Using The New Tabular Crack Growth Rate Data Library

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Background

- Initially assigned to create curve fits for twelve materials
- We now have 40 materials available for release

Data Available

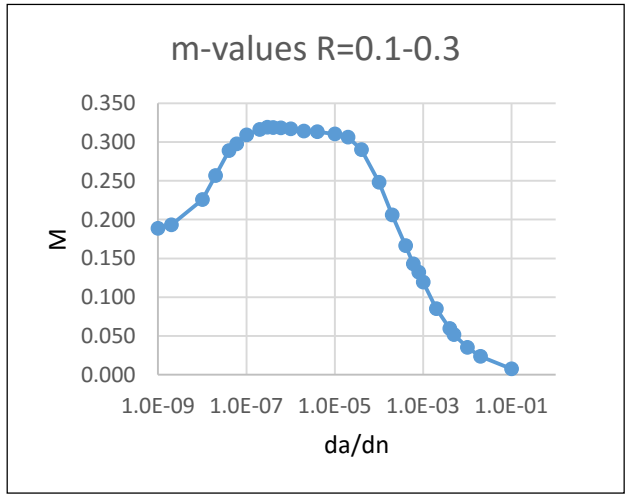
2000 Series	7000 Series	Steel
2024-T3 L-T LAB AIR SHEET	7010-T73651 L-T LAB AIR PLATE	15-5PH H1025
2024-T351 L-T LAB AIR PLATE	7050-T74 L-T LAB AIR FORGING	17-4PH H1025 LAB AIR T-L ROUND BAR
2024-T3511 L-T LAB AIR EXTRUTION	7050-T7451 L-T HHA	300M
2024-T42 L-T LAB AIR PLATE	7050-T73511 L-T HHA EXTRUSION	316L (800)
2024-T851 L-T LAB AIR PLATE	7050-T73651 L-T LAB AIR Plate	4340
2124-T851 L-T LAB AIR PLATE	7050-T74511 L-T LA EXTRUSION	IN100
2219-T87 T-L LAB AIR PLATE	7050-T76511 L-T LAB AIR EXTRUSION	PH13-8Mo-H1000
2324-T39 L-T LA & HHA	7050-T76511 L-T STW	PH13-8Mo-H1050
	7075-T76 L-T LHA SHEET	WASPALOY
	7075-T651 L-T LAB AIR	
	7075-T7351 L-T LAB AIR PLATE	
	7075-T73511 L-T LAB AIR EXTRUSION	
	7075-T6 L-T LAB AIR SHEET	
	7075-T7651 L-T LHA PLATE	
	7075-T76511 L-T LHA EXTRUSION	
	7150-T7751 LAB AIR PLATE	
	7150-T77511 LAB AIR EXTRUSION	
	7175-T736 L-T HHA FORGING	
	7175-T74 L-T LAB AIR FORGING	
	7178-T6 L-T LAB AIR SHEET	
	7475-T761 L-T LAB AIR	
	7475-T7351 L-T HA PLATE	
	7475-T7651 L-T LAB AIR SHEET	

