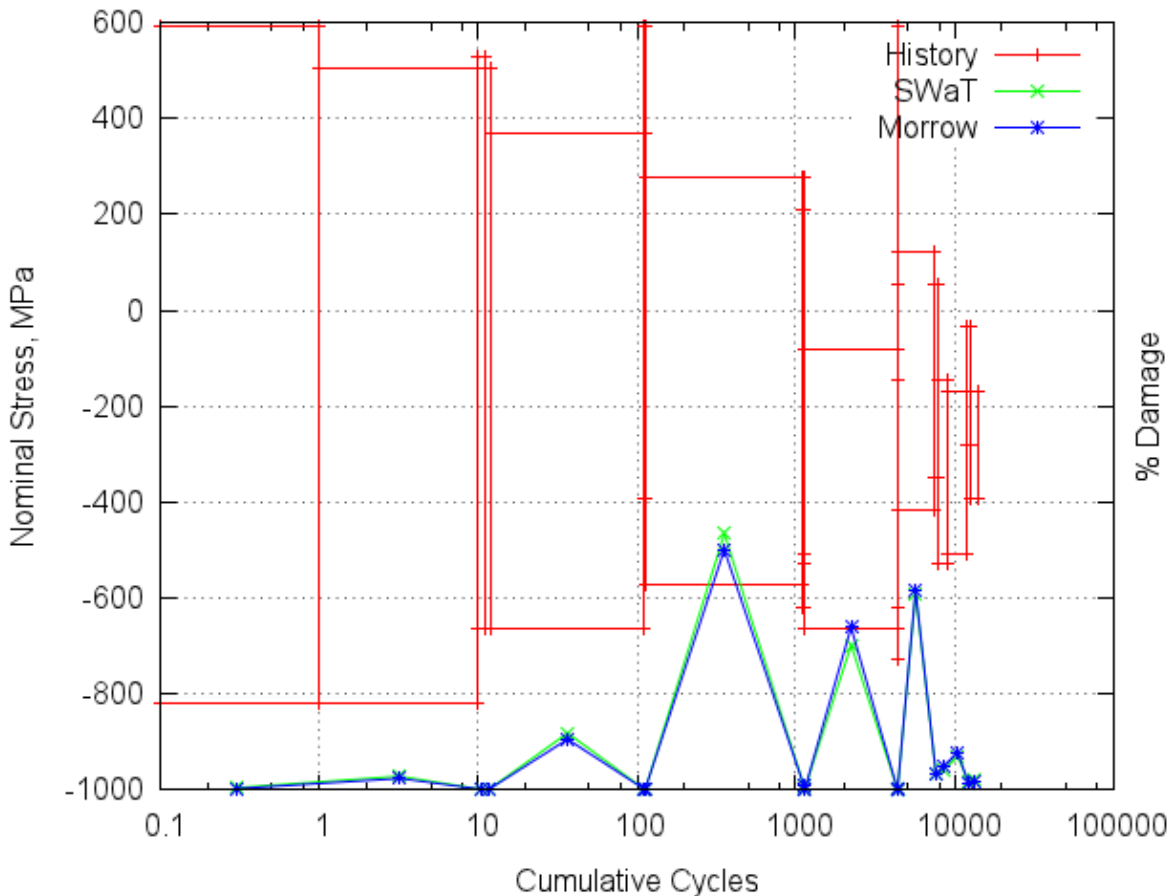
Multiplication Factor= -0.2300000E+01

## Crack Initiation Life Results

### Predicted History Repetitions to Initiation:

