2019 PLS-CADD Advanced Training and User Group

IEEE P1283
Elevated Temperature Creep

by

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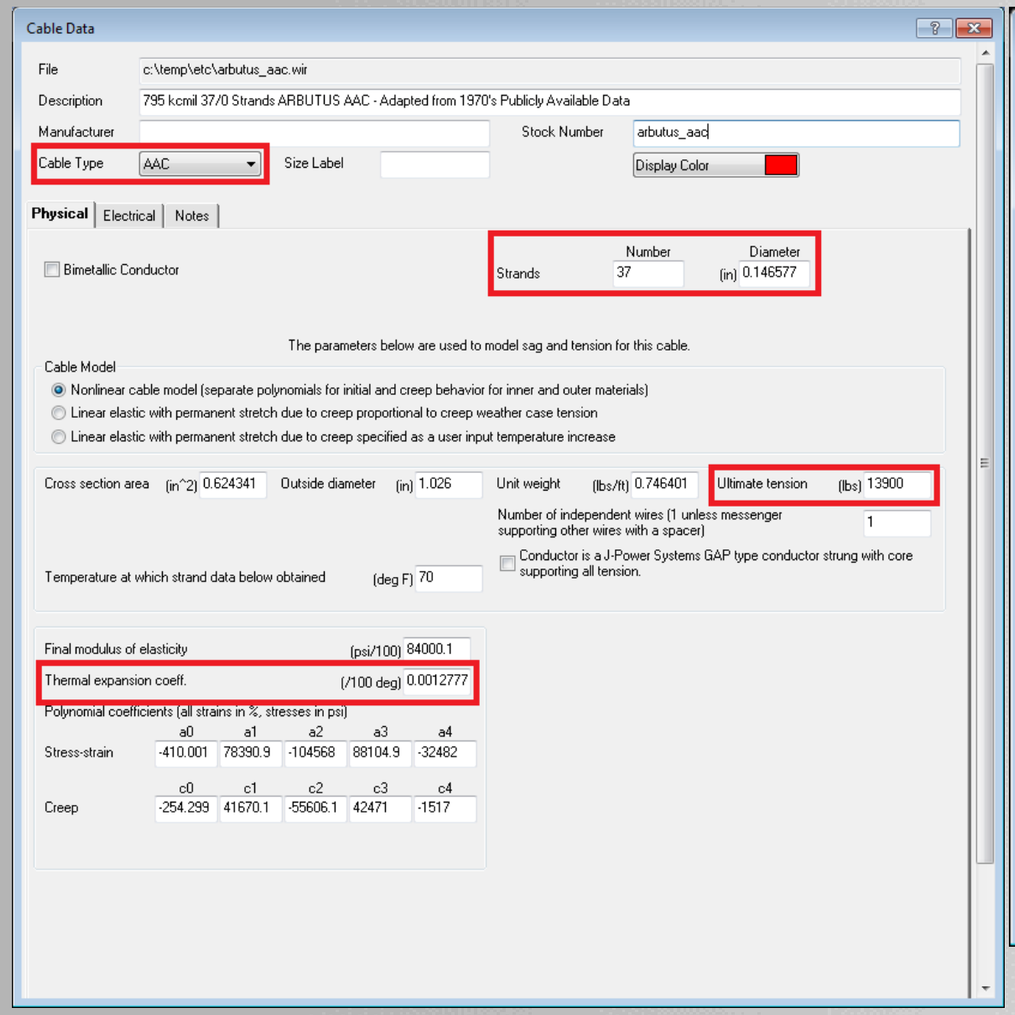
Introduction

