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AFGROW.NET

AFGROW European Workshop 2026

AFGROW Current Release and Release 5.5 Overview

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Agenda

1. Current AFGROW release 5.5 overview
2. New AFGROW features description
3. Spectrum Manager version 1.3.1 overview
4. New Spectrum Manager features description

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AFGROW Release 5.5 Features Overview

- Updated the Classic Model solution for double, symmetric oblique cracks at a hole solution using the most recent wide plate tabular database from Börje Andersson
- Improved bearing width correction for double, symmetric oblique cracks
- Implemented the full r/t range (0.1 to 10) for the Advanced Model corner crack/through crack at hole solution option in AFGROW
- Created a web-based post-processing application for analyzing AFGROW output xml files (afgrow.net/post-processing)
- Added a link to open curve fit tabular crack growth rate data from the AFMAT database in the tabular lookup materials dialog
- Updated Advanced Model single corner crack solution with the latest Börje Andersson FE tabular data
- Added a da/dN rate summary report to AFGROW output
- Added the ability to open the appropriate dialog box by double-clicking on a parameter in the status view while holding down the control key
- Added a preference for AFGROW to look for spectrum files in the desired input file folder and/or a predefined spectrum folder on the user's computer
- Added user preference information to the Status Tree View
- Added user preference information to the output file
- Added the user preference option to enter data in mm for Classic and API 579 Model geometry input dialogs
- Improved distinction between crack initiation and growth in the crack length vs. life plot in the AFGROW main frame window
- Added the ability to add a crack to a hole in the Advanced Model interface by right-clicking on the desired hole
- AFGROW saves life data in hours when right-clicking on the desired Life Plot Legend, when applicable
- Added an option in the growth increment preference to calculate K only when the c-length equals an input length in the beta table for 1-D User Defined Beta model
- Added a COM function that allows AFGROW to open curve fit tabular growth rate data from the tabular lookup material database
- Added COM events that provide information for every crack direction
- Added a COM function to stop a prediction on request
- Add COM Functions/Properties to Check whether the current AFGROW Model is a Part-Through or Through Crack
- Added the ability to send events from a plugin application to the notification list
- Improved plugin plotting capabilities
- Added ability to request update plugin parameters from plugin
- Added ability to have read only plugin parameters
- Added Mat-8 Burst Model Transition/Failure Criteria
- Added API 579 Level 2 FAD Assessment Transition Criteria
- Eight new materials added to the local tabular lookup material database

AFGROW Release 5.5 Fixed Bugs

- Fixed a numerical truncation issue when converting tabular lookup data between English and Metric units
- Updated the outdated SetClosureModel parameters in COM manual
- Stress State 'a' Direction was missing for several models in the Stress State Dialog
- When Tabular Lookup information was updated through COM, the Status view and Material Data plot were not refreshed
- Tabular lookup model verification returned a strange message, the new message is less strange
- Fixed an issue where AFGROW hangs in memory when using the RunFrozPredict function
- The wrong radius Is Used in the K calculation subroutine of model 2090
- AFGROW was not using the correct Poisson ratio for K calculation when the Tabular Lookup material model was selected for model 2090
- Bug in implementation of the API 9B.5.14 Model (Circumferential Surface Crack in Cylinder with Polynomial Stress Distribution)
- For a knife-edge countersunk hole with a corner crack at the faying surface; the a-Length values were not displayed correctly after modifying the c-Length
- When the hole diameter was changed for an AFGROW Advanced Offset Hole Model, the hole offset was modified
- Issue with the output file extension when there is a '.' in the file name
- When "Keep 'A/C' constant" is selected for a part-through crack prediction, and the model is changed to a through crack, AFGROW fails and throws an error
- The label (DADNLO) was missing from the tabular Data Set dialog
- The 510_outside.txt data file contained an erroneous value
- AFGROW crashed when the Ct Direction was greater than the Maximum Crack Length
- When Model 5190 was selected in COM, it was not declared correctly
- AFGROW reports using width correction even when it is not used
- AFGROW did not save notifications in the XML Output file
- Added two missing crack transition types: THROUGH_TO_SLOT_TRANSITION and PART_THROUGH_TO_SLOT_TRANSITION

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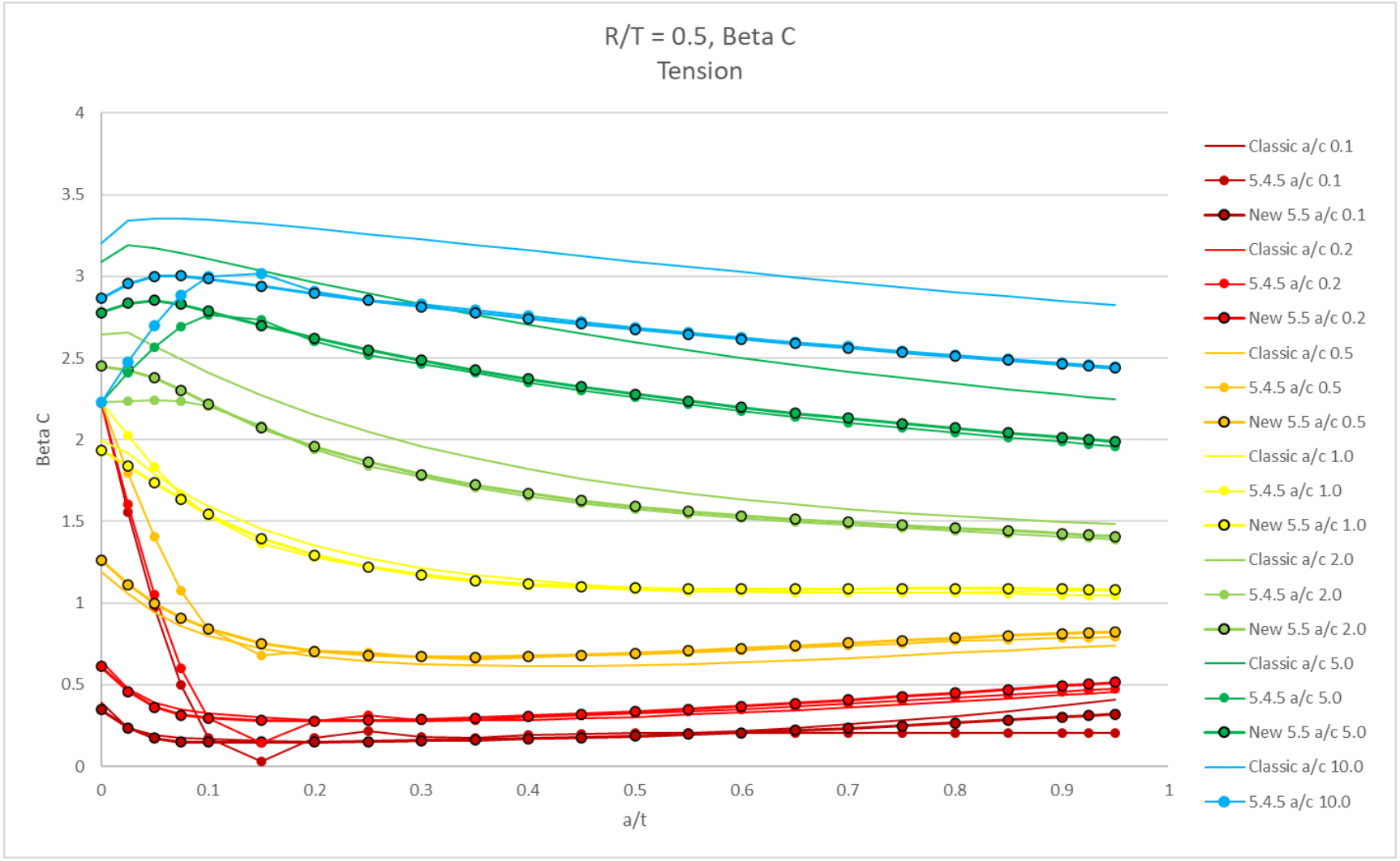
Updated Advanced Model Single Corner Crack Solution