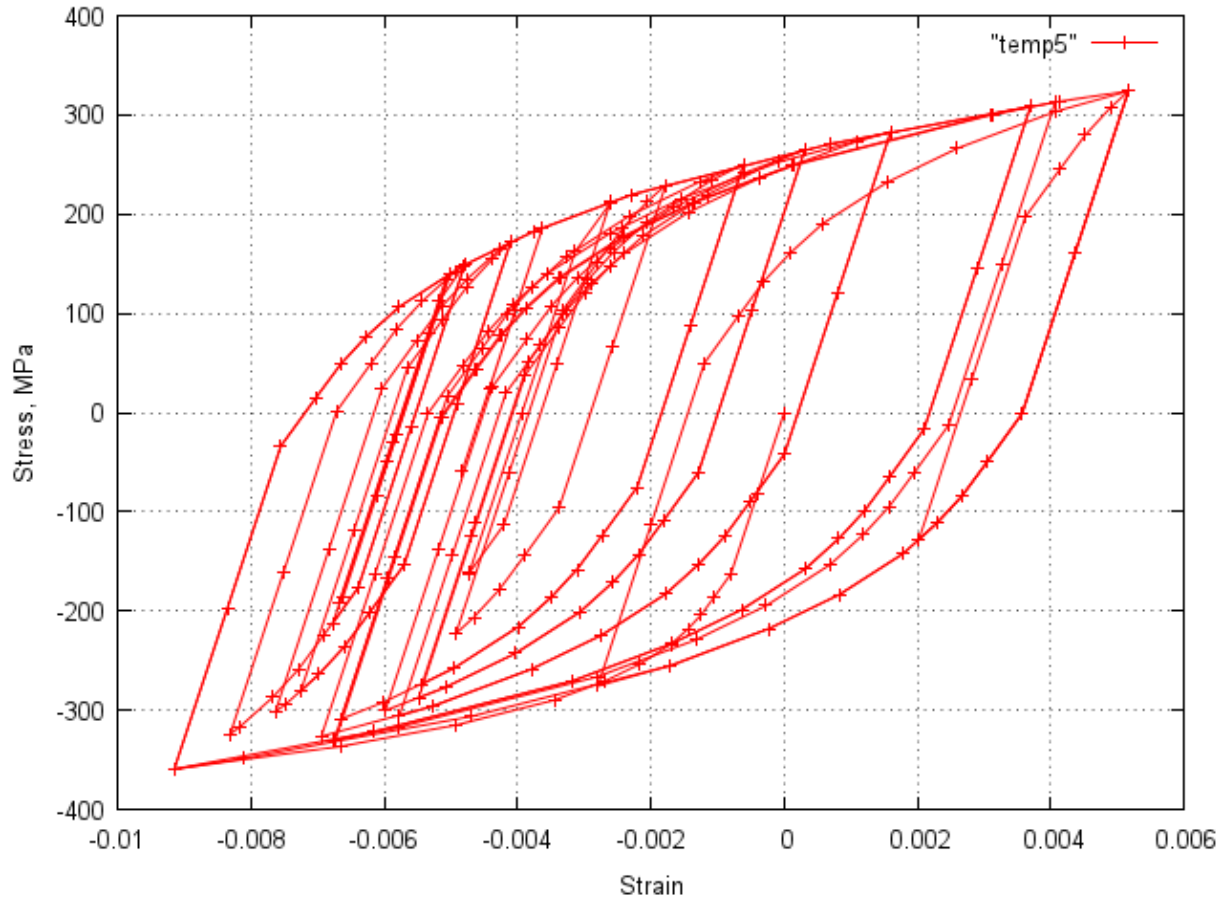
StrainLife_Reps	SWaT_Life_Reps	StressLife_Reps	Morrow_Reps	Goodman_Reps (Reps= Repetitions)
10.0	12.5	10.0	12.7	14.3

