Results for hs_WeldMetal+POL-Decay_kt=-2.3.ini : Crack Initiation Using saefcalc2

Author: userNameHere
Affiliation: where
Tue Jun 3 10:32:42 EDT 2014 **saefcalc2.f vers.=** 2.1

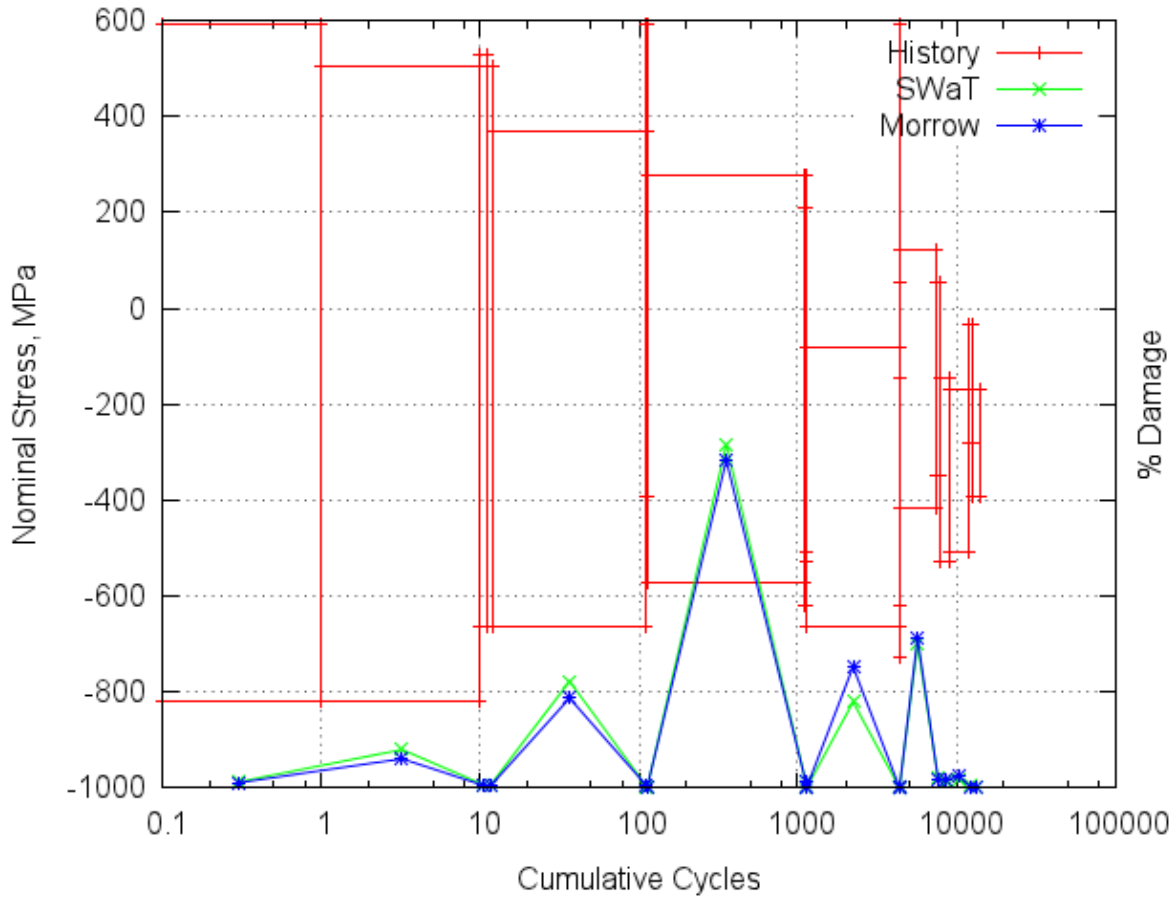
Simulation input data:
Material file= heulerSeeger_WeldMetal_POL_fitted.html
Multiplication Factor= -0.2300000E+01

Crack Initiation Life Results

Predicted History Repetitions to Initiation:

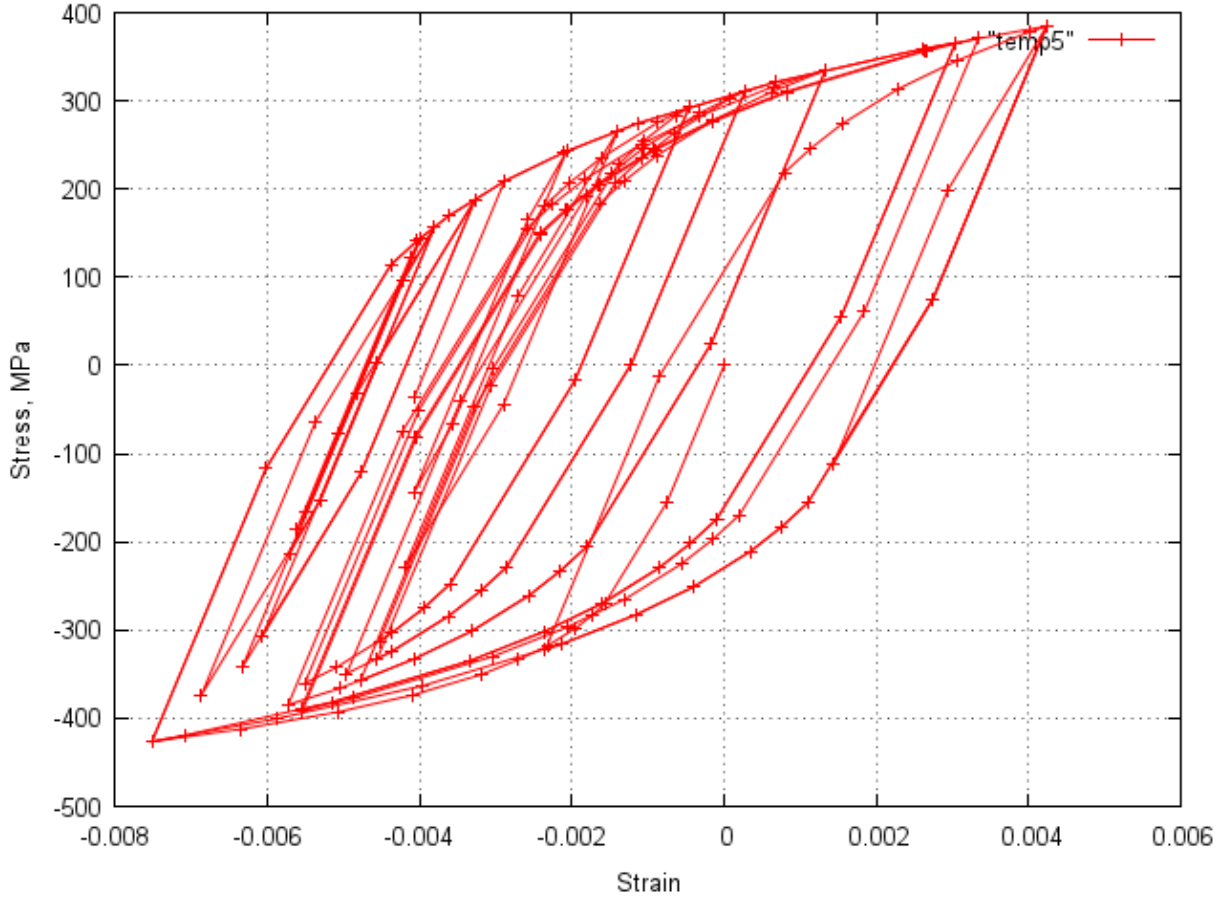
StrainLife_Reps	SWaT_Life_Reps	StressLife_Reps	Morrow_Reps	Goodman_Reps (Reps= Repetions)
24.1	29.9	24.1	32.3	35.2

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	%Morr
1	593.4	-818.8	1.0	385.	-427.	811.	0.00424	-.00752	0.01176	0.8	0.8	0.8	0.7
2	503.7	-818.8	9.0	366.	-427.	793.	0.00304	-.00752	0.01056	4.9	5.0	4.9	3.8
3	526.7	-662.4	1.0	371.	-391.	762.	0.00334	-.00554	0.00888	0.3	0.4	0.3	0.3
4	503.7	-662.4	1.0	366.	-390.	756.	0.00304	-.00556	0.00860	0.3	0.3	0.3	0.3
5	368.0	-662.4	99.0	335.	-385.	720.	0.00133	-.00573	0.00706	13.8	13.9	13.8	11.7
6	593.4	-393.3	1.0	385.	-322.	707.	0.00424	-.00235	0.00659	0.1	0.2	0.1	0.3
7	368.0	-572.7	1.0	335.	-358.	692.	0.00133	-.00478	0.00612	0.1	0.1	0.1	0.1
8	278.3	-572.7	999.0	312.	-349.	661.	0.00028	-.00496	0.00524	42.9	44.8	42.9	42.7
9	211.6	-618.7	24.0	293.	-360.	653.	-.00046	-.00551	0.00505	0.9	0.8	0.9	0.8
10	278.3	-529.0	1.0	312.	-333.	644.	0.00028	-.00456	0.00484	0.0	0.0	0.0	0.0
11	211.6	-506.0	1.0	293.	-313.	605.	-.00046	-.00453	0.00407	0.0	0.0	0.0	0.0
12	-79.8	-662.4	3249.0	189.	-342.	530.	-.00327	-.00633	0.00306	20.1	11.2	20.1	15.8
13	-147.0	-729.1	1.0	156.	-374.	530.	-.00381	-.00687	0.00306	0.0	0.0	0.0	0.0
14	-79.8	-618.7	1.0	189.	-307.	496.	-.00327	-.00607	0.00280	0.0	0.0	0.0	0.0
15	593.4	54.7	5.0	385.	-111.	496.	0.00424	0.00144	0.00280	0.0	0.1	0.0	0.1
16	121.9	-416.3	3000.0	266.	-230.	496.	-.00140	-.00420	0.00280	12.8	18.7	12.8	19.6
17	54.7	-349.6	550.0	243.	-145.	388.	-.00207	-.00408	0.00202	0.6	1.3	0.6	1.2
18	-147.0	-529.0	1250.0	156.	-213.	369.	-.00381	-.00571	0.00189	1.1	0.9	1.1	1.2
19	-169.5	-506.0	2750.0	145.	-186.	331.	-.00399	-.00562	0.00164	1.3	1.1	1.3	1.5
20	-35.0	-280.6	733.0	209.	-36.	244.	-.00289	-.00407	0.00118	0.0	0.3	0.0	0.0
21	-169.5	-393.3	1251.0	145.	-78.	223.	-.00399	-.00506	0.00108	0.0	0.0	0.0	0.0