- An updated advanced model single corner Crack included with AFGROW 5.5
- This solution was generated using a subset of BARE's Single Corner crack data set
- This model has been extended to a/t=0.0001 using the classic single corner crack at hole as a guide.
- This extension allows for much smaller cracks, a dimension range 0.0001 <= a/t <= 0.95
- This extension also reduces spline curve oscillation near the edge of the solution.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1
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5.4.5 a/c 0.1
New 5.5 a/c 0.1
Classic a/c 0.2
5.4.5 a/c 0.2
New 5.5 a/c 0.2
Classic a/c 0.5
5.4.5 a/c 0.5
New 5.5 a/c 0.5
Classic a/c 1.0
5.4.5 a/c 1.0
New 5.5 a/c 1.0
Classic a/c 2.0
5.4.5 a/c 2.0
New 5.5 a/c 2.0
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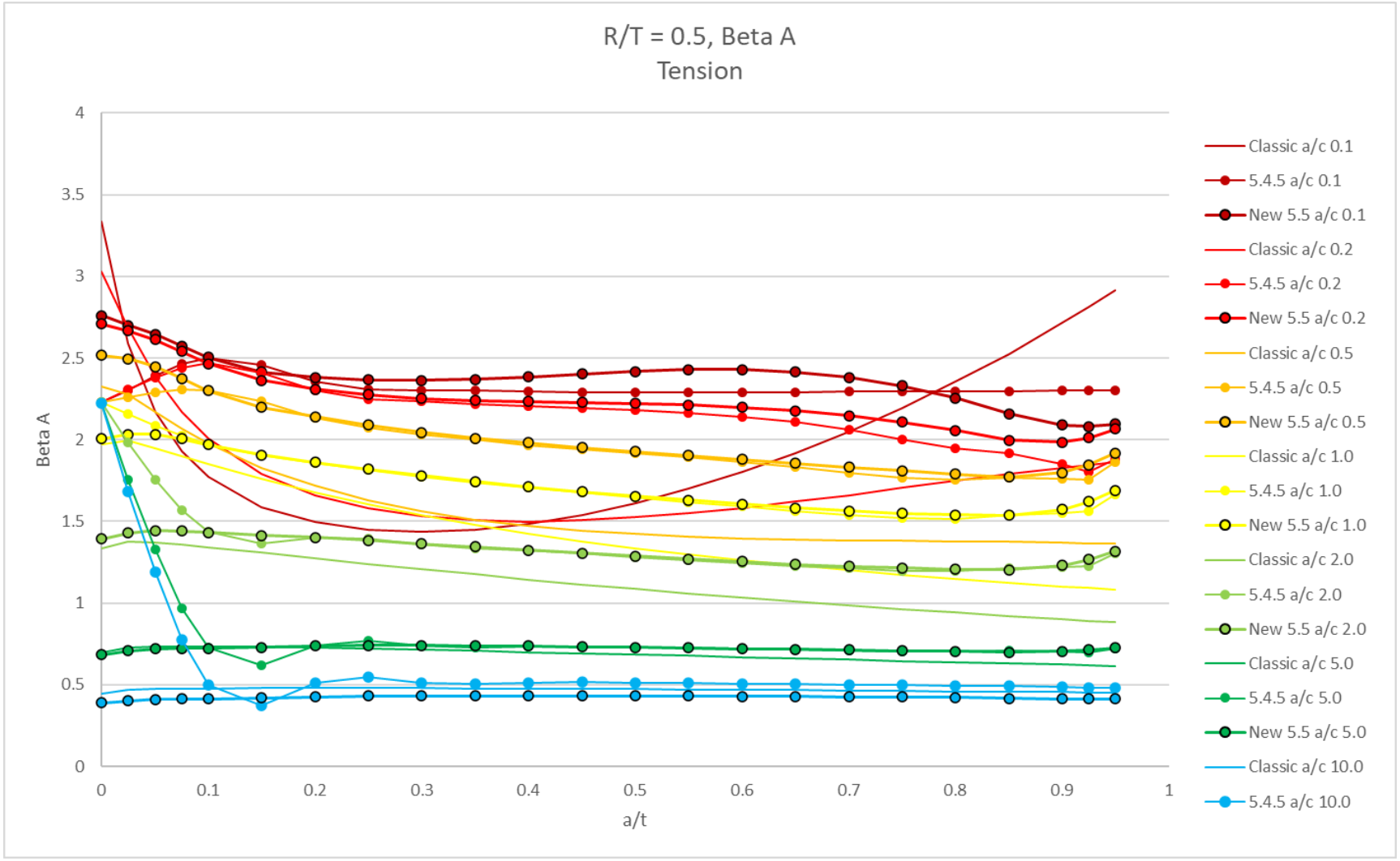
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Beta A
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1
Classic a/c 0.1
5.4.5 a/c 0.1
New 5.5 a/c 0.1
Classic a/c 0.2
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New 5.5 a/c 0.2
Classic a/c 0.5
5.4.5 a/c 0.5
New 5.5 a/c 0.5
Classic a/c 1.0
5.4.5 a/c 1.0
New 5.5 a/c 1.0
Classic a/c 2.0
5.4.5 a/c 2.0
New 5.5 a/c 2.0
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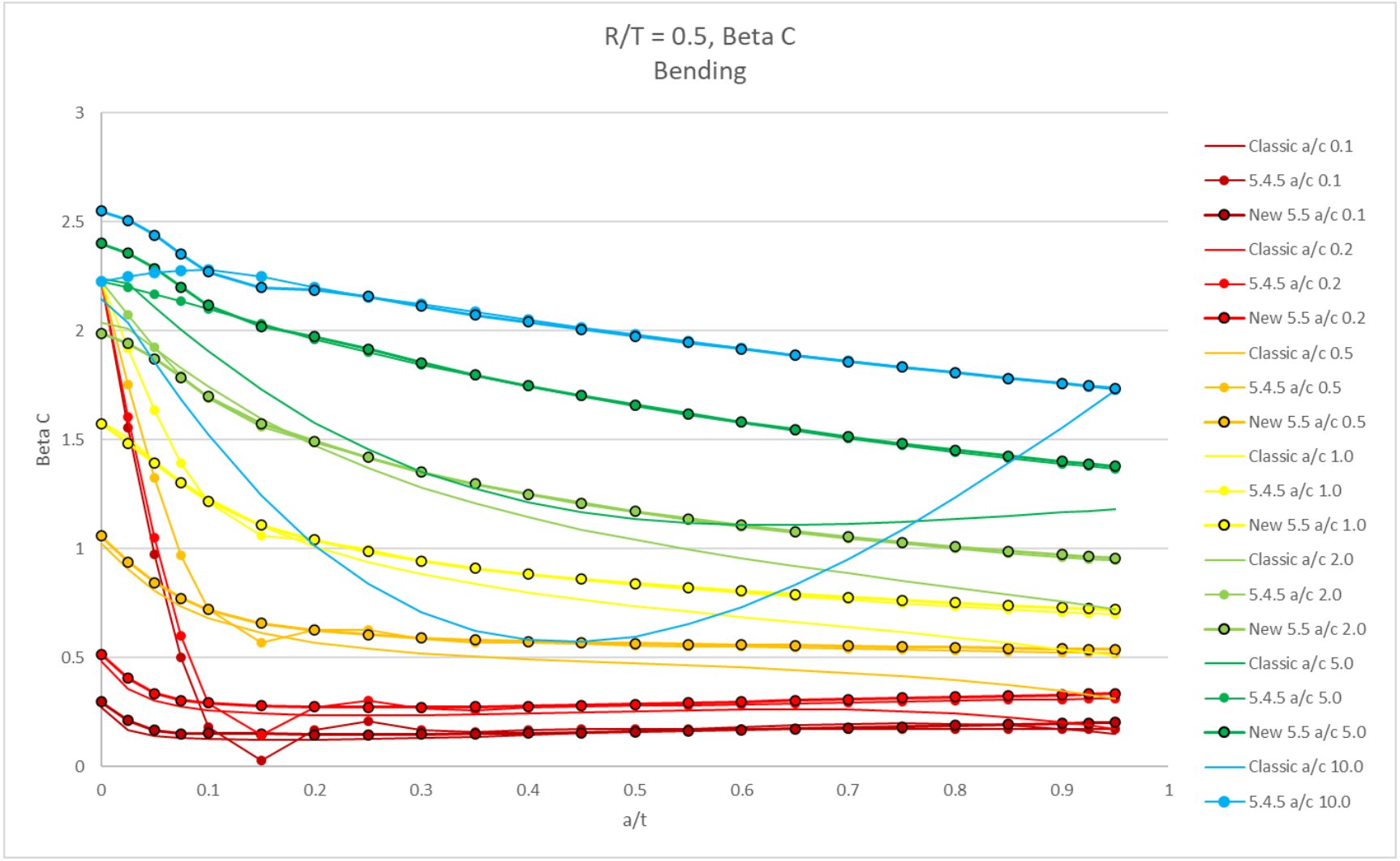
5.4.5 a/c 10.0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0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
Classic a/c 0.1
5.4.5 a/c 0.1
New 5.5 a/c 0.1
Classic a/c 0.2
5.4.5 a/c 0.2
New 5.5 a/c 0.2
Classic a/c 0.5
5.4.5 a/c 0.5
New 5.5 a/c 0.5
Classic a/c 1.0
5.4.5 a/c 1.0
New 5.5 a/c 1.0
Classic a/c 2.0
5.4.5 a/c 2.0
New 5.5 a/c 2.0
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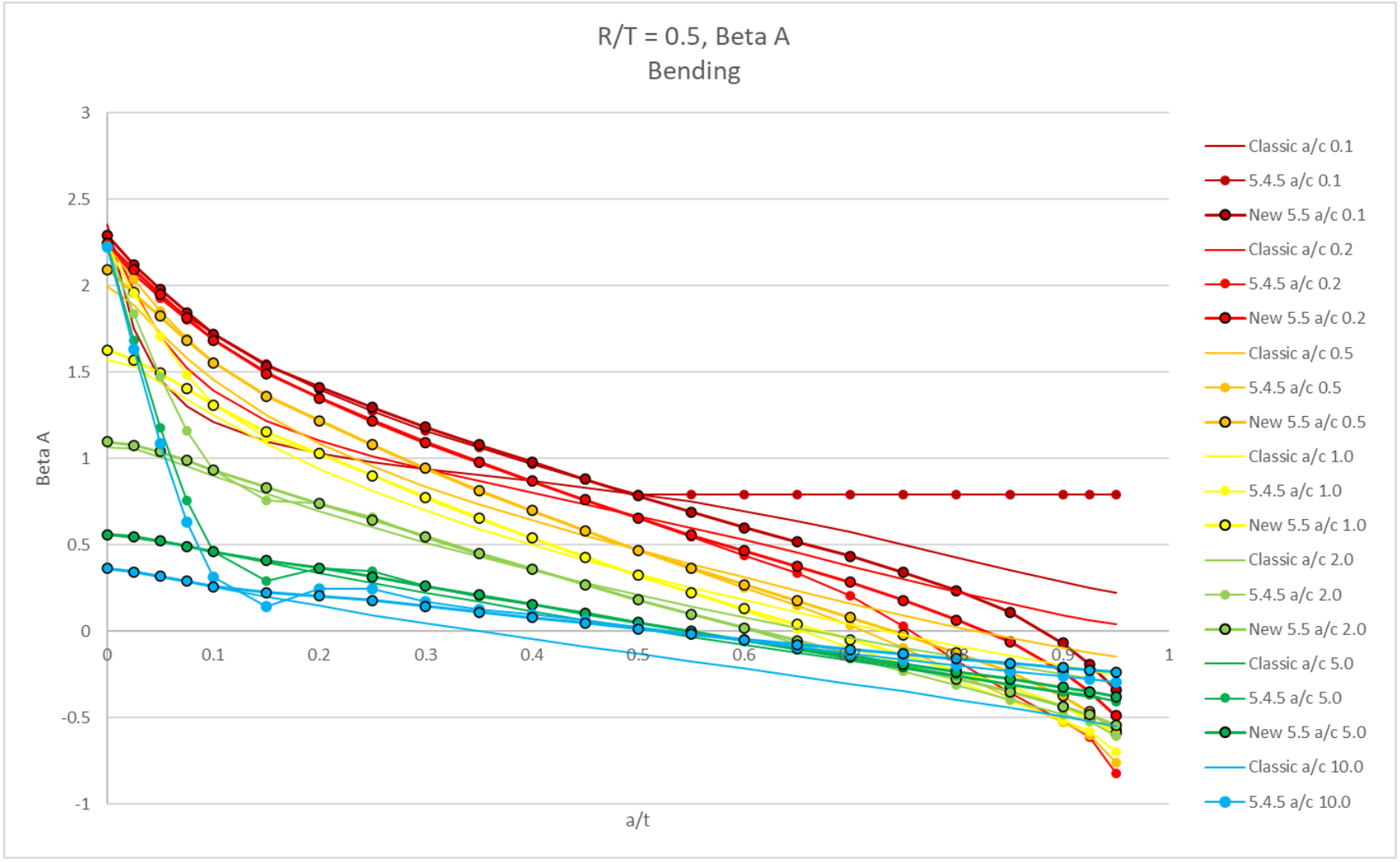
5.4.5 a/c 10.0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Bending
Beta A
a/t
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1
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5.4.5 a/c 0.1
New 5.5 a/c 0.1
Classic a/c 0.2
5.4.5 a/c 0.2
New 5.5 a/c 0.2
Classic a/c 0.5
5.4.5 a/c 0.5
New 5.5 a/c 0.5
Classic a/c 1.0
5.4.5 a/c 1.0
New 5.5 a/c 1.0
Classic a/c 2.0
5.4.5 a/c 2.0
New 5.5 a/c 2.0
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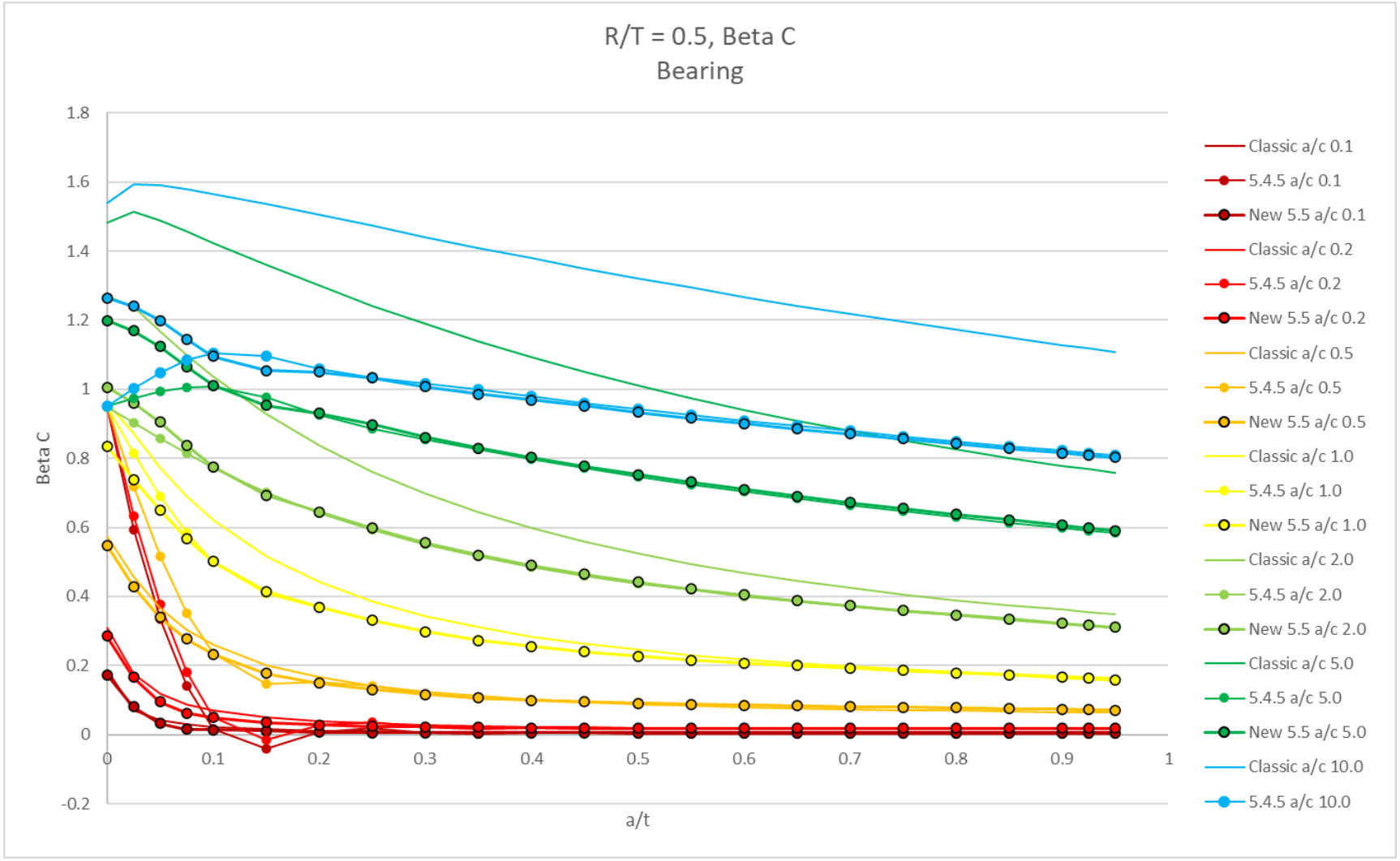
5.4.5 a/c 10.0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0.6
0.7
0.8
0.9
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Classic a/c 0.1
5.4.5 a/c 0.1
New 5.5 a/c 0.1
Classic a/c 0.2
5.4.5 a/c 0.2
New 5.5 a/c 0.2
Classic a/c 0.5
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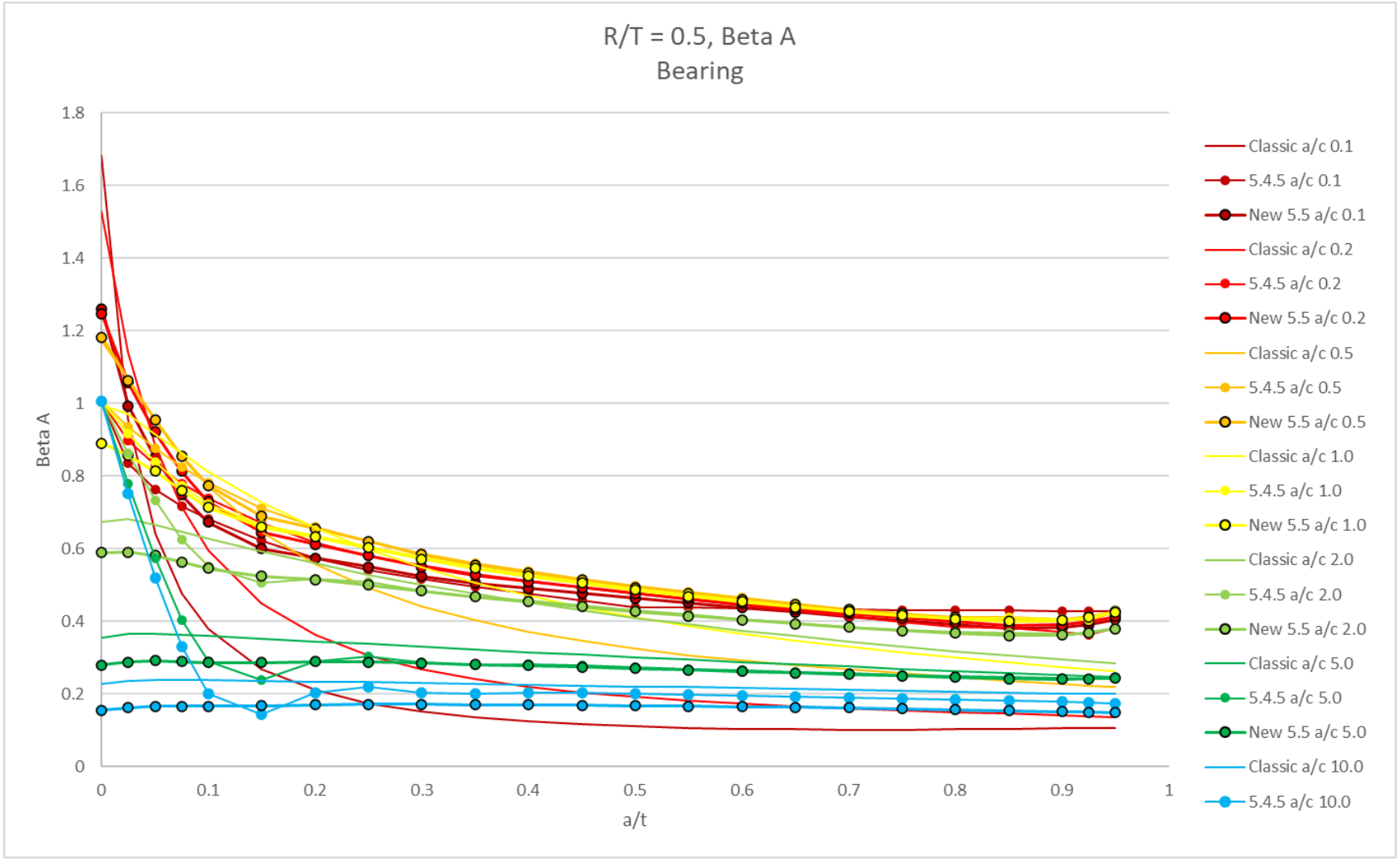
5.4.5 a/c 10.0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Classic a/c 0.1
5.4.5 a/c 0.1
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Classic a/c 2.0
5.4.5 a/c 2.0
New 5.5 a/c 2.0
Classic a/c 5.0
5.4.5 a/c 5.0
New 5.5 a/c 5.0
Classic a/c 10.0
5.4.5 a/c 10.0

Updated Classic Solution for Double, Symmetric Oblique Cracks at a Hole

- This solution was generated using a subset of BARE's Corner and Oblique crack data set
- The new solution includes a wider range of model dimensions
- The new solution data exhibits more consistent behavior when plotted across its parameters
- Shah correction will be used to generate a single oblique crack at hole solution from a double symmetric solution

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Symmetric Oblique Cracks - Vertex Calculation

- The C vertex was calculated by finding the local maximum near the surface of the crack in the C direction
- The A vertex was calculated with an analytic formula provided by BARE that provides a K value at 1% of the thickness of the specimen
- The analytic solution allows for consistent Ks even when the crack front Ks go to infinity when reaching the surface of the specimen.

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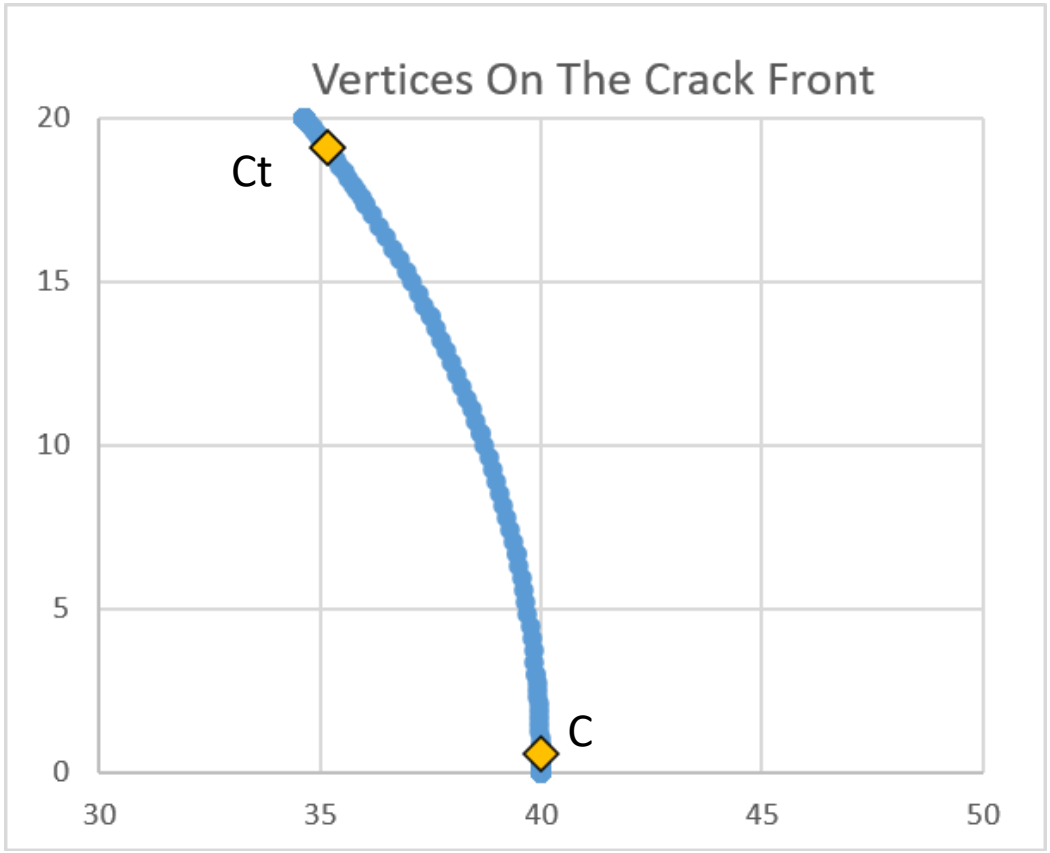
Symmetric Oblique Valid Ranges

- New Symmetric Oblique Solution Limits
  - 0.1 <= r/t <= 10.0
  - 1.05 <= a/t <= 10.0
  - 0.1 <= a/c <= 10.0
- Old Symmetric Oblique Solution Limits
  - 0.2 <= a/c <= 2.0
  - 1.05 <= a/t <= 10.0
  - 0.5 <= r/t <= 2.0

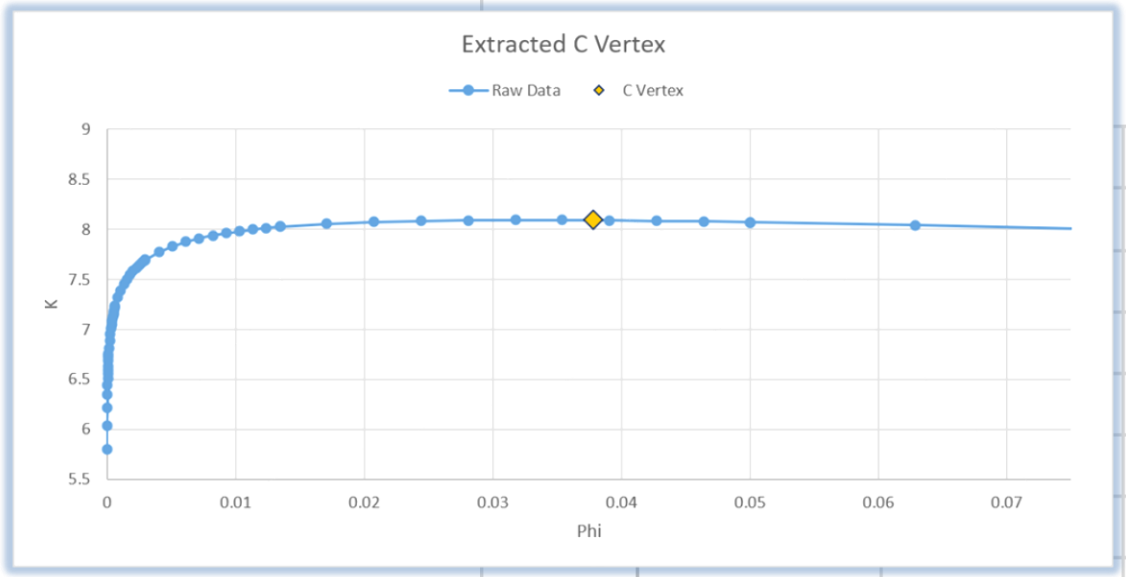
Example of the Crack Front K distribution for an Oblique Crack

