

AFGROW Workshop 2018

AFMAT Online Database overview

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New Data

- I. Added five additional downloadable tabular look-up material data files:
 - 7005-T6 Lab Air L-T Sheet
 - 7075-T6 L-T Lab Air
 - 7075-T7351 L-T Lab Air Plate
 - 7175-T736 HHA L-T Forging
 - 7475-T61 Alclad & Bare T-L Lab Air

- II. Working on additional crack growth rate data for:
 - D6AC (Curve Fit in progress)
 - 304L (Curve Fit in progress)
 - 316H
 - 7075-T73 L-T (Curve Fit in progress)
 - PWA 1202
 - PWA 1480

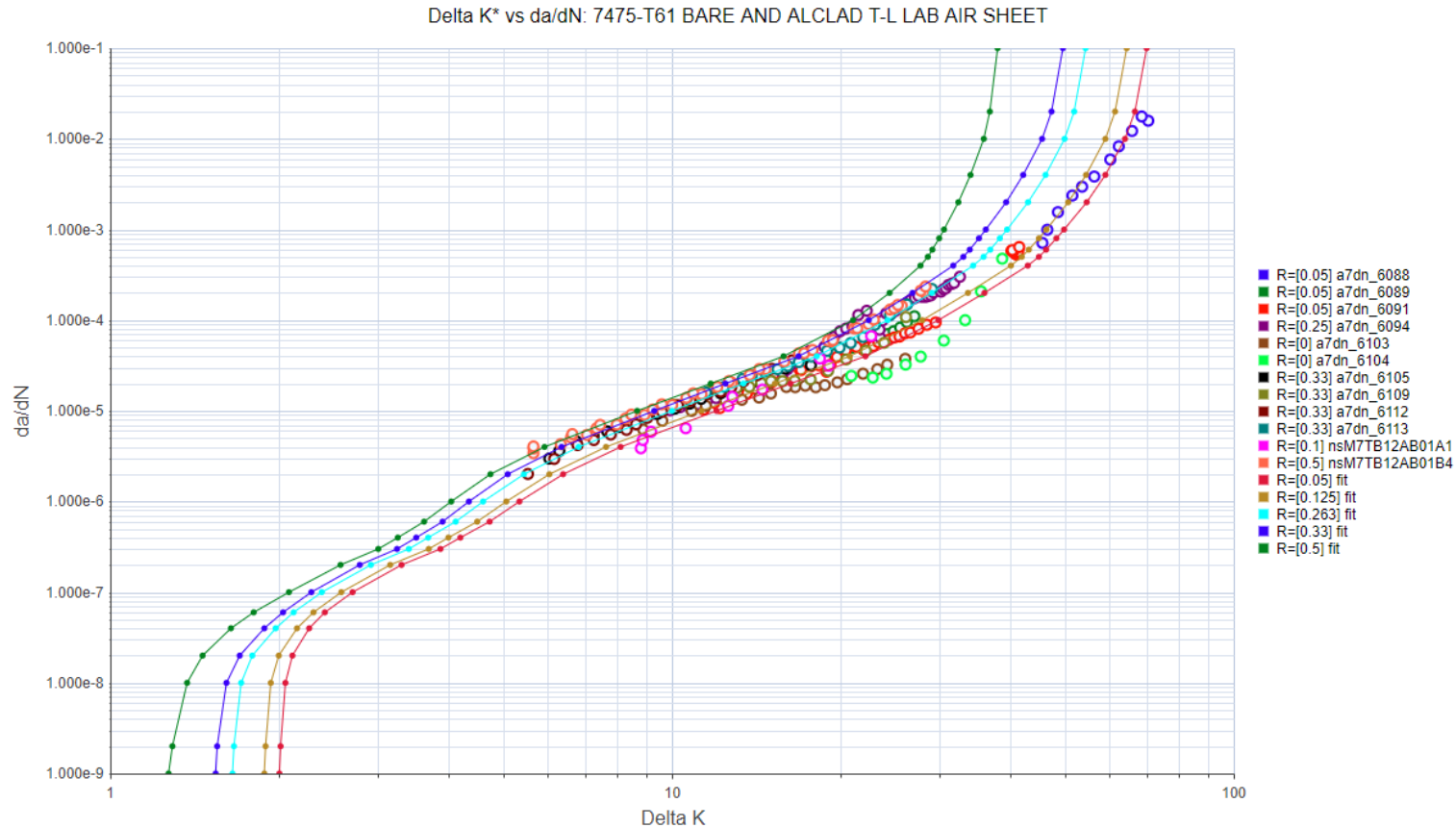
Example of New Tabular look-up data

[AF Mat](#) > [Tabular Lookup da/dN Data](#) > View Tabular_Lookup da/dN Data

Tabular Lookup da/dN Data - 7475-T61 BARE AND ALCLAD T-L LAB AIR SHEET

Materials

- ALLOY STEELS
- Aluminum
 - ALUMINUM 2000/6000 ALLOYS
 - ALUMINUM 7000/8000 ALLOYS
 - 7005
 - 7010
 - 7049
 - 7050
 - 7075
 - 7079
 - 7150
 - 7175
 - 7178
 - 7249
 - 7475
 - 7475-T7351 L-T HHA Plate
 - 7475-T61 BARE AND ALCLAD T-L LAB AIR SHEET
 - 7475-T7351 L-T LAB AIR PLATE
 - X7091
 - ALUMINUM CASTING ALLOYS
- STAINLESS STEELS



Added Description to Test and Data Table Variables for Property Types:

- Fatigue Life (a vs N)
- Fracture Toughness Measured By CTOD
- J-Integral Fracture Toughness
- K1 Environmentally Assisted Cracking
- Plane Strain Fracture Toughness (K1C)
- Plane Stress Fracture Toughness (KC)
- R-Curve (JR)
- R-Curve (KR)

Defined Variable Names In Test Information Tables

- Fracture Toughness

General Specimen Reference Product Test and Data					
nsstct_40007					
Test Information					
Composition:	.2C-.007P-.029SI-1.11MN-.023S		Weld Process:	0	
Product Width:		Percent Elongation:	38	Percent Reduction In Area:	67
Initial Crack Length:		Test Standard:	BS5762	Test Standard (Year):	1979
Final Crack Length:		Filler Type/Name:		Filler Size/Diameter:	
Total Side Groove Depth:		Heat Input:		Sort Temperature:	
Travel Speed:		Preheat Temperature:		Postheat Temperature:	