### Cumulative Cycle Plot of History and Damage:



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

### Local Stress and Strain Response:



### Fatigue Damage Details for each Cycle Set

Loop	Smax	Smin	N	Sigmax	Sigmin	Delta	Epsmax	Epsmin	DeltaEps	%Eps	%SWaT	%Sts	%Mor
1	593.4	-818.8	1.0	324.	-359.	683.	0.00517	-0.00916	0.01433	0.2	0.3	0.2	0.2
2	503.7	-818.8	9.0	309.	-359.	668.	0.00370	-0.00916	0.01286	1.7	1.8	1.7	1.5
3	526.7	-662.4	1.0	313.	-330.	643.	0.00407	-0.00674	0.01080	0.1	0.1	0.1	0.1
4	503.7	-662.4	1.0	309.	-330.	638.	0.00370	-0.00676	0.01046	0.1	0.1	0.1	0.1
5	368.0	-662.4	99.0	283.	-326.	610.	0.00160	-0.00695	0.00856	6.9	7.4	6.9	6.6
6	593.4	-393.3	1.0	324.	-276.	600.	0.00517	-0.00280	0.00798	0.1	0.1	0.1	0.1
7	368.0	-572.7	1.0	283.	-306.	589.	0.00160	-0.00578	0.00738	0.0	0.1	0.0	0.1
8	278.3	-572.7	999.0	265.	-300.	565.	0.00031	-0.00599	0.00629	31.0	33.4	31.0	31.3
9	211.6	-618.7	24.0	250.	-309.	559.	-0.00061	-0.00666	0.00606	0.7	0.6	0.7	0.6
10	278.3	-529.0	1.0	265.	-288.	553.	0.00031	-0.00549	0.00579	0.0	0.0	0.0	0.0
11	211.6	-506.0	1.0	250.	-274.	524.	-0.00061	-0.00544	0.00483	0.0	0.0	0.0	0.0
12	-79.8	-662.4	3249.0	172.	-301.	473.	-0.00411	-0.00764	0.00353	29.3	18.9	29.3	21.2
13	-147.0	-729.1	1.0	149.	-324.	473.	-0.00480	-0.00832	0.00352	0.0	0.0	0.0	0.0
14	-79.8	-618.7	1.0	172.	-281.	453.	-0.00411	-0.00726	0.00315	0.0	0.0	0.0	0.0
15	593.4	54.7	5.0	324.	-128.	452.	0.00517	0.00202	0.00315	0.0	0.1	0.0	0.1
16	121.9	-416.3	3000.0	229.	-223.	452.	-0.00178	-0.00493	0.00315	19.9	25.6	19.9	26.1
17	54.7	-349.6	550.0	212.	-163.	375.	-0.00261	-0.00474	0.00214	1.4	2.0	1.4	2.0
18	-147.0	-529.0	1250.0	149.	-213.	362.	-0.00480	-0.00678	0.00198	2.7	2.6	2.7	3.0
19	-169.5	-506.0	2750.0	140.	-192.	333.	-0.00502	-0.00669	0.00167	4.3	4.4	4.3	4.9
20	-35.0	-280.6	733.0	186.	-59.	246.	-0.00363	-0.00484	0.00121	0.6	1.1	0.6	0.9
21	-169.5	-393.3	1251.0	140.	-83.	224.	-0.00502	-0.00612	0.00110	0.8	1.3	0.8	1.1

## Appendix 1: Rainflow Cycles

```
#Inputs after scaling and sorting:
#  Srange  Smean  Cycles  Smax  Smin
1412.2 -112.7      1.0 593.4 -818.8
1322.5 -157.6      9.0 503.7 -818.8
1189.1  -67.8      1.0 526.7 -662.4
1166.1  -79.3      1.0 503.7 -662.4
1030.4 -147.2     99.0 368.0 -662.4
986.7  100.0      1.0 593.4 -393.3
940.7 -102.4      1.0 368.0 -572.7
851.0 -147.2    999.0 278.3 -572.7
830.3 -203.6     24.0 211.6 -618.7
807.3 -125.4      1.0 278.3 -529.0
717.6 -147.2      1.0 211.6 -506.0
582.6 -371.1   3249.0 -79.8 -662.4
582.1 -438.0      1.0-147.0 -729.1
538.9 -349.3      1.0 -79.8 -618.7
538.7  324.1      5.0 593.4   54.7
538.2 -147.2   3000.0 121.9 -416.3
404.3 -147.4     550.0  54.7 -349.6
382.0 -338.0   1250.0-147.0 -529.0
336.5 -337.8   2750.0-169.5 -506.0
245.6 -157.8    733.0 -35.0 -280.6
223.8 -281.4   1251.0-169.5 -393.3
```

## Appendix 2: Stress-Strain-Init.Life file: "merged\_a36\_w\_POL\_fitted.html"

```
#SAE Standard Fatigue Data File format
```

```
##
```

```
Pick one: #FDE_plot #FDE_fit ##
```

```
#
#Copyright (C) 2014 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 !! with Adjustment for expected Periodic OverLoads
# Original test 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
```

## Results for hs\_A36+POL-Decay\_kt=-2.3.ini : Crack Initiation Using saefcalc2

```

#
# 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
#
#NOTE!! The Following Points are FITTED DATA:
#NOTE!! Fitted Stress computed using Experm. K' and n'
#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
#Following are Estimated Periodic Overload Curve Points:
0.00217 150000 36.8 0. 0.00092 29528. #Fitted_pointPOL
0.00169 240000 33.8 0. 0.00055 29528. #Fitted_pointPOL
0.00144 400000 31.6 0. 0.00037 29528. #Fitted_pointPOL
0.00125 600000 29.6 0. 0.00025 29528. #Fitted_pointPOL
0.00106 800000 27.1 0. 0.00014 29528. #Fitted_pointPOL
0.0008 1400000 23.6 0. 0.0 29528. #Fitted_pointPOL
0.0004 6000000 11.8 0. 0.0 29528. #Fitted_pointPOL
0.0004 30000000 11.8 0. 0.0 29528. #Fitted_pointPOL
#
#

```