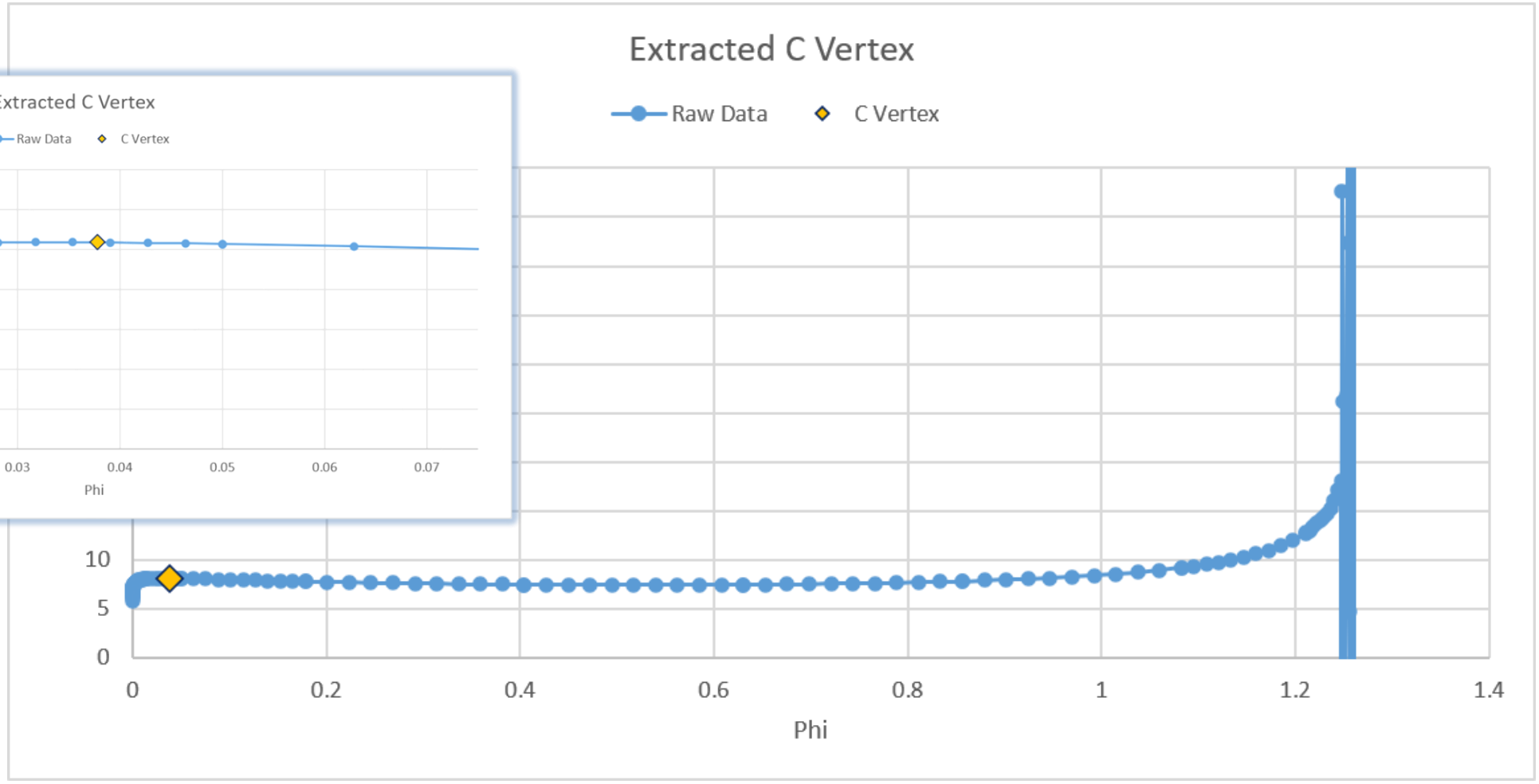


C direction – local maximum
Ct Direction – fixed angle

C direction

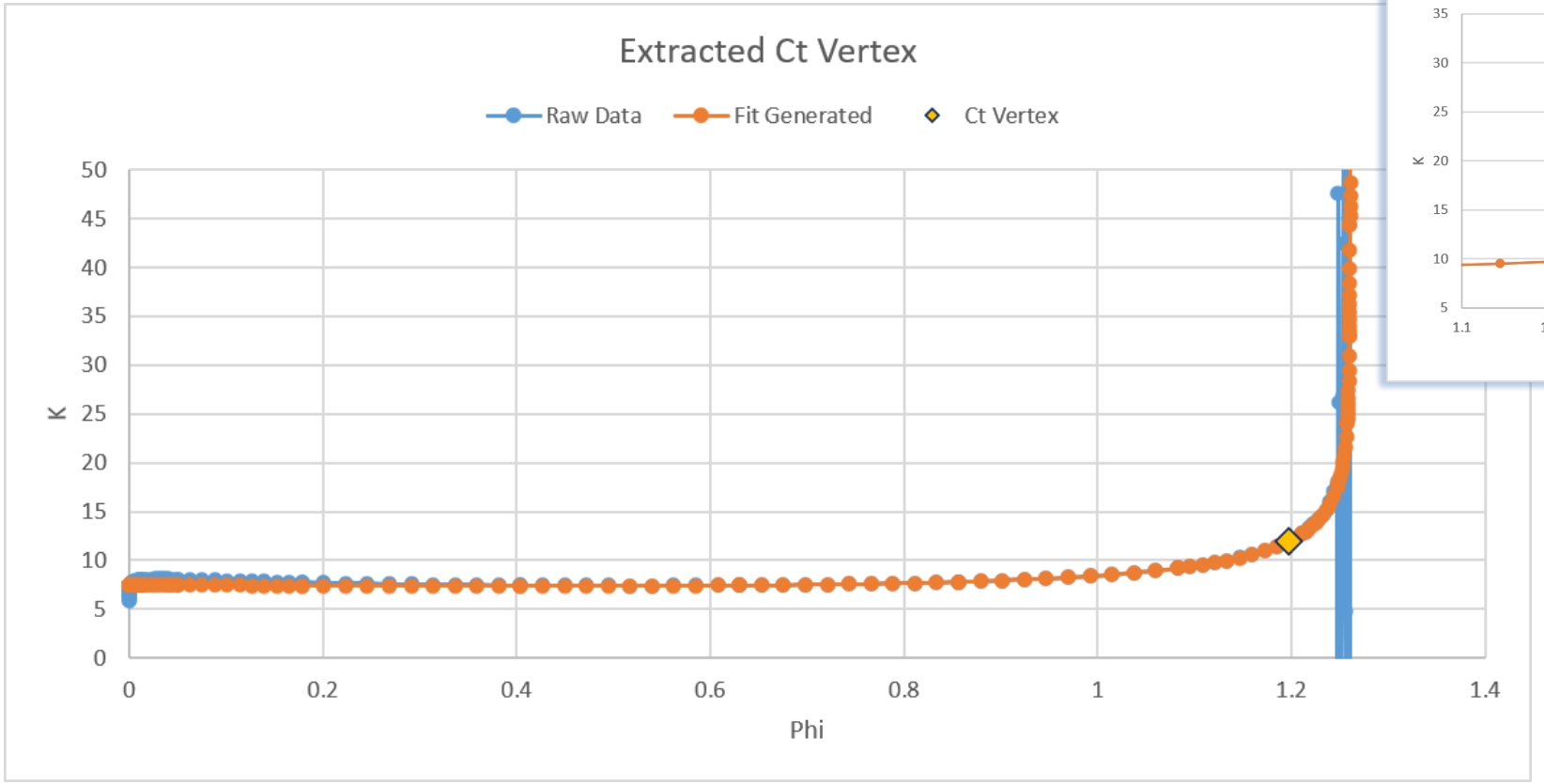
Generated by locating the local maximum within the portion of the curve that is close to the C edge

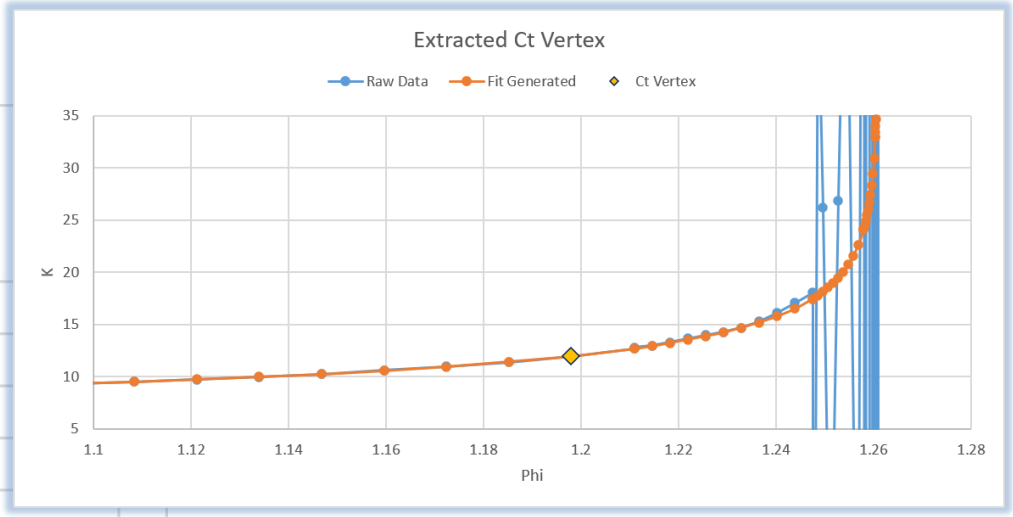


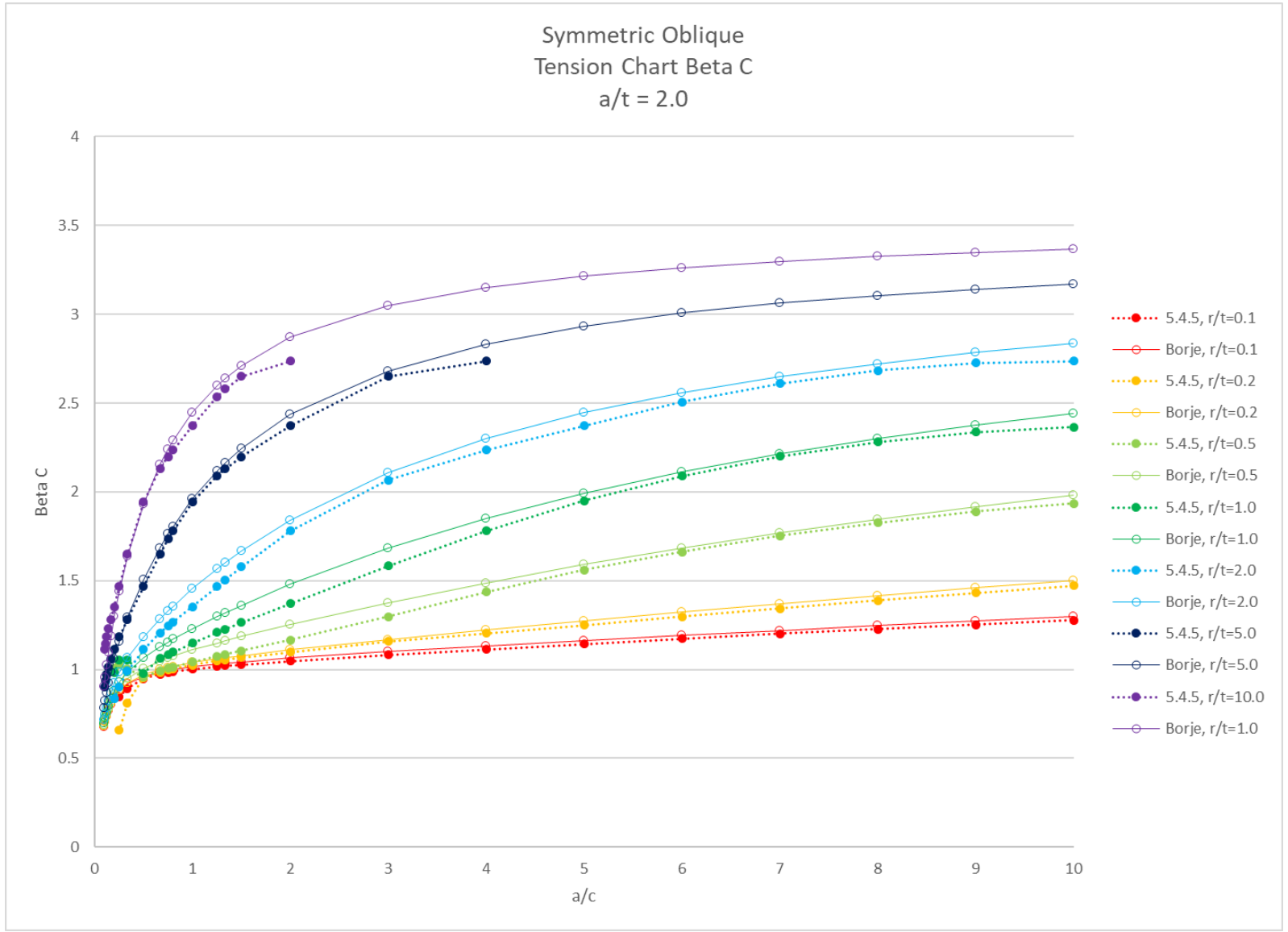


Ct direction

1. Fit is generated based on equations developed by Börje Andersson - BARE, AB Sweden
2. The vertex is located at 5% of phi from the edge