Interpass Temperature:		Tensile Test Orientation:	0	Tensile Test Temperature:	68
Joint Preparation:	Unknown		Voltage:		Amperage:
K_{Ic} AS CALCULATED FROM CTOD (TO BE DET'D):		Critical tearing modulus:		CTOD @ beginning of stable crack extension:	
CTOD @ beginning of unstable crack ext. (lower shelf):		CTOD @ beginning of unstable crack extension (transition region):		CTOD @ plastic collapse plateau (plastic hinge):	
CTOD @ onset of slow crack growth:	0.0006				

Defined Variable Names In Test Information Tables

- J-Integral

nsstji_30413

Test Information

Composition:	.219C-.34MN-.005S-.15SI-3.15NI-.27CR-.46MO-.041V	Weld Process:	0		
Product Width:		Percent Elongation:	28	Percent Reduction In Area:	69
Initial Crack Length:		Test Standard:	E813	Test Standard (Year):	
Final Crack Length:		Filler Type/Name:		Filler Size/Diameter:	
Total Side Groove Depth:	0.8	Heat Input:		Sort Temperature:	
Travel Speed:		Preheat Temperature:		Postheat Temperature:	0
Interpass Temperature:		Tensile Test Orientation:	0	Tensile Test Temperature:	
Joint Preparation:	Unknown	Voltage:		Amperage:	
K _{IC} as Calculated From CTOD (TO BE DET'D):		Critical Tearing Modulus:		J-Integral Fracture Toughness:	1599

Defined Variable Names In Test Information Tables

- Plane Strain Fracture Toughness (K1c)

General Specimen Reference Product Test and Data					
nsP3EA20AB01B03					
Test Information					
Composition:		Weld Process:		Product Width:	
Failure Stress:		Failure Toughness:	69.4	Percent Elongation:	
Filler Type/Name:		Filler Size/Diameter Cracking Threshold:		Percent Reduction In Area:	
Final Crack Length:		Initial Crack Length:	1	Notch Length:	0
Heat Input:		Interpass Temperature:		Crack Depth:	
Preheat Temperature:		Postheat Temperature:		Sort Temperature:	
Test Standard:		Test Standard (Year):		Travel Speed:	
Tensile Test Orientation:		Tensile Test Temperature:		Joint Preparation:	Unknown
Plane Stress:		Voltage:		Amperage:	
Validity Check for K_{Ic} Based on Min Thickness:					