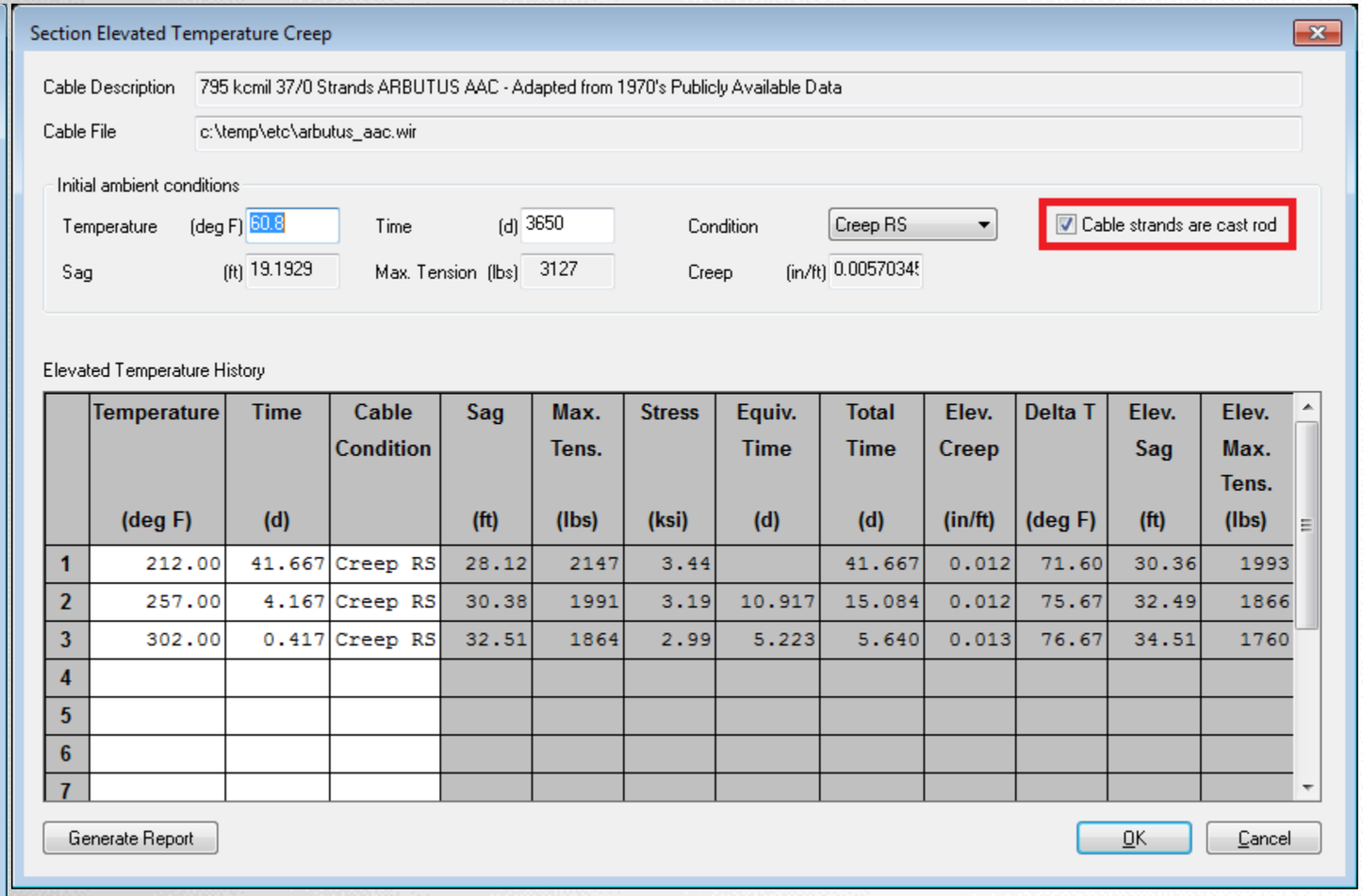
- ETC calculator applies sequential stages of elevated temperatures for given lengths of time
- Calculate a total temperature change
- Resulting temperature change can then be added to the previous temperatures to get sag that includes ETC
- Initial implementation is minimal to avoid revising cable files or DON files

Prerequisites

- Cable types of AAC, AAAC, ACAR, ACSR & AACSR only (per IEEE P1283)
- Cable stranding quantity and diameter (must equal traditional cable cross section area)
- Cable ultimate tension
- Cable thermal expansion coefficient
- Type of construction - cast rod or rolled rod (per IEEEP1283 & not currently stored in cable files)

Required Cable Inputs





	Temperature (deg F)	Time (d)	Cable Condition	Sag (ft)	Max. Tens. (lbs)	Stress (ksi)	Equiv. Time (d)	Total Time (d)	Elev. Creep (in/ft)	Delta T (deg F)	Elev. Sag (ft)	Elev. Max. Tens. (lbs)
1	212.00	41.667	Creep RS	28.12	2147	3.44		41.667	0.012	71.60	30.36	1993
2	257.00	4.167	Creep RS	30.38	1991	3.19	10.917	15.084	0.012	75.67	32.49	1866
3	302.00	0.417	Creep RS	32.51	1864	2.99	5.223	5.640	0.013	76.67	34.51	1760
4												
5												
6												
7												

Steps to Use

- Select **Sections | Thermal Calculations | Elevated Temperature Creep**
- Graphically select the cable to analyze
- Enter initial ambient conditions (note “Cable strands are cast rod” option in dialog)
- Enter sequential stages of elevated temperatures, times and cable conditions
- Click **Generate Report** to see results

Notables

- Maximum input time for each stage is 50 years
- Only ACSR with steel area ratios (As/At) <= 7.5% are analyzed (per IEEE P1283)
- Only outer strand counts of 7, 19, 37 & 61 are supported for non-steel type conductors (per IEEE P1283)

Example B.3 from IEEE P1283 Annex B

IEEE 1283-2013 Elevated Temperature Creep Calculations

Span and Cable Input

```
Line No.           =         1
Section No.        =         1
Ruling Span Length =    799.87 (ft)
Cast Rod Cable     =       Yes
Cable File         = c:\temp\etc\arbutus_aac.wir
Cable Description  = 795 kcmil 37/0 Strands ARBUTUS AAC - Adapted from 1970's Publicly Available Data
```

Initial Ambient Conditions

```
Temperature               =      60.0 (deg F)
Time                      =    3650.0 (d)
Cable Condition           =  Creep RS
Sag                       =     19.14 (ft)
Max. Tension              =   3135.21 (lbs)
Horiz. Tension            =   3120.93 (lbs)
Creep (elevated)          =     0.006 (in/ft)
Sag (elevated)            =     22.03 (ft)
Max. Tension (elevated)   =   2729.24 (lbs)
Horiz. Tension (elevated) =   2712.80 (lbs)
```

Elevated Temperature Results

Temp.	Time	Cable Condition	Sag	Max. Stress Tens.		Equiv. Time	Total Time	Delta T	Elevated Creep	Elevated Sag	Elevated Hori. Tens.	Elevated Max. Tens.
(deg F)	(d)		(ft)	(lbs)	(ksi)	(d)	(d)	(deg F)	(in/ft)	(ft)	(lbs)	(lbs)
212.00	41.67	Creep RS	28.12	2147	3.44		41.67	71.47	0.0118	30.35	1970	1993
257.00	4.17	Creep RS	30.38	1991	3.19	10.92	15.08	75.54	0.0124	32.49	1841	1866
302.00	0.42	Creep RS	32.51	1864	2.99	5.22	5.64	76.54	0.0126	34.50	1735	1760

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Questions?

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