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Beta C
a/c
0
0.5
1
1.5
2
2.5
3
3.5
4
0
1
2
3
4
5
6
7
8
9
10
5.4.5, r/t=0.1
Borje, r/t=0.1
5.4.5, r/t=0.2
Borje, r/t=0.2
5.4.5, r/t=0.5
Borje, r/t=0.5
5.4.5, r/t=1.0
Borje, r/t=1.0
5.4.5, r/t=2.0
Borje, r/t=2.0
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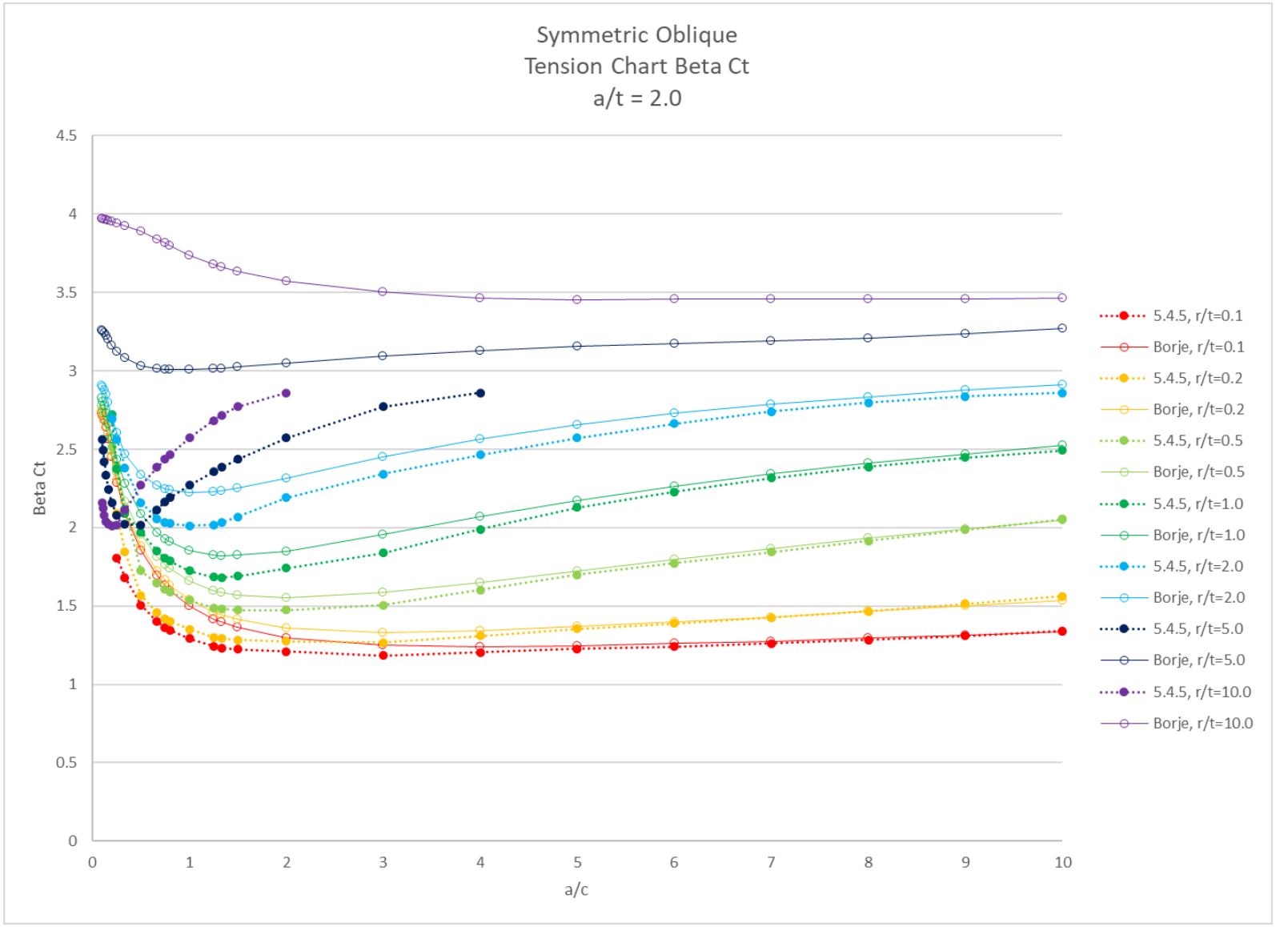
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Tension Chart Beta Ct
a/t = 2.0
Beta Ct
a/c
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0.5
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1.5
2
2.5
3
3.5
4
4.5
0
1
2
3
4
5
6
7
8
9
10
5.4.5, r/t=0.1
Borje, r/t=0.1
5.4.5, r/t=0.2
Borje, r/t=0.2
5.4.5, r/t=0.5
Borje, r/t=0.5
5.4.5, r/t=1.0
Borje, r/t=1.0
5.4.5, r/t=2.0
Borje, r/t=2.0
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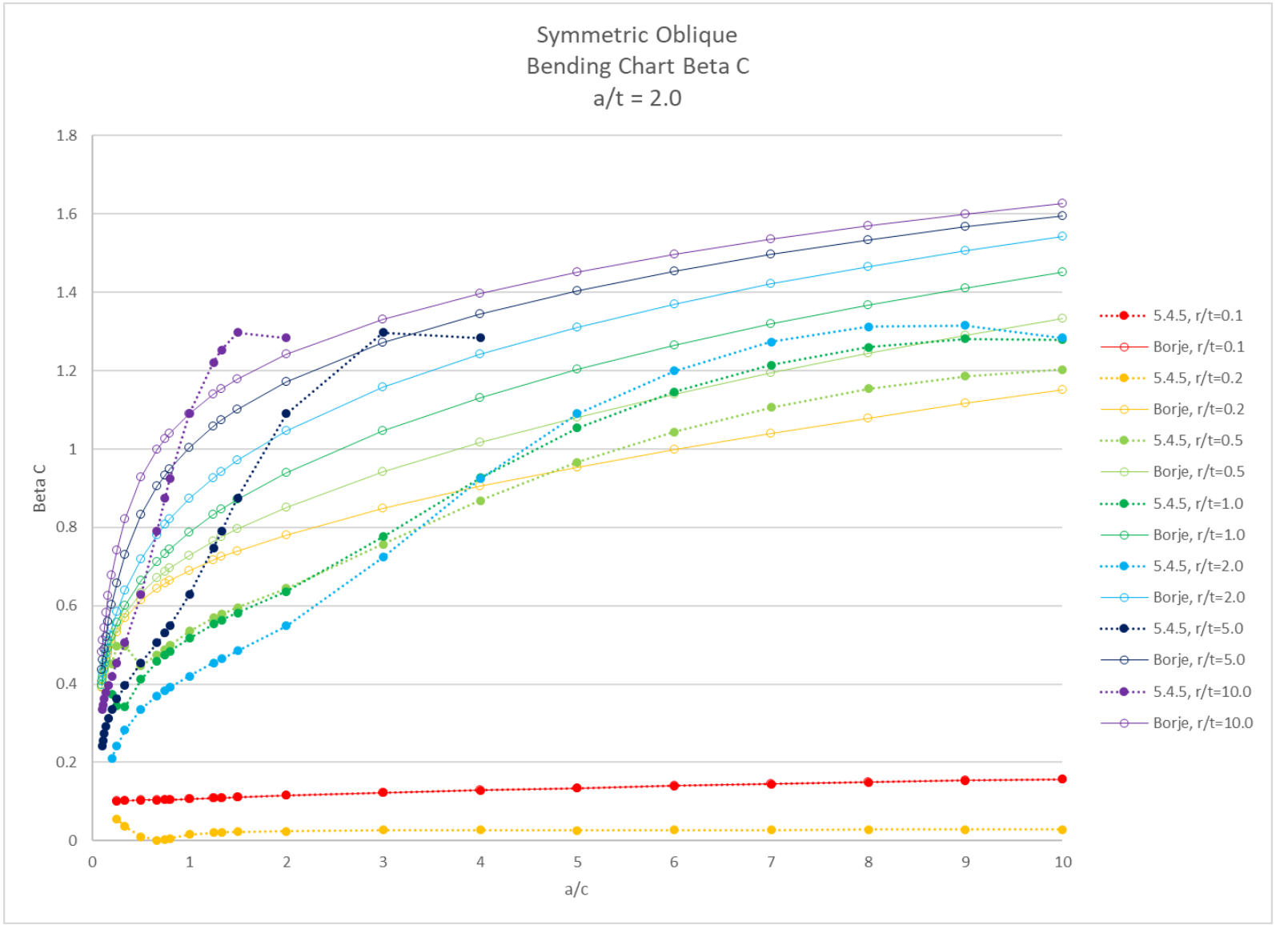
Symmetric Oblique
Bending Chart Beta C
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Beta C
a/c
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0.2
0.4
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1.2
1.4
1.6
1.8
0
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2
3
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5.4.5, r/t=0.1
Borje, r/t=0.1
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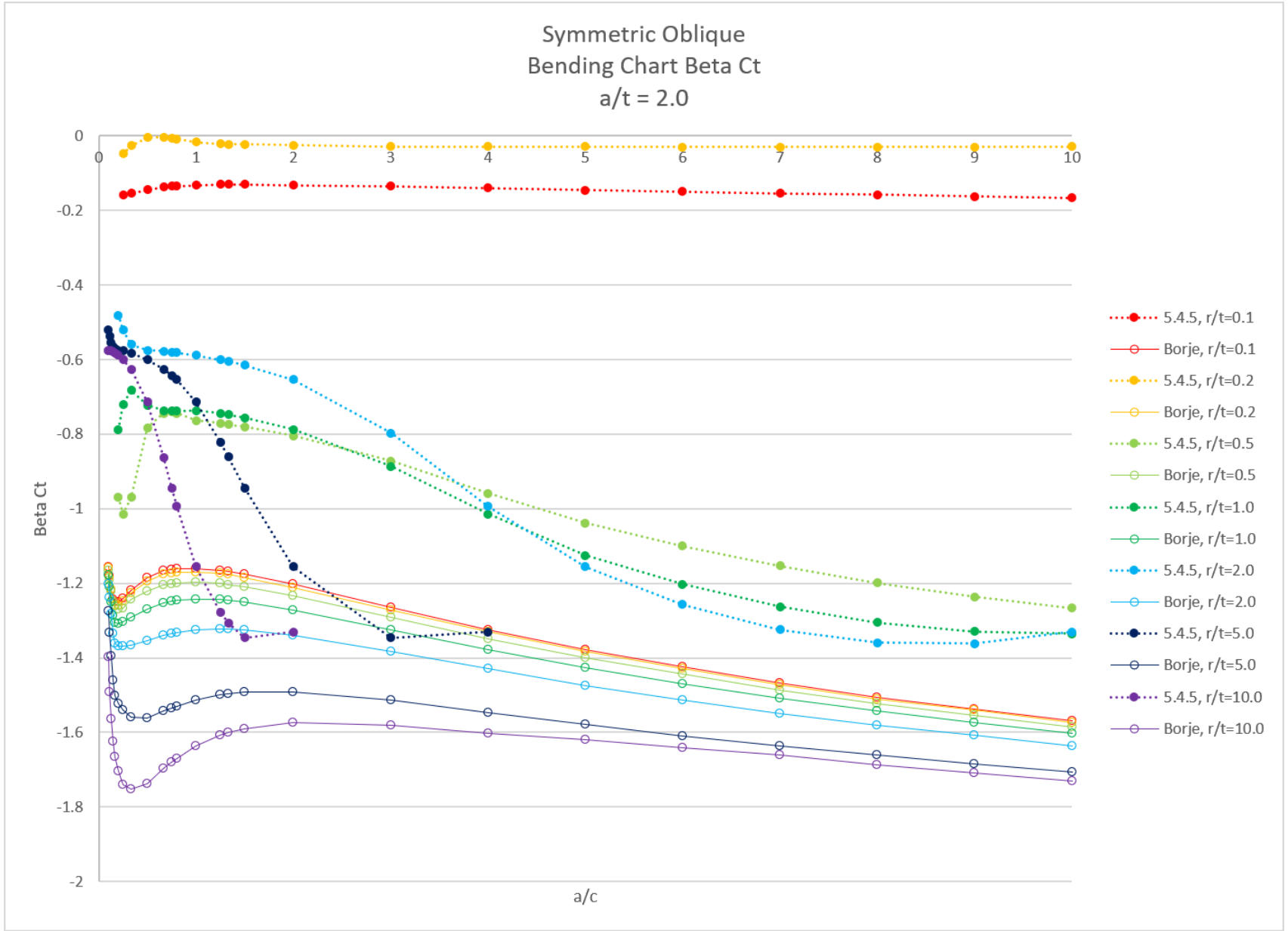
Symmetric Oblique
Bending Chart Beta Ct
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Beta Ct
a/c
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-0.2
-0.4
-0.6
-0.8
-1
-1.2
-1.4
-1.6
-1.8
-2
0
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10
5.4.5, r/t=0.1
Borje, r/t=0.1
5.4.5, r/t=0.2
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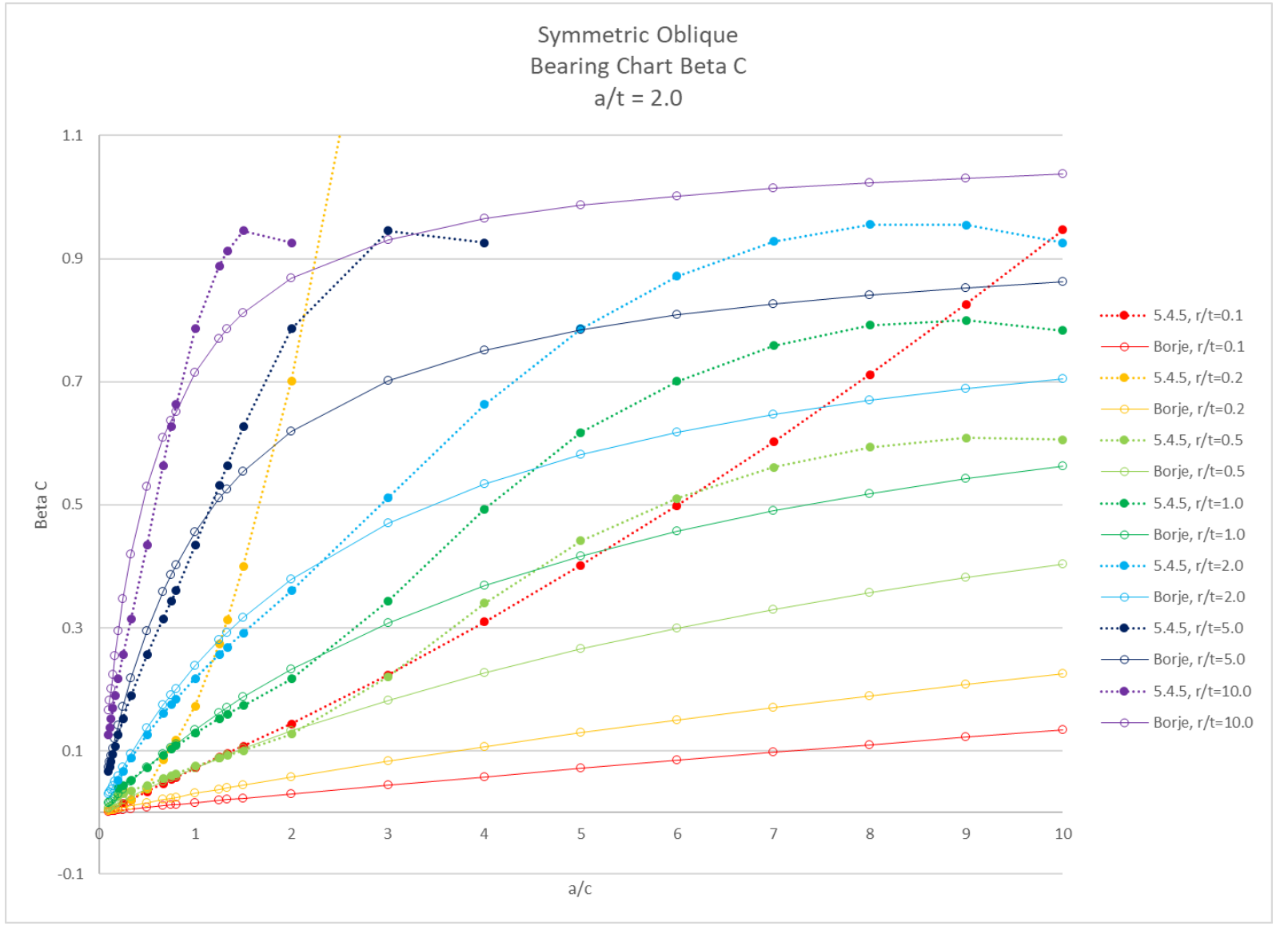
Borje, r/t=10.0


Symmetric Oblique
Bearing Chart Beta C
a/t = 2.0
Beta C
a/c
1.1
0.9
0.7
0.5
0.3
0.1
-0.1
0
1
2
3
4
5
6
7
8
9
10
5.4.5, r/t=0.1
Borje, r/t=0.1
5.4.5, r/t=0.2
Borje, r/t=0.2
5.4.5, r/t=0.5
Borje, r/t=0.5
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Borje, r/t=1.0
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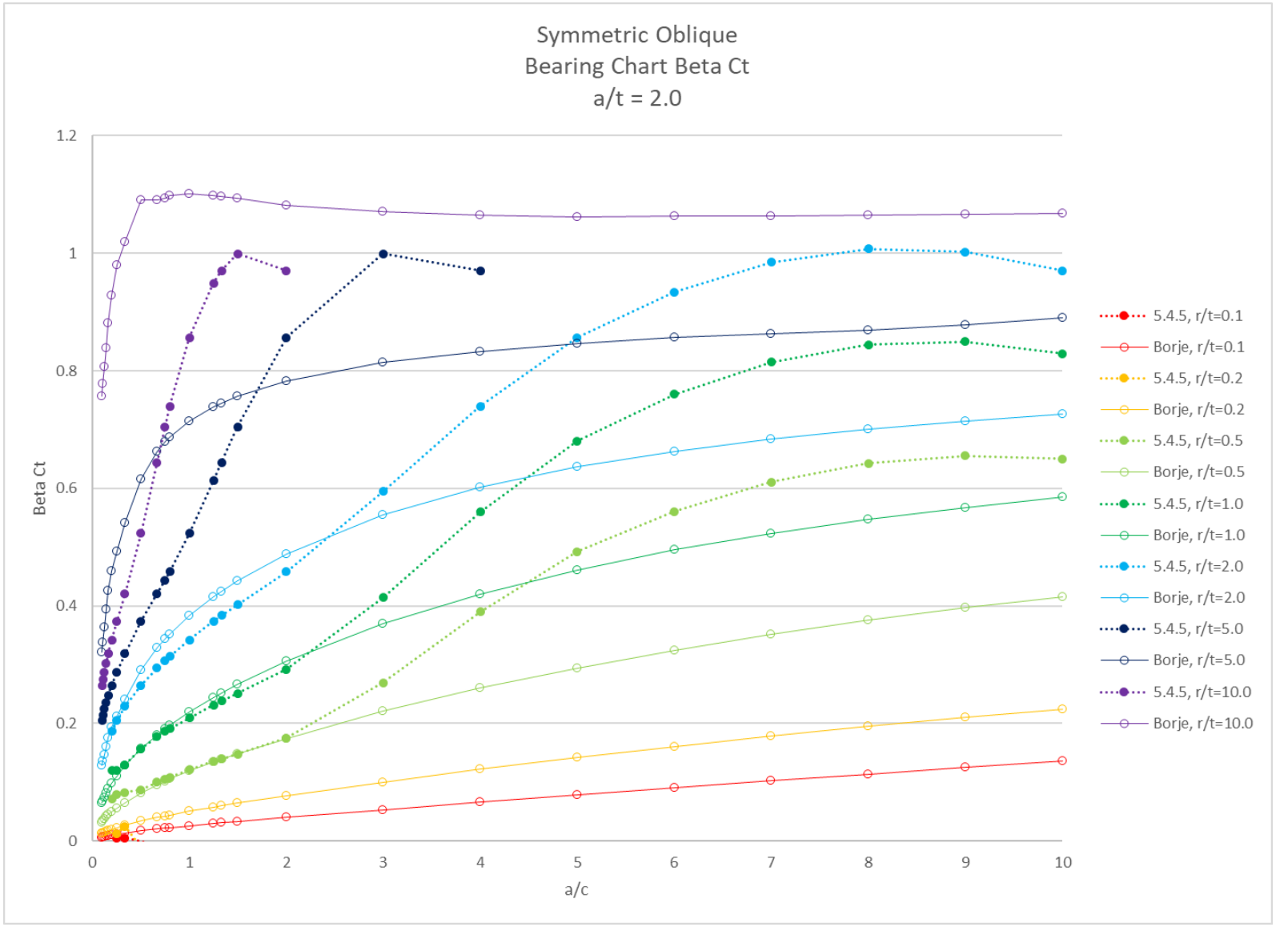
Symmetric Oblique
Bearing Chart Beta Ct
a/t = 2.0
Beta Ct
a/c
1.2
1
0.8
0.6
0.4
0.2
0
0
1
2
3
4
5
6
7
8
9
10
5.4.5, r/t=0.1
Borje, r/t=0.1
5.4.5, r/t=0.2
Borje, r/t=0.2
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Borje, r/t=0.5
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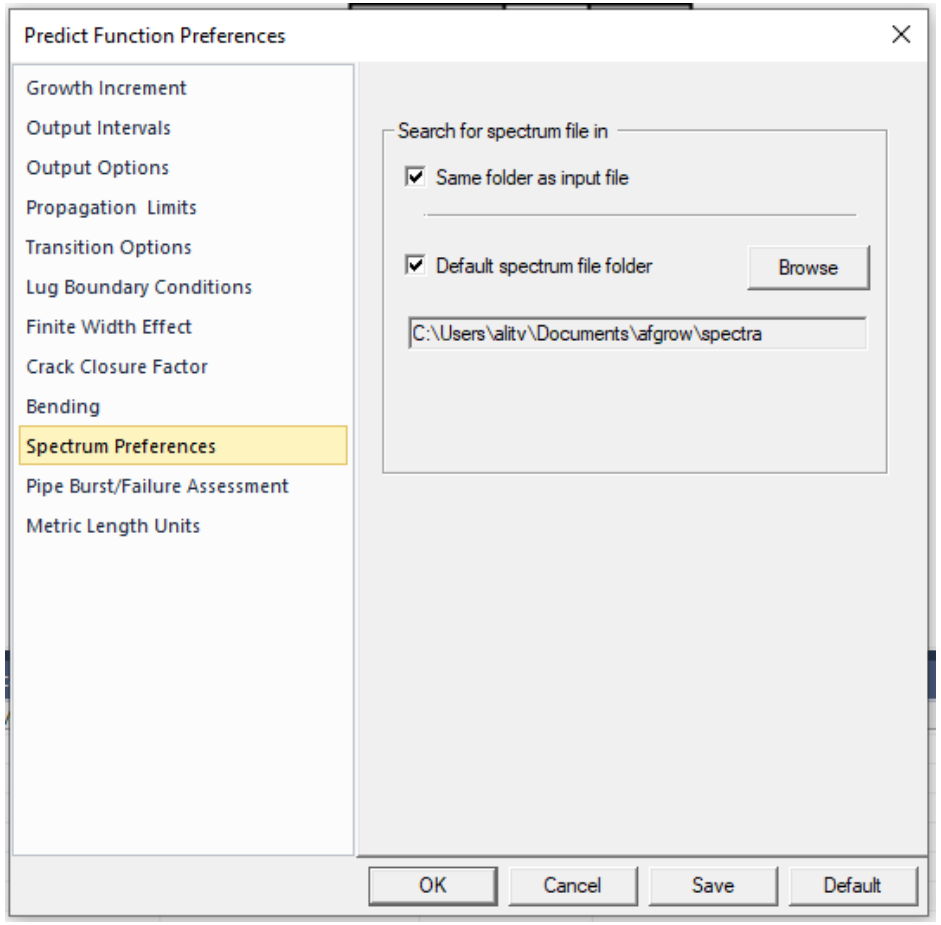
Borje, r/t=1.0
5.4.5, r/t=2.0
Borje, r/t=2.0
5.4.5, r/t=5.0
Borje, r/t=5.0
5.4.5, r/t=10.0
Borje, r/t=10.0