Defined Variable Names In Test Information Tables

- Plane Strain Fracture Toughness (K_C)

nsE2FA10AA07A01					
Test Information					
Sort Temperature:		Initial Stress:		Weld Process:	0
Notch Length:		Maximum Stress:		Stress Corrosion Cracking Threshold:	
Initial Crack Length:	1.75	Failure Stress:	36	Crack Depth:	0
Final Crack Length:		Fracture Toughness:	89	Buckling Restraint:	Unknown
K Apparent (stress intensity):		K _C (Plane stress):		Sort Temperature:	
Check on Validiy of KAPP Criteria:	Unknown	Check on Validiy of K _C Criteria:	Unknown	SW Sort:	

Defined Headers in Data table For R-Curve (JR) Property

General Specimen Reference Product **Test and Data** Plot

nsstjr_80143

Test Information					
Composition:	.24K-1.08MN-.012M-.013N-.21SI-.008NI-.01CR-.002MO-.009CU-.047AL-.002SN	Weld Process:	0	Product Width:	
Percent Elongation:	33	Percent Reduction In Area:	68	Crack Measure Technique:	Unknown
Filler Type/Name:		Filler Size/Diameter:		Crack Measure Accuracy:	
Heat Input:		Total Side Groove Depth:	0	Restraint:	Unknown
Preheat Temperature:		Postheat Temperature:		Interpass Temperature:	
Test Standard:		Test Standard (Year):		Travel Speed:	
Tensile Test Orientation:	0	Tensile Test Temperature:	550.4	Joint Preparation:	Unknown
Voltage:		Amperage:		Maximum Value of J_R :	

Applied Load	As-Measured Specimen Displacement	Corrected Specimen Displacement	Calculated Value of J_R	Actual Delta a	Effective Delta a
0	0	0	0		0

Defined Headers in Data table For R-Curve (KR) Property

nsalkr_70016

Test Information													
Composition:		Weld Process:	0	Product Width:									
Percent Elongation:		Percent Reduction In Area:		Crack Measure Technique:	Compliance Method								
Filler Type/Name:	0	Filler Size/Diameter:		Crack Measure Accuracy:									
Heat Input:		Restraint:	Unknown	Oblique Fracture:	80								
Preheat Temperature:		Postheat Temperature:		Interpass Temperature:									
Test Standard:	E561	Test Standard (Year):		Travel Speed:									
Tensile Test Orientation:	0	Tensile Test Temperature:		Joint Preparation:	Unknown								
Voltage:		Amperage:		K _c Plane stress:	57.94								
Method Plastic Zone:	$0.5 \cdot \pi \cdot (\text{ABS}(K(I)/TYS))^{**2}$	Walloy:		%Oblique Fracture:									
MTD_K_CA:		GRF_TYPE:											

Maximum Load	Measured Crack Length-Front 1	Measured Crack Length-Back 1	Measured Crack Length-Front 2	Measured Crack Length-Back 2	Plastic Zone Size Adjustment-Front	Plastic Zone Size Adjustment-Back	Effective Crack Length-Front	Effective Crack Length-Back	Delta Effective Crack Length	Effective Stress Intensity Factor-Front	Effective Stress Intensity Factor-Back	Average Measured Crack Length-Front	Average Measured Crack Length-Back	Wal

New Column added to The Data Table for Fatigue Life (a vs N)

- Fatigue Life property now shows Max Load values in the data table

[AF Mat](#) > [Test Profile](#) > View Test Profile

Test Profile

Materials

- ALLOY STEELS
- Aluminum
- BERYLLIUM/BERYLLIUM ALLOYS
- BRASS
- BRONZE
- COPPER/COPPER ALLOYS
- IRON ALLOYS
- MANGNESIUM ALLOYS
- MOLYBDENUM/MOLYBDENUM ALLOYS
- NICKEL BASED SUPER ALLOYS
- NIOBIUM/NIOBIUM ALLOYS
- SOLDERS
- STAINLESS STEELS

General Specimen Reference Product Test and Data Plot

ttan_932

Test Information			
Frequency (Low):	0	Frequency (High):	10
Notch Length:	0	Stress Ratio:	0.1
Crack Measure Technique:	Visual		
Product Width:	130		
Wave Form:	Sinusoidal		