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: "heulerSeeger_WeldMetal_POL_fitted.html"

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

# #

Pick one: #FDE_plot #FDE_fit # #

```
#
#Copyright (C) 2014   Fatigue Design+Evaluation 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!!:  Data are Estimated Periodic Overload Curve
# TT_StE-32 Steel DIN 1.0851  Radiused specimen.
# Unable to find chemistry or equivalent spec. for this steel.
# StE implies structural steel with strength spec. TT may be for pipe steel.
# "32" probably means yield stresss .ge. 320 mpa.
# Ref.: P.Heuler and T.Seeger, "Rechnerische und experimentelle Lebensdauer-
```

```
# vorhersage am Beispiel eines geschweissten Bauteils," Konstruktion 35 1983
# Heft 1, pp.21-26.
#
#FileType= strain_life
#DataType= fitted
#TIMEcol= 0
#NAME=  TT_StE-32
#NAME=  Structural
#NAME=  Steel
#Stress_units= mpa
#Strain_units= strain
#Sy=  375  mpa   0.2pc offset
#Su=  558  mpa
#eu=       0   #strain at Su not reported
#E= 209000 mpa
#FractureStrain= 0. not reported
#FractureStress=  0. not reported
#monotonic_K= 0 not reported
#monotonic_n= 0 not reported
#BHN= 0. not reported
#%RA= 0. %  not reported
#StrAmpl    2Nf  StsAmpl So  PlasStrAmpl IniMod   NeuberStressAmpl
# TT_StE-32  Structural BHN=    0 Fn=    0
#          Monotonic Props.       Cyclic Props.
#ELAS. MOD.= 30313. KSI,  209. GPA     K'        = 136.1 KSI,   939.MPA
#YIELD,0.2%=    54. KSI,  375. MPA     N'        = 0.1518
#ULT. STRG.=    81. KSI,  558. MPA     F. STRG COEF=  108.3 KSI,  747.MPA
#K       =      0.0 KSI,      0. MPA   F.STRG EXP, b=-0.0700
#N            = 0.0000                FAT DUCT COEF=   0.2220
#RED. IN AREA =  0.0                  F.DUCT EXP, c=-0.4608
#T. FRAC. STG.=   0.0 KSI,    0. MPA   Exp Cyc Yld  =   53. Ksi, 365.MPA
#T. FRAC. STR.= 0.000                 Fit Cyc Yld  =   53. Ksi, 366.MPA
#No. fatigue data points=   19
#
# NOTE!! The Following Points are FITTED DATA:#NOTE!! Fitted Stress computed using Experm.
#Stress_Units= MPa
# Total Strain   2Nf  Stress  Mean   Plastic Strain   Initial
#    Amp              Amp   Stress      Amp        Elastic Mod.
   0.22559          1   753.0      0.   0.22199    209000. #Fitted_point
   0.16472          2   717.0      0.   0.16129    209000. #Fitted_point
   0.10895          5   672.1      0.   0.10573    209000. #Fitted_point
   0.07988         10   639.9      0.   0.07682    209000. #Fitted_point
   0.05873         20   609.3      0.   0.05581    209000. #Fitted_point
   0.03932         50   571.1      0.   0.03659    209000. #Fitted_point
   0.02918        100   543.8      0.   0.02658    209000. #Fitted_point
   0.02179        200   517.8      0.   0.01931    209000. #Fitted_point
   0.01498        500   485.4      0.   0.01266    209000. #Fitted_point
   0.01141       1000   462.2      0.   0.00920    209000. #Fitted_point
   0.00879       2000   440.1      0.   0.00668    209000. #Fitted_point
   0.00635       5000   412.5      0.   0.00438    209000. #Fitted_point
   0.00506      10000   392.7      0.   0.00318    209000. #Fitted_point
   0.00410      20000   374.0      0.   0.00231    209000. #Fitted_point
   0.00319      50000   350.5      0.   0.00152    209000. #Fitted_point
   0.00270     100000   333.8      0.   0.00110    209000. #Fitted_point
#Pts below are manually adjusted for estimated POL effect
   0.00232     180000   317.9      0.   0.00080    209000. #Fitted_point POL
   0.00195     280000   298.0      0.   0.00053    209000. #Fitted_point POL
   0.00174     500000   283.8      0.   0.00038    209000. #Fitted_point POL
   0.00157     700000   270.3      0.   0.00028    209000. #Fitted_point POL
   0.00075   15000000   155.       0.   0.00002    209000. #Fitted_point POL
   0.00075   80000000   155.       0.   0.00002    209000. #Fitted_point POL
#
```

#