New Spectrum File Location Preferences

- This preference is local, it is not saved in the AFGROW input or XML output file
- Spectrum file search order:
  - Same folder as the input file
  - Default spectrum folder
- New spectrum file location is automatically updated and saved with the file



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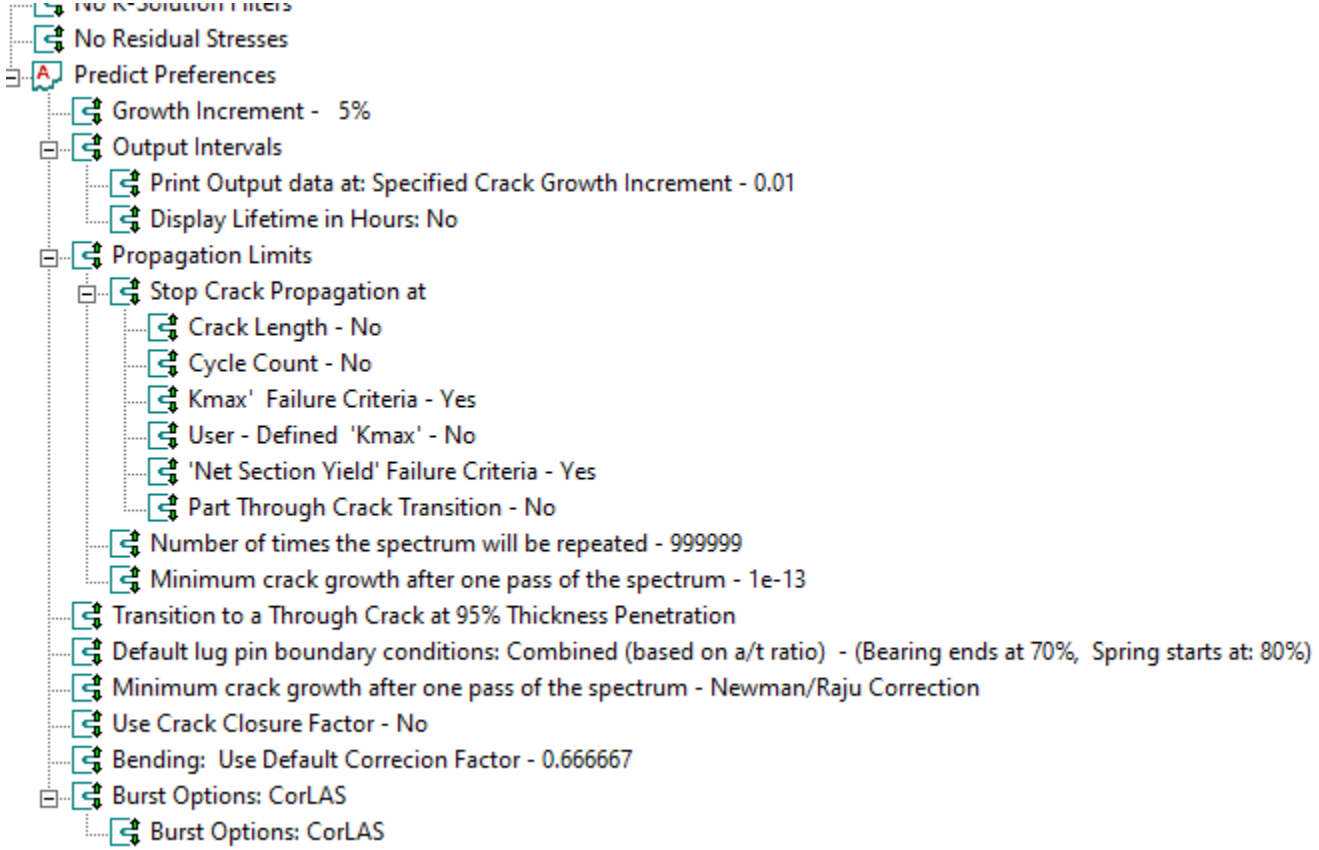
Preferences Added to Status and Output Windows

Status View

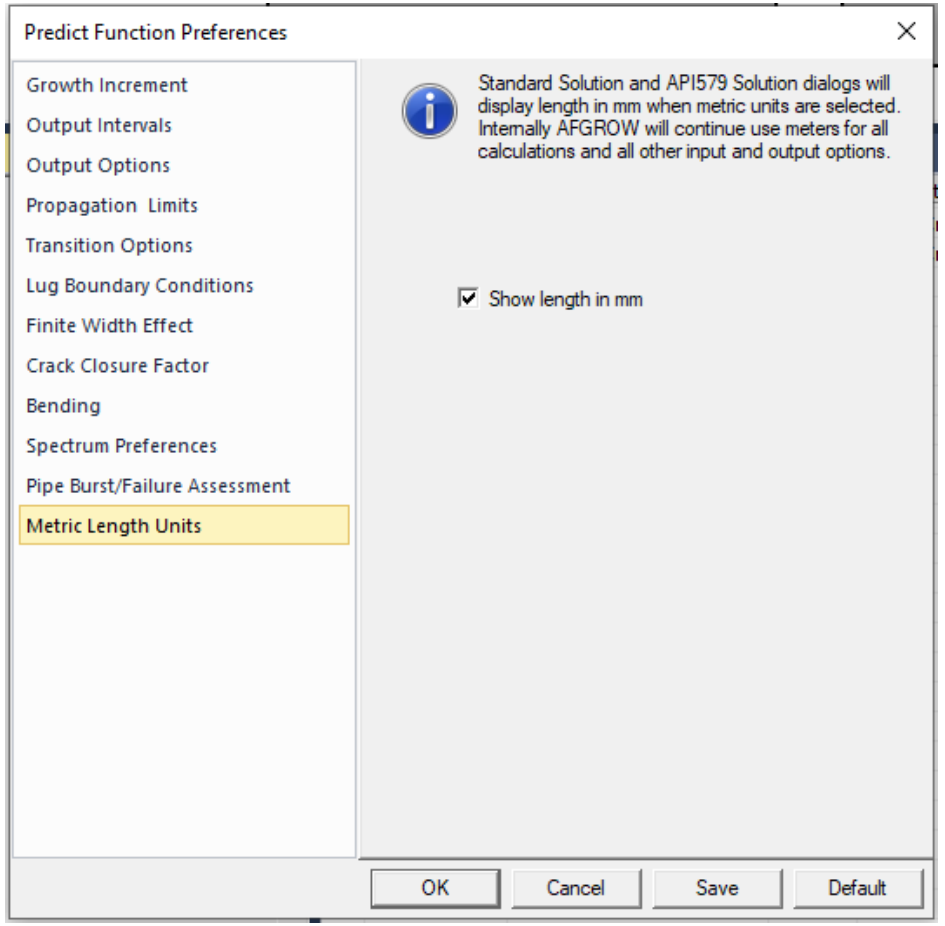


Output View

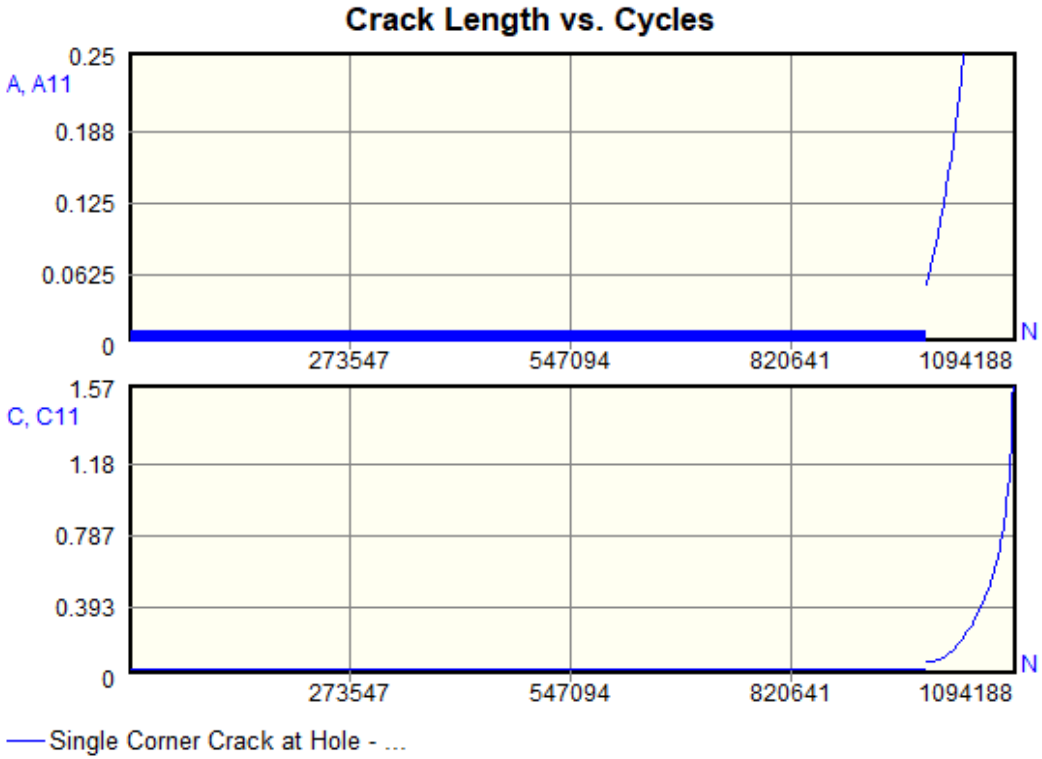
```
##########################################################
This space for comments
##########################################################
AFGROW 5.5.1.26        9/ 4/2025      15: 35     **English Units [ Length(in), Stress(Ksi), Temperature(F), Force(Kip) ]

Preferences

Growth Increment -  5%
Output Intervals
        Print Output data at: Specified Crack Growth Increment - 0.01
        Display Lifetime in Hours: No
Propagation Limits
        Stop Crack Propagation at
                Crack Length - No
                Cycle Count - No
                Kmax'  Failure Criteria - Yes
                User - Defined  'Kmax' - No
                'Net Section Yield' Failure Criteria - Yes
                Part Through Crack Transition - No
        Number of times the spectrum will be repeated - 999999
        Minimum crack growth after one pass of the spectrum - 1e-13
Transition to a Through Crack at 95% Thickness Penetration
Default lug pin boundary conditions: Combined (based on a/t ratio)  - (Bearing ends at 70%,  Spring starts at: 80%)
Minimum crack growth after one pass of the spectrum - Newman/Raju Correction
Use Crack Closure Factor - No
Bending:  Use Default Correcion Factor - 0.666667
Burst Options: CorLAS
Flow Stress Option: Yield Strength + 10


Crack Growth Model and Spectrum Information
Title: Example Problem

 Load: Axial Stress Fraction: 1, Bending Stress Fraction: 0, Bearing Stress Fraction: 0

 Crack Model: 1030 - Single Corner Crack at Hole - Standard Solution
Parametric Angle for the Newman and Raju Solution: C-Direction =  5.00, A-Direction = 80.00
Initial crack depth              (A):     0.0500
Initial surface crack length     (C):     0.0700
 Thickness   :     0.250
 Width       :     4.000
```

User Preferences to Enter Metric Data in mm

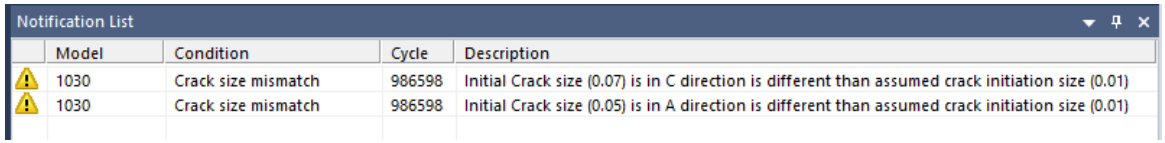
- User can enter data in *mm* only in Standard Solution and API579 dialogs
- It is possible to expand this options to other data input dialogs if users are interested
- Internally AFGROW converts entered data to meters and using meters in all calculations and input and output options

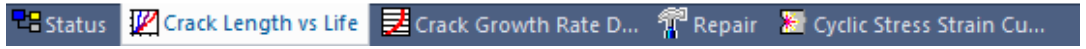


Show Distinction Between Crack Initiation and Growth in the GUI



- Crack initiation presented in the Crack Length vs Cycle plot as horizontal block with the thickness equal to an assumed crack initiation, usually 0.01 inc.
- AFGROW also provide notification if the initial size of the crack for a damage tolerance analysis is different than an assumed crack initiation





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COM Interface Changes

Application Interface

Functions:

- void Stop()
- boolean ModelHasThroughCrack()
- boolean ModelHasPartThroughCrack()
- boolean ModelIsAPIPressureModel()
- boolean ModelIsAPIPolynomialModel()
- boolean ModelIsAPIWeightFunctionModel()

***Output Info Interface* properties:**

- BSTR sKey
- int nCrackID
- int nHoleID
- int nDirectionID
- double dBurstPressure
- double dFlowPressure
- double dFracturePressure
- double dAPILvl2Lr
- double dAPILvl2Kr

Events

- void PredictFinishedExt(*short result, double dblCycles, VARIANT* iOutputArray*)
- void PredictInfoExt(*AfgrowModels model, double dStress, double dRStress, double dCycles, long dPass, VARIANT* iOutputArray*)
- void TransitionInfoExt(*long nType, long nReason, double dStress, double dRStress, double dCycles, long dPass, VARIANT* iOutputArray*)
- void FractureInfoExt(*long nReason, double dStress, double dRStress, double dCycles, long dPass, VARIANT* iOutputArray*)

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New Application Interface COM Events