Data Code	Cycles	Crack Tip 1 Front Side	Crack Tip 2 Front Side	Crack Tip 1 Back Side	Crack Tip 2 Back Side	Normalized Compliance	Crack Closure Load	kMax	Max Load	Min Load	Wal
T	150000	0	0.025	0	0			0	0.28		
T	174940	0	0.05	0	0			0	0.28		
T	226120	0	0.075	0	0			0	0.28		
T	228270	0	0.1	0	0			0	0.28		
T	246240	0	0.125	0	0			0	0.28		

Improved Sort For Headers In Test Profile

- Users can click a header in the test profile to sort each column by ascending or descending order

Test Profile

AND + + x

Property Type EqualTo Plane Stress Fracture Toughness (KC) x

Apply

	Id	Alloy	Data Source	Condition Heat Treatment	Property Type	Orientation	Specimen Type	Specimen Thickness	Product Form	Environment	Temperature
ALLOY STEELS											
Aluminum											
BERYLLIUM/BERYLLIUM ALLOYS	20125	18NI(MAR 200)	Additional NASA Data	VIM	Plane Stress Fracture Toughness (KC)	T-L	Part Through Surface Crack (PTSC) (Max Load Specified)	0.36	Plate	Unknown	75
BRONZE	20108	S-200	Additional NASA Data	VHP	Plane Stress Fracture Toughness (KC)	L-T	Compact Tension (CT)	2	Plate(1973)	Unknown	500
COPPER/COPPER ALLOYS	20107	S-200F	Additional NASA Data	VHP	Plane Stress Fracture Toughness (KC)	T-L	Compact Tension (CT)	0.248		Unknown	75
MANGNESIUM ALLOYS	19913	300M	Additional NASA Data	UNK	Plane Stress Fracture Toughness (KC)	L-T	Middle Tension (MT)	0.25	Plate	Unknown	75
NICKEL BASED SUPER ALLOYS	19912	300M	Additional NASA Data	UNK	Plane Stress Fracture Toughness (KC)	L-T	Middle Tension (MT)	0.37	Forging	Unknown	75
NIOBIUM/NIOBIUM ALLOYS	19911	300M	Additional NASA Data	UNK	Plane Stress Fracture Toughness (KC)	T-L	Middle Tension Stiffened (MTS)	0.081	Forging	Unknown	75
STAINLESS STEELS	19910	300M	Additional NASA Data	UNK	Plane Stress Fracture Toughness (KC)	L-T	Middle Tension Stiffened (MTS)	0.079	Forging	Unknown	75
TITANIUM ALLOYS	19909	300M	Additional NASA Data	UNK	Plane Stress Fracture Toughness (KC)	L-T	Middle Tension Stiffened (MTS)	0.077	Forging	Unknown	75
	19908	300M	Additional NASA Data	UNK	Plane Stress Fracture Toughness (KC)	L-T	Compact Tension (CT)	0.887	Plate	Unknown	75
	19907	300M	Additional NASA Data	UNK	Plane Stress Fracture Toughness (KC)	L-T	Double Edge Tension (DET)	1	Plate	Unknown	75
	19906	300M	Additional NASA Data	UNK	Plane Stress Fracture Toughness (KC)	L-T	Double Edge Tension (DET)	1	Plate	Unknown	75
	19905	300M	Additional NASA Data	UNK	Plane Stress Fracture Toughness (KC)	L-T	Double Edge Tension (DET)	0.5	Plate	Unknown	75

AFMAT Integration with AFGROW : Goals

- Make tabular lookup material data from AFMAT to be easily available in AFGROW
- Have an option to export test data in the format that is understood by AFGROW
- Be compliant with the latest Air Force and industry security regulations for a software that accesses the data on the cloud
- Reuse existent functionality that is available in AFGROW and familiar to AFGROW users

AFMAT Integration with AFGROW: Possible Options

Option 1

- AFGROW directly connects to AFMAT
- User require to provide id and password
- Always the latest set of the material data available
- System administrator can turn on and off the connectivity vie configuration file

Option 2

- Develop a separate application that will be responsible for synchronization of the local or network folder with AFMAT. The folder can be accessed by one or more users at the same company or location.
- User require to provide id and password during synchronization only.
- AFGROW can use a “Network access to material data” functionality to open the files

Questions