- Prior to AFGROW release 5.5 there were only up to 4 directions that had information available in events like *PredictFinished* and *PredictInfo*
- With release 5.5, new (Extended) events will provide information about every crack direction for every model
- The direction parameters will be reported via an array of *iOutputArray* objects

```
[id(6)] void PredictFinishedExt(short result, double dblCycles, VARIANT* iOutputArray);
[id(7)] void PredictInfoExt(AfgrowModels model, double dStress, double dRStress, double dCycles, long dPass, VARIANT* iOutputArray);
[id(8)] void TransitionInfoExt(long nType, long nReason, double dStress,  double dRStress, double dCycles, long dPass, VARIANT* iOutputArray);
[id(9)] void FractureInfoExt(long nReason, double dStress, double dRStress, double dCycles, long dPass, VARIANT* iOutputArray);
```

COM Interface Changes Continued

***Predict Preferences Interface* properties:**

- AfgrowBurstOption nSelectedBurstModel
- PipelineFlowStressOption nPipelineFlowStressCalculationMethod
- double dMAT8ResidualFormingStress
- boolean bUseUserDefinedLrCutoff
- double dUserDefinedLrCutoff

AFGROW Burst Options

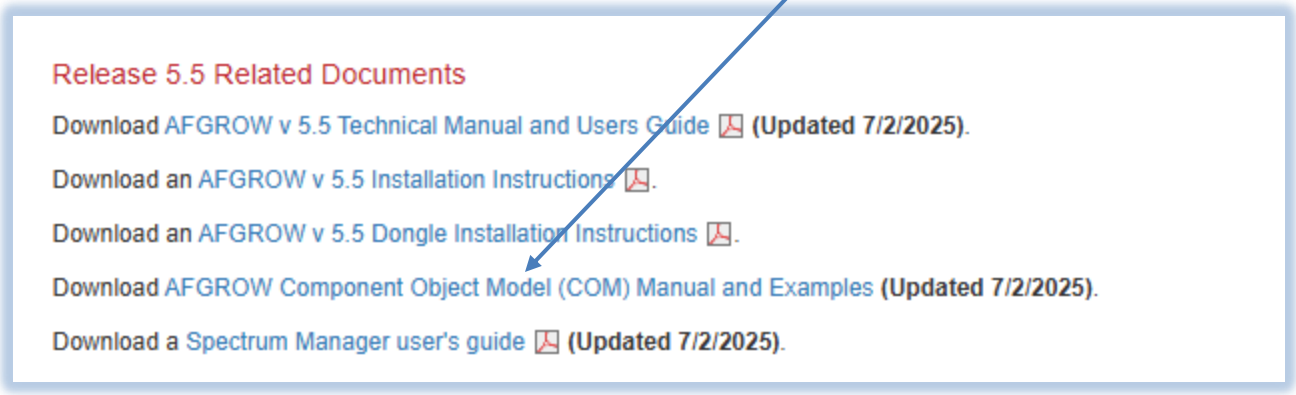
- BurstOptionNoBurst = 0
- BurstOptionMAT8 = 1
- BurstOptionCorLAS = 2
- BurstOptionAPILvl2 = 3

Pipeline Flow Stress Options

- FlowStressOptionYeildPlus10 = 0
- FlowStressOptionUltimateAverage = 1

***Tabular Lookup Material Interface* Function:**

- boolean OpenTabularLookupMaterialByGUID(*BSTR MaterialGUID*)



Plugin COM Interface Changes

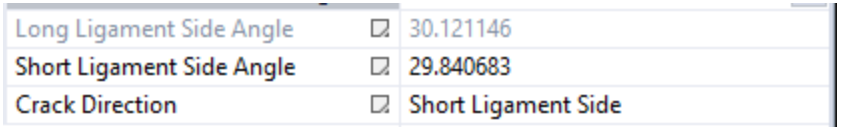
New *AFGROW Plugin Parameter Type*:

ParamDouble = 0
ParamEnum = 1
ParamString = 2
ParamFileName = 3
ParamCommandButton = 10

AFGROW Beta Plugin Interface new functions:

boolean ParameterButtonClick(*BSTR sID, [out] BSTR* sErrorDescription*) – Executed when users clicks on the button in the property field
void SetNotificationInt(*IDispatch* INotify*)

New *AFGROW Beta Plugin Notify Interface*



void UpdateParameters(*VARIANT iParameterNameArray*) – Directs AFGROW to request new parameter values from plugin
boolean Notification(*BSTR sConditionDescription, BSTR sDescription*) – Add notification to AFGROW notification list
boolean EnableParameter(*BSTR sID, boolean bEnable*) – Toggles read only access of the plugin parameters

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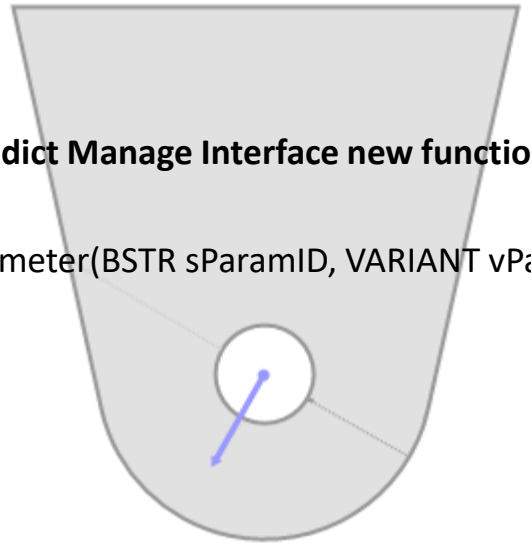
Plugin COM Interface Changes

***AFGROW Specimen Draw Interface* new functions:**

void AddLineEx(*double left, double top, double right, double bottom, int thickness, AfgrowColorSpecimenDrawing styleLine, AfgrowLineCup startCap, AfgrowLineCup endCap, AfgrowDashStyle iColor*)

void AddCurve(*VARIANT aX, VARIANT aY*)

void AddCurveToPath(*BSTR sPathID, VARIANT aX, VARIANT aY*)



AFGROW Predict Manage Interface new function:

Void SetParameter(BSTR sParamID, VARIANT vParameterValue)

AFGROW Color Specimen Drawing

Default, Red, Blue, Gray

AFGROW Dash Style

- DashStyleSoli
- DashStyleDash
- DashStyleDot
- DashStyleDashDot
- DashStyleDashDotDot

AFGROW Line Cups

- LineCapFlat = 0
- LineCapSquare = 1
- LineCapRound = 2
- LineCapTriangle = 3
- LineCapNoAnchor = 0x10
- LineCapSquareAnchor = 0x11
- LineCapRoundAnchor = 0x12
- LineCapDiamondAnchor = 0x13
- LineCapArrowAnchor = 0x14

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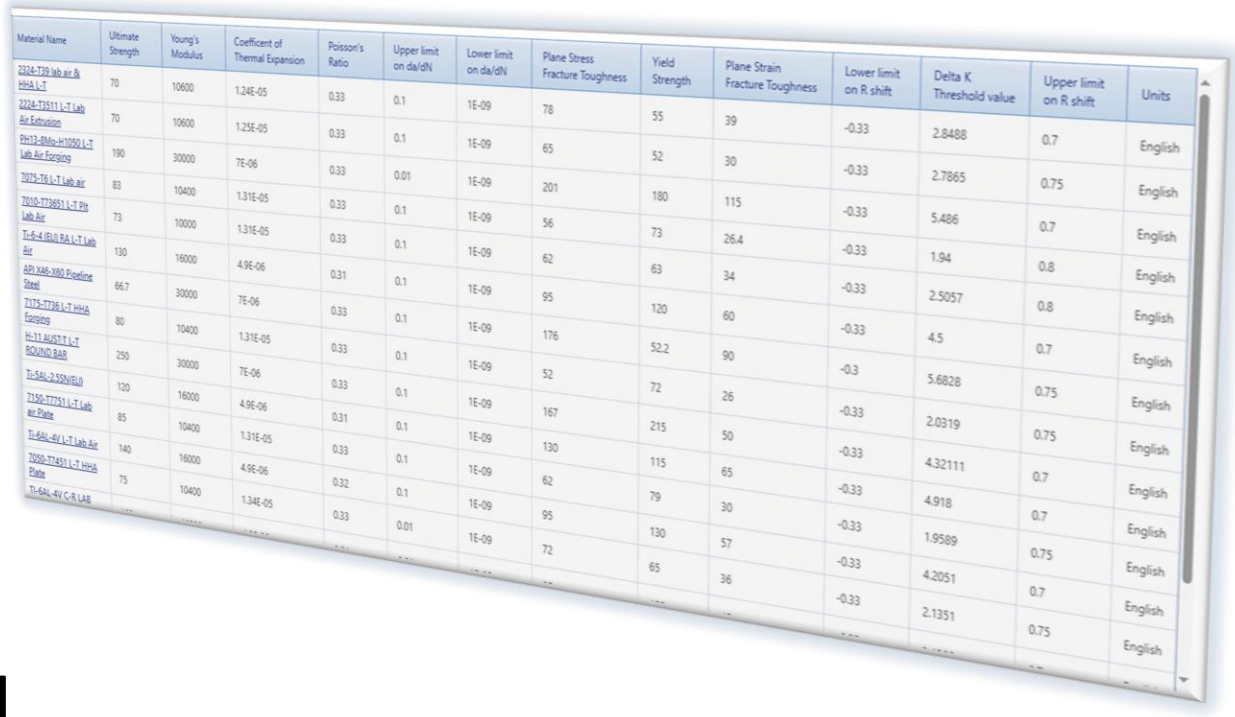
New Materials Added to Tabular Lookup Database

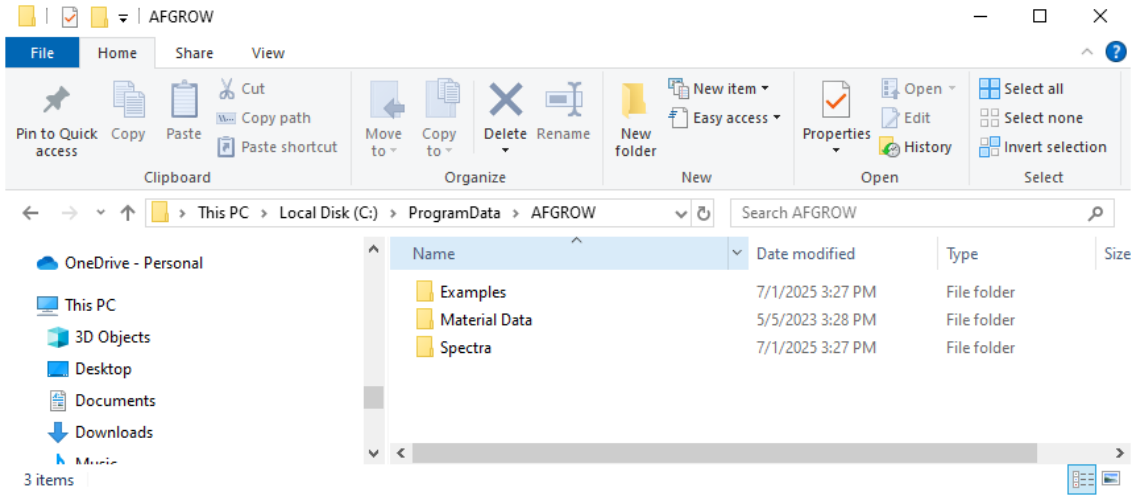
- 2024-T4 Lab Air L-T
- 2524-T3 L-T Lab Air Sheet
- 7050-T7451 S-L HHA Plate
- 7050-T7451 T-L HHA Plate
- 7150-T651 L-T Plate Lab Air
- 7175-T74 T-L Forging Lab Air
- CDA172 BECU-T Lab air C-L Rod
- Hastelloy B LAB AIR C-R BAR



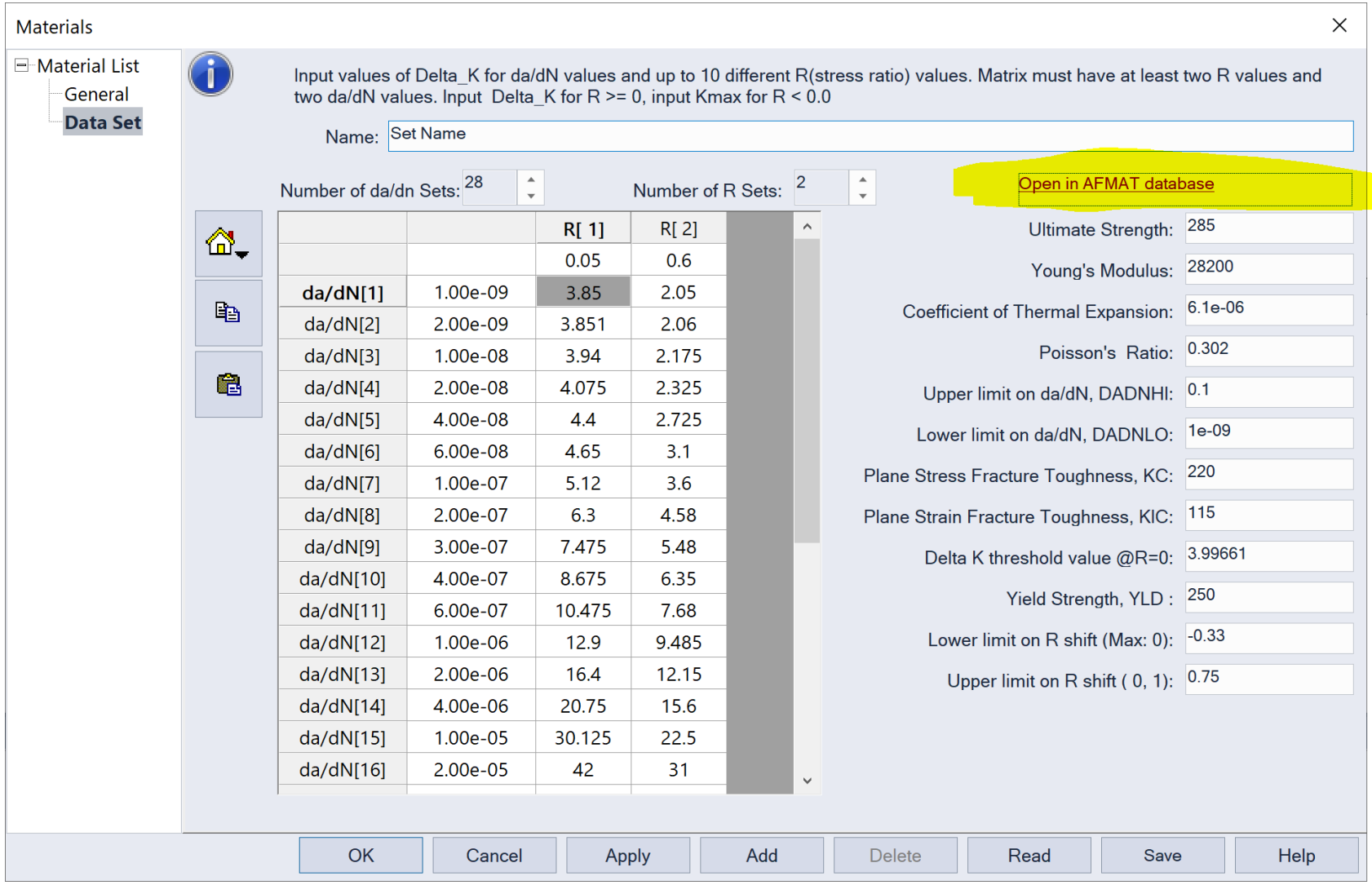
Material Name	Ultimate Strength	Young's Modulus	Coefficent of Thermal Expansion	Poisson's Ratio	Upper limit on da/dN	Lower limit on da/dN	Plane Stress Fracture Toughness	Yield Strength	Plane Strain Fracture Toughness	Lower limit on R shift	Delta K Threshold value	Upper limit on R shift	Units
2324-T39 lab air & HHA L-T	70	10600	1.24E-05	0.33	0.1	1E-09	78	55	39	-0.33	2.8488	0.7	English
2224-T3511 L-T Lab Air Extrusion	70	10600	1.25E-05	0.33	0.1	1E-09	65	52	30	-0.33	2.7865	0.75	English
PH13-8Mo-H1050 L-T Lab Air Forging	190	30000	7E-06	0.33	0.01	1E-09	201	180	115	-0.33	5.486	0.7	English
7075-T6 L-T Lab air	83	10400	1.31E-05	0.33	0.1	1E-09	56	73	26.4	-0.33	1.94	0.8	English
7010-T73651 L-T Plt Lab Air	73	10000	1.31E-05	0.33	0.1	1E-09	62	63	34	-0.33	2.5057	0.8	English
Ti-6-4 (ELI) RA L-T Lab Air	130	16000	4.9E-06	0.31	0.1	1E-09	95	120	60	-0.33	4.5	0.7	English
API X46-X60 Pipeline Steel	66.7	30000	7E-06	0.33	0.1	1E-09	176	52.2	90	-0.3	5.6828	0.75	English
7175-T736 L-T HHA Forging	80	10400	1.31E-05	0.33	0.1	1E-09	52	72	26	-0.33	2.0319	0.75	English
H-11 AUST T L-T ROUND BAR	250	30000	7E-06	0.33	0.1	1E-09	167	215	50	-0.33	4.32111	0.7	English
Ti-5AL-2.5SN/ELI	120	16000	4.9E-06	0.31	0.1	1E-09	130	115	65	-0.33	4.918	0.7	English
7150-T77751 L-T Lab air Plate	85	10400	1.31E-05	0.33	0.1	1E-09	62	79	30	-0.33	1.9589	0.75	English
Ti-6AL-4V L-T Lab Air	140	16000	4.9E-06	0.32	0.1	1E-09	95	130	57	-0.33	4.2051	0.7	English
7050-T7451 L-T HHA Plate	75	10400	1.34E-05	0.33	0.01	1E-09	72	65	36	-0.33	2.1351	0.75	English
Ti-6AL-4V C-R LAB													

Improved Installation of AFGROW Solution and Spectra Examples

- Added a copy of **Spectra** and **Examples** folders in "*C:\ProgramData\AFGROW*" folder, that is shared among all the user accounts on your PC
- Added an additional example: *MSD Example.dax*
- Added an additional spectra example: *Normalized Transport Fuselage.spx*



Link to Open Material in AFMAT Database Online



		R[1]	R[2]
		0.05	0.6
da/dN[1]	1.00e-09	3.85	2.05
da/dN[2]	2.00e-09	3.851	2.06
da/dN[3]	1.00e-08	3.94	2.175
da/dN[4]	2.00e-08	4.075	2.325
da/dN[5]	4.00e-08	4.4	2.725
da/dN[6]	6.00e-08	4.65	3.1
da/dN[7]	1.00e-07	5.12	3.6
da/dN[8]	2.00e-07	6.3	4.58
da/dN[9]	3.00e-07	7.475	5.48
da/dN[10]	4.00e-07	8.675	6.35
da/dN[11]	6.00e-07	10.475	7.68
da/dN[12]	1.00e-06	12.9	9.485
da/dN[13]	2.00e-06	16.4	12.15
da/dN[14]	4.00e-06	20.75	15.6
da/dN[15]	1.00e-05	30.125	22.5
da/dN[16]	2.00e-05	42	31

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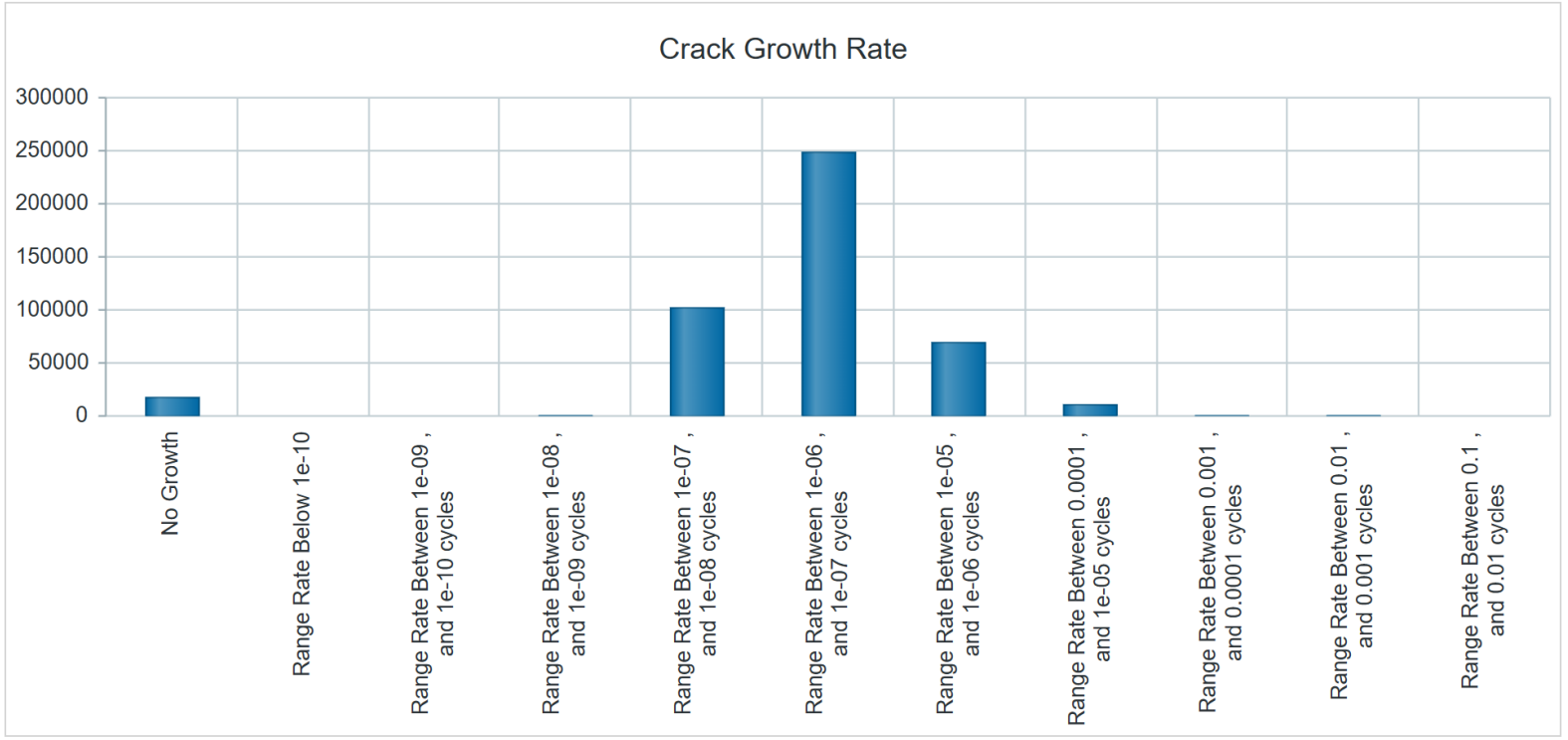
dA/dN rate summary report

No growth: 17094
Rate range bellow 1.0e-10 cycles: 0
Rate range between 1.0e-10 and 1.0e-09 cycles: 0
Rate range between 1.0e-09 and 1.0e-08 cycles: 251
Rate range between 1.0e-08 and 1.0e-07 cycles: 100980
Rate range between 1.0e-07 and 1.0e-06 cycles: 248203
Rate range between 1.0e-06 and 1.0e-05 cycles: 69186
Rate range between 1.0e-05 and 1.0e-04 cycles: 10522
Rate range between 1.0e-04 and 1.0e-03 cycles: 112
Rate range between 1.0e-03 and 1.0e-02 cycles: 1



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Spectrum Manager 1.3.1.0 (AFGROW Release 5.5)

- Added cycle counting ability
- Added an ability to concatenate spectra
- Added an ability to auto sequence sub spectra
- Added ability to filter exceedance data by damage tags
- Added an icon on Sequence Data's tab to indicate an invalid spectrum
- Added the ability to filter spectrum data by damage tag

Damage Tag Filter on Exceedance Plot

- Filter the Exceedance Plot by damage tags in the Spectrum
- Can Filter by “Entire Spectrum (Default View), All Damage Tags (All levels with damage tags), No Damage Tag (only levels without any damage tag), and each individual damage tag
- Can also select multiple damage tags to view at once
- Only visible if you have Damage tags enabled in the Spectrum Options

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Damage Tag Filter on Exceedance Plot

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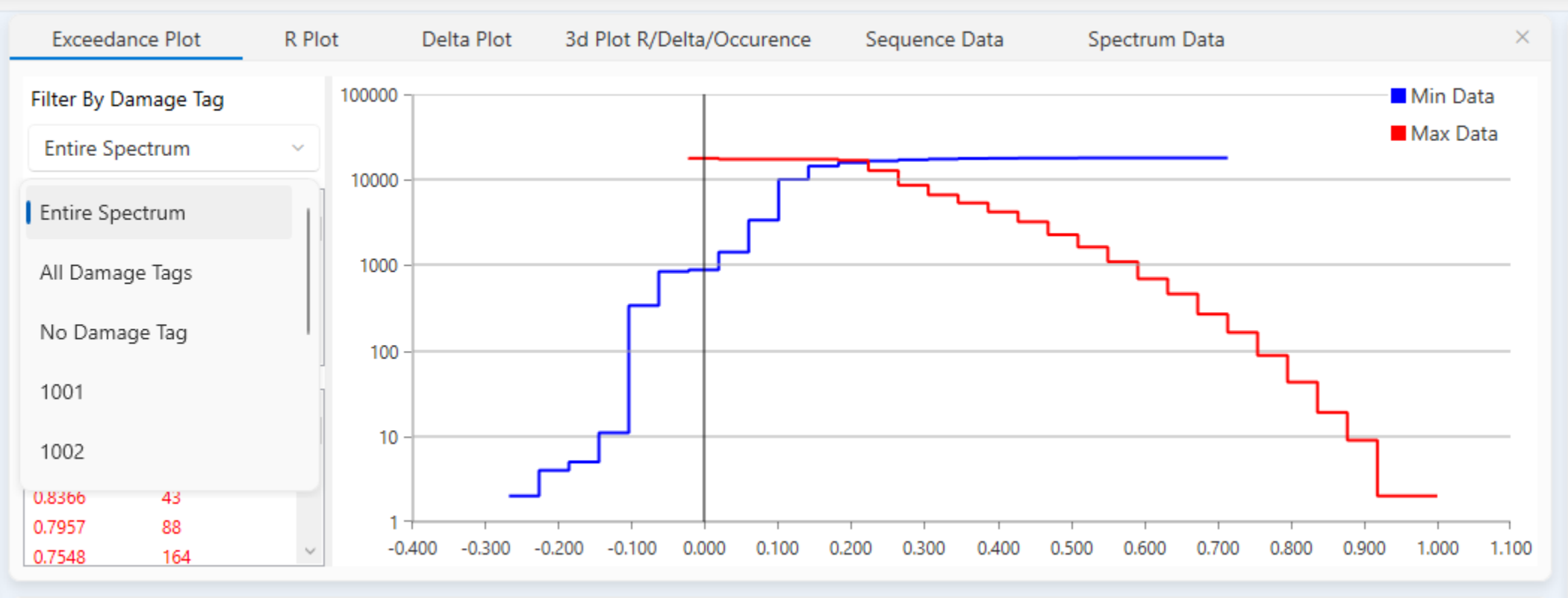

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Damage Tag Filter on Exceedance Plot

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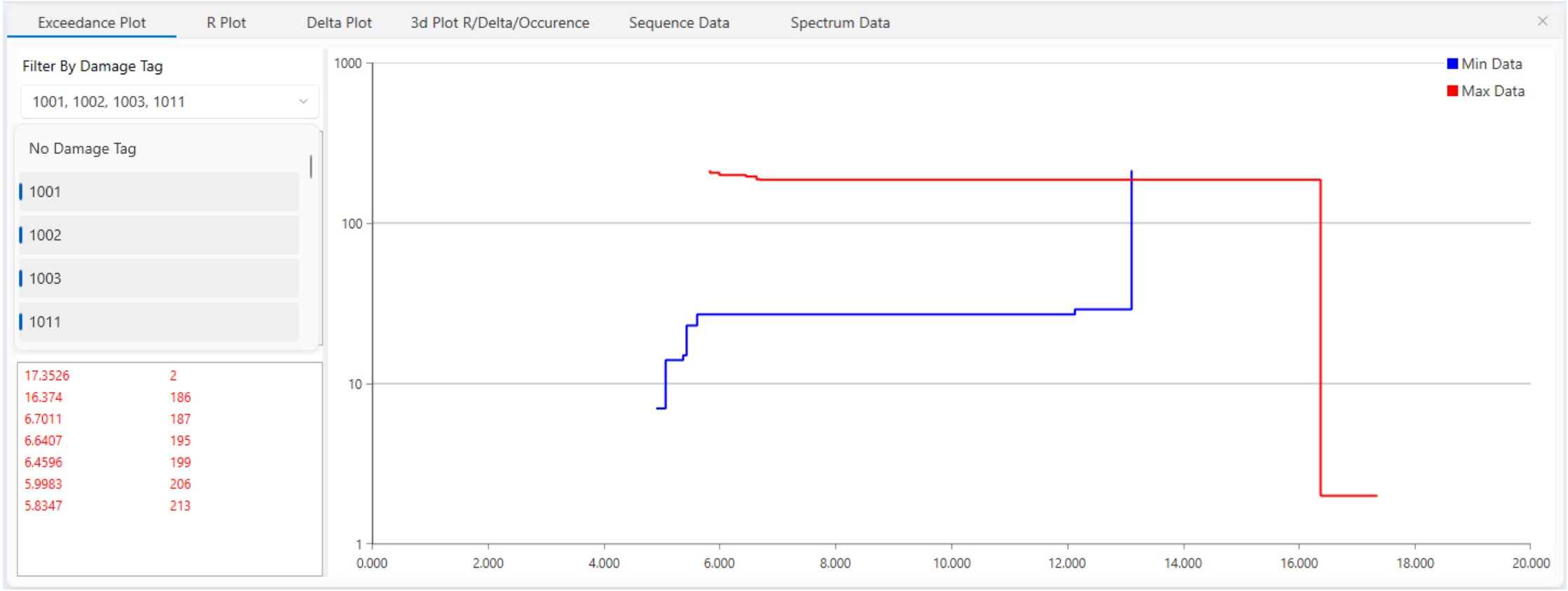
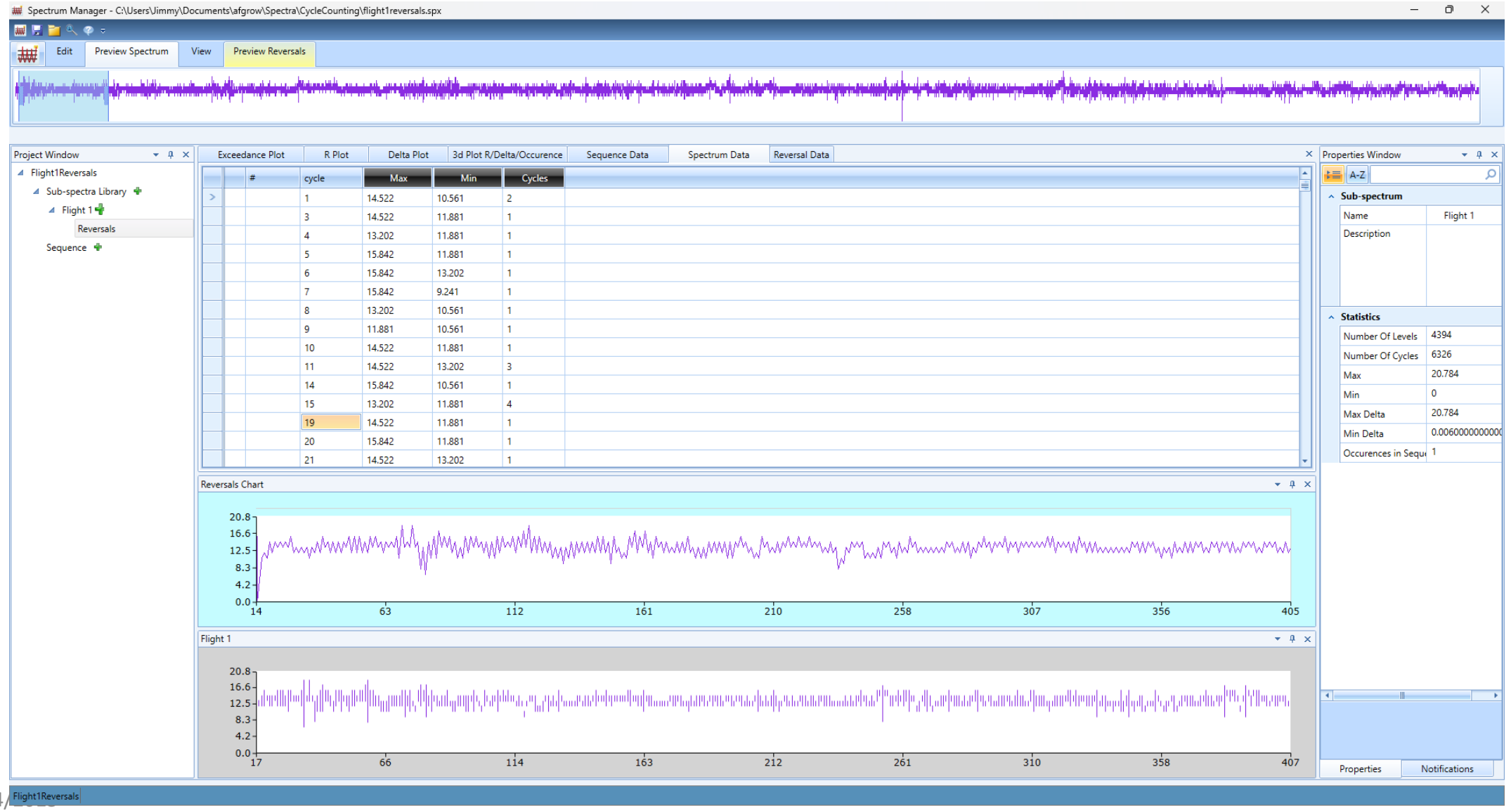


Cycle Count

- Create a cycle counted sub-spectrum from time sampled or peak-valley uncounted input data
- Ability to apply damage tags to uncounted data
- Three different cycle counting options:
  - Modified Rain-Flow counting routine, was originally available in Cycle Counting application distributed with AFGROW
  - Simplified Rain-Flow counting routine IAW: ASTM E1049-85
  - Range-Pair counting routine IAW: ASTM E1049-85
- Option to select if you wish the resulting sub spectrum to be normalized
- New counted Sub Spectrum will be added to the end of the Sub Spectra Library
- Symbol will appear next to the name in library to indicate that the Sub Spectrum is from uncounted data
- The pick-valley uncounted input data are saved with the sub spectrum and could be exported on demand

Cycle Count


Spectrum Manager - C:\Users\Jimmy\Documents\afgrow\Spectra\CycleCounting\flight1reversals.spx
Edit
Preview Spectrum
View
Preview Reversals
Project Window
Flight1Reversals
Sub-spectra Library
Flight 1
Reversals
Sequence
Exceedance Plot
R Plot
Delta Plot
3d Plot R/Delta/Occurence
Sequence Data
Spectrum Data
Reversal Data
cycle Max Min Cycles
1 14.522 10.561 2
3 14.522 11.881 1
4 13.202 11.881 1
5 15.842 11.881 1
6 15.842 13.202 1
7 15.842 9.241 1
8 13.202 10.561 1
9 11.881 10.561 1
10 14.522 11.881 1
11 14.522 13.202 3
14 15.842 10.561 1
15 13.202 11.881 4
19 14.522 11.881 1
20 15.842 11.881 1
21 14.522 13.202 1
Properties Window
Sub-spectrum
Name Flight 1
Description
Statistics
Number Of Levels 4394
Number Of Cycles 6326
Max 20.784
Min 0
Max Delta 20.784
Min Delta 0.0060000000000
Occurences in Sequ 1
Properties
Notifications
Reversals Chart
20.8
16.6
12.5
8.3
4.2
0.0
14 63 112 161 210 258 307 356 405
Flight 1
20.8
16.6
12.5
8.3
4.2
0.0
17 66 114 163 212 261 310 358 407
Flight1Reversals

Concatenate Spectra

- Combine two spectra together
- Prompt will appear to use the current spectrum's Label to auto-generate names
- Damage Tag, Environment Tag, and Time Dependence data will be lost when concatenating the spectra

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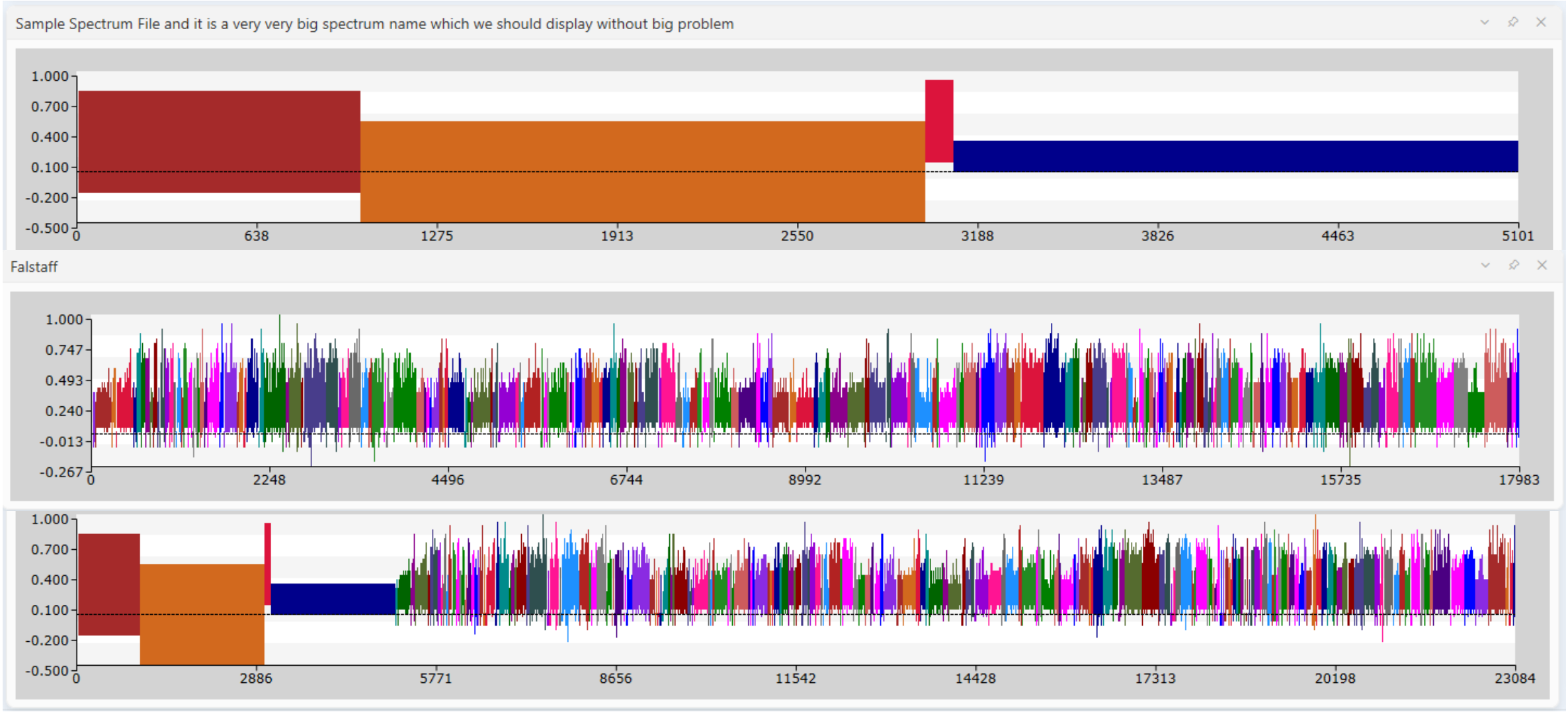
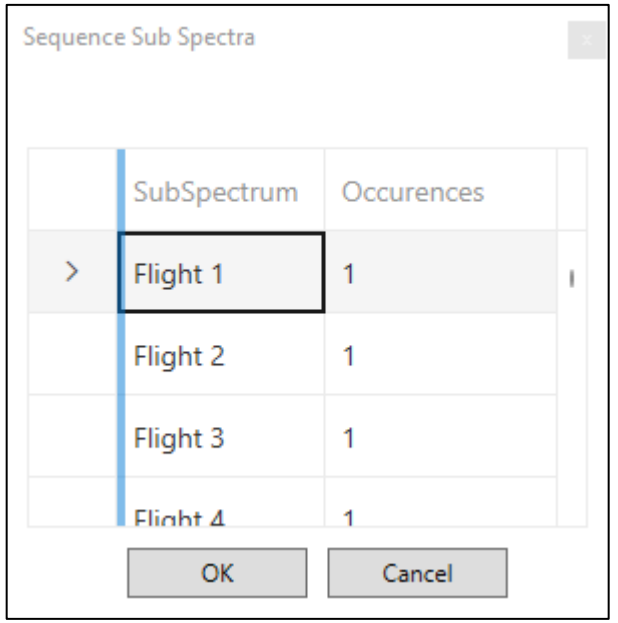
Concatenate Spectra



Auto Sequence

- Automatically add the Sub Spectra in the Sub Spectra Library to the Sequence
- Can modify the number of times a Sub Spectra appears in the sequence by changing the Occurrences value next to the Sub Spectrum name.
- These additional occurrences will be sequential.



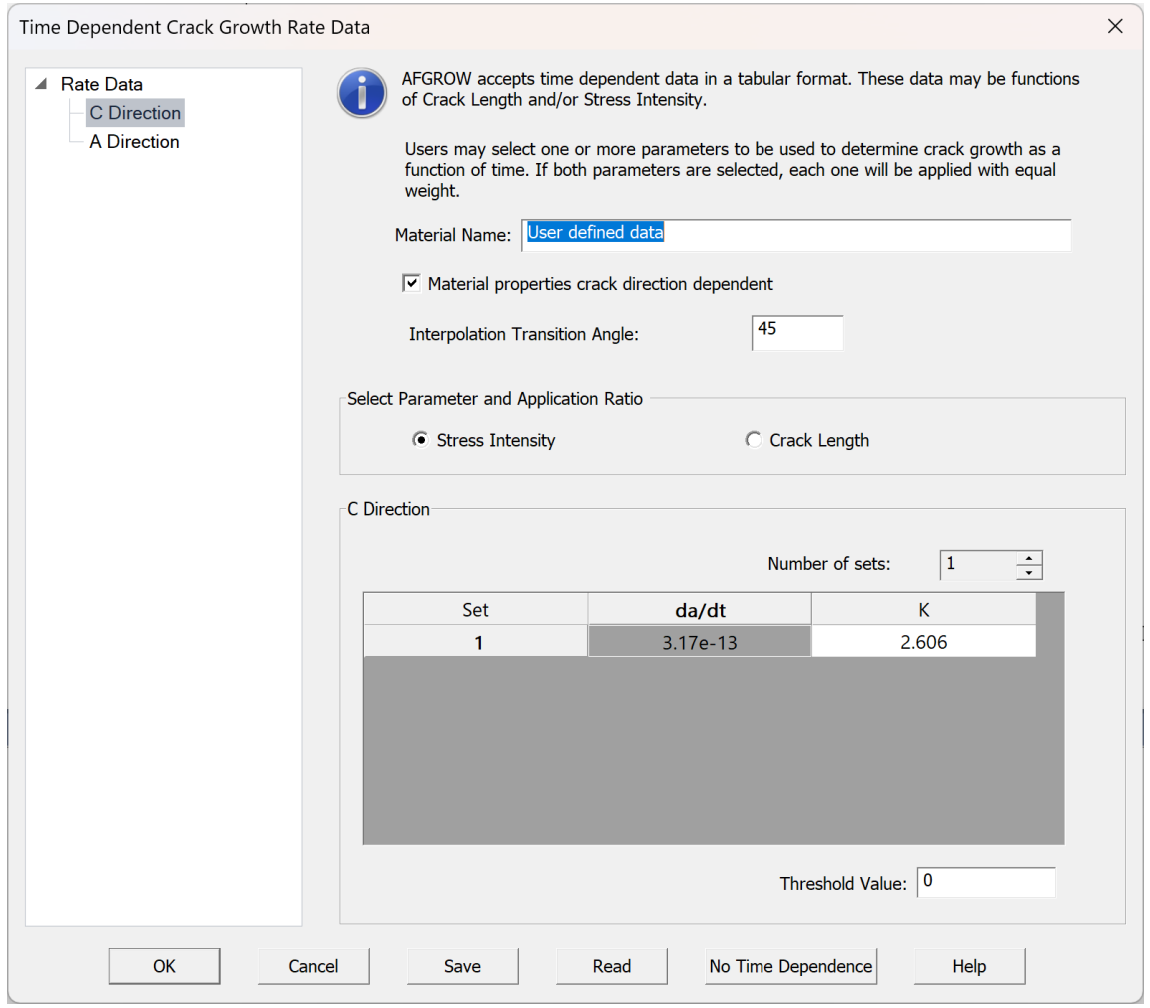
Release 5.05.02.25 (August 21, 2025)

- Bug: Sometimes AFGROW crashes when user changes a-length of advanced model corner crack(s) at hole
- Bug: AFGROW calculates incorrect beta values for advanced bearing part-through/through solution

Release 5.05.03.25 (December 1, 2025)

- Enhancement: Added the ability to have different time-dependent crack growth for two directions
- Enhancement: Added a COM API function to set to the COM Preferences interface: Synchronize beta calculation increment with the through crack UserDefined beta length entries
- Enhancement : The XML output now includes a time parameter
- Enhancement: Added the ability to disable/enables properties to the IAfgrowBetaPluginInt interface
- Enhancement: Added a tag to XML output that indicates whether the loaded spectrum is time dependent
- Bug: With AFGROW in metric units, a new model created using the COM interface had default geometric parameters in English units
- Bug: Loading a NASGRO material data file through COM while Metric units are selected resulted in slightly different results vs English units
- Bug: COM function ModelHasPartThroughCrack may return incorrect value after user changes the model
- Bug: AFGROW displays the wrong frame header in Beta correction dialog
- Bug: AFGROW crashed when user runs prediction and then tries to enter "hours per pass" value in preferences
- Bug: Advanced model output did not display whether AFGROW failed due to the K max or K residual stress requirement
- Bug: In COM API when crack transitions to a slot the TransitionInfo event was sent after the transition was completed instead of before causing the information about the transitioning crack direction to be missing
- Bug: Impossible to set BetaCorrection for cracks at Countersunk Hole through COM API

Time-Dependent Crack Growth in Two Directions



Time dependent crack growth rate data may be entered to be used for all growth directions, or the user may select the option to enter time dependent material properties for each growth direction separately.

In the latter case, the time dependent data for the a-direction and c-direction will be entered into two different tables which are selected under the Rate data column on the left side of the dialog box. All values entered in this dialog must be > 0.

Release 5.05.03.25 (December 1, 2025) (Continued)

- Bug: When a plugin model was selected, AFGROW reported garbage values when printing enumerated parameter values in the Status View
- Bug: The UpdateProperties function of the IAfgrowBetaPluginNotifyInt worked only with double values
- Bug: When plugin drop down control new value was rejected, the selection in controls visually changed from string to enumerated value
- Bug: Flow stress calculation option "yield stress plus 10" was not working properly when metric units were being used
- Bug: API 579 models did not work correctly with initiation, because initiation requires stress, not pressure
- Bug: Prediction slowed significantly when MAT-8 was enabled and the A crack direction approached the thickness
- Bug: When delta K is zero due to negative loading in the spectrum, API-579 Level-2 assessment AFGROW crashed
- Bug: AFGROW reports notification that MAT-8 burst model is out of the range even when it was not selected as the transition preference

Release 5.05.04.25 (January 27, 2026)

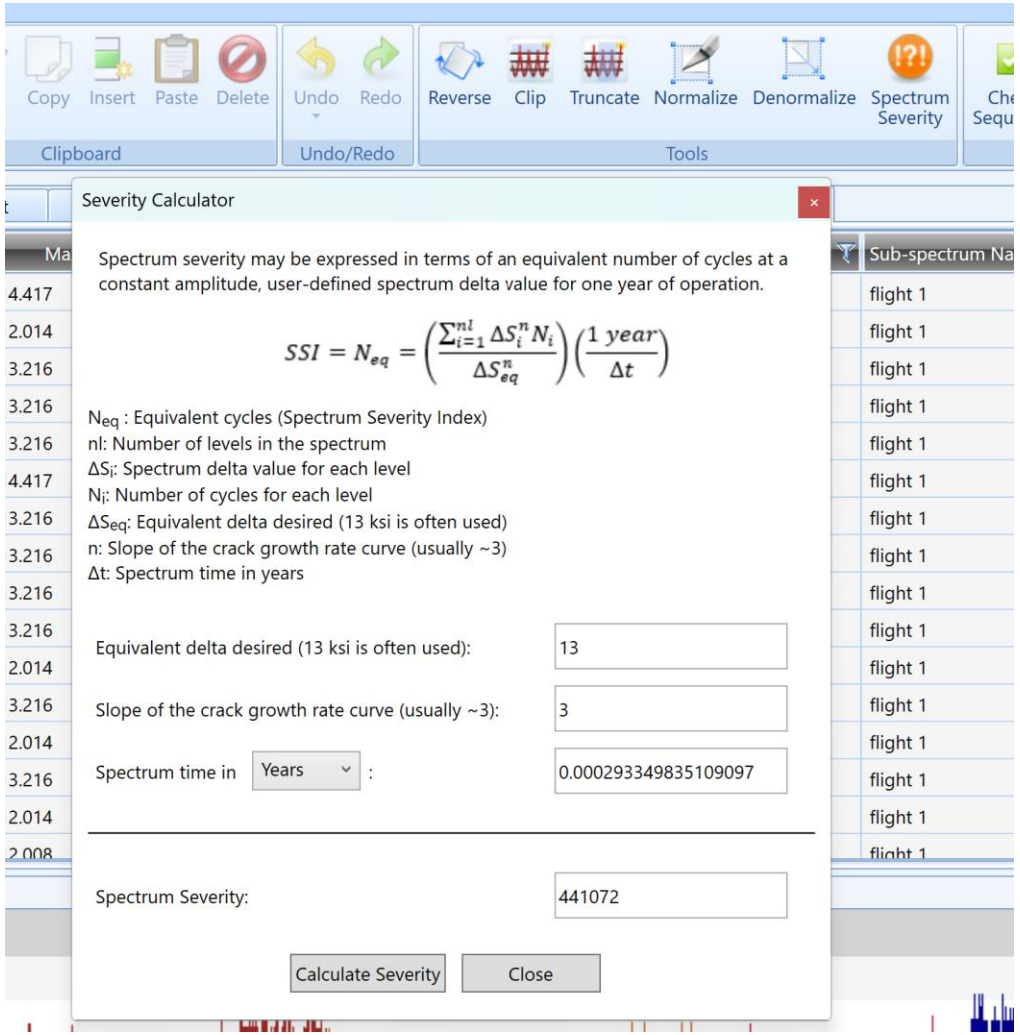
AFGROW

- Bug: AFGROW incorrectly converted tabular lookup material data from English to Metric units when AFGROW was set to Metric units at startup
- Bug: The new property *nCrackPositionID* of the *iOutputInfo* Interface sometimes reported incorrect values
- Bug: XML output always reported units as English
- Bug: Final output event was not printed unless the *"Kmax Failure Criteria"* of the *Stop Crack Propagation* preference was selected
- Bug: API-579 Level 2 Assessment and MAT-8 Burst Mode ignored the residual strength requirement
- Bug: Errors converting units for several AFGROW models

Spectrum Manager

- Enhancement: Added a Spectrum Severity Calculator

Spectrum Manager - Spectrum Severity Calculator



The spectrum severity tool provides a metric that allows the user to assess the severity of a spectrum by estimating the equivalent number of constant amplitude cycles with a user-specified delta (cyclic range) value.

The SSI (Spectrum Severity Index) calculator shown above is commonly used by the pipeline industry. The calculation doesn't include stress ratio effects, so **the result should not be interpreted as an accurate estimate of the expected number of constant amplitude cycles for 1-year of service. It should be seen as a relative severity estimation when comparing different spectra.**

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Questions