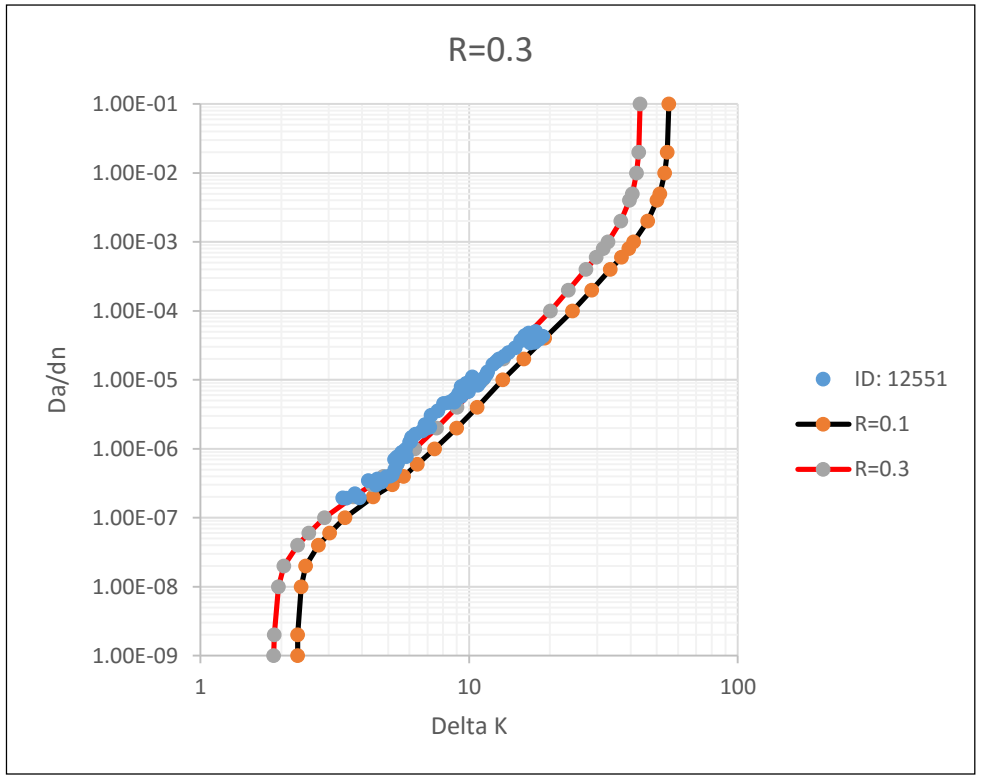
Data Release

- The new tabular crack growth rate data will be released in two formats, PDF and Tabular look-up
- The PDF format will consist of m-plots and comparison plots of the material data and curve fits
- The look-up files will contain the curve fits and material properties

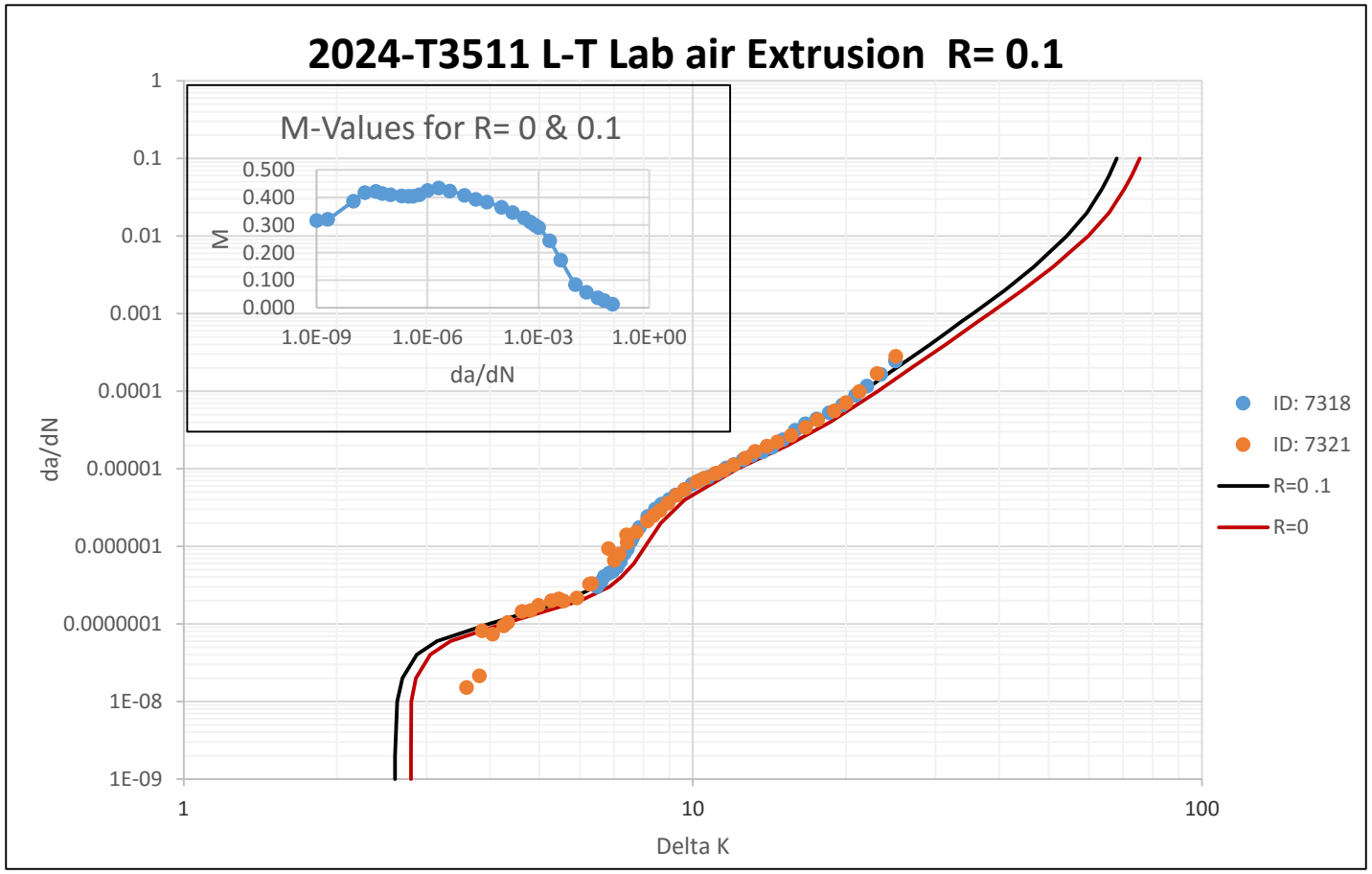
Sample Curve Fit Documentation

- The user can:
  - View how the data compares to the fit
  - View the amount of data available
  - View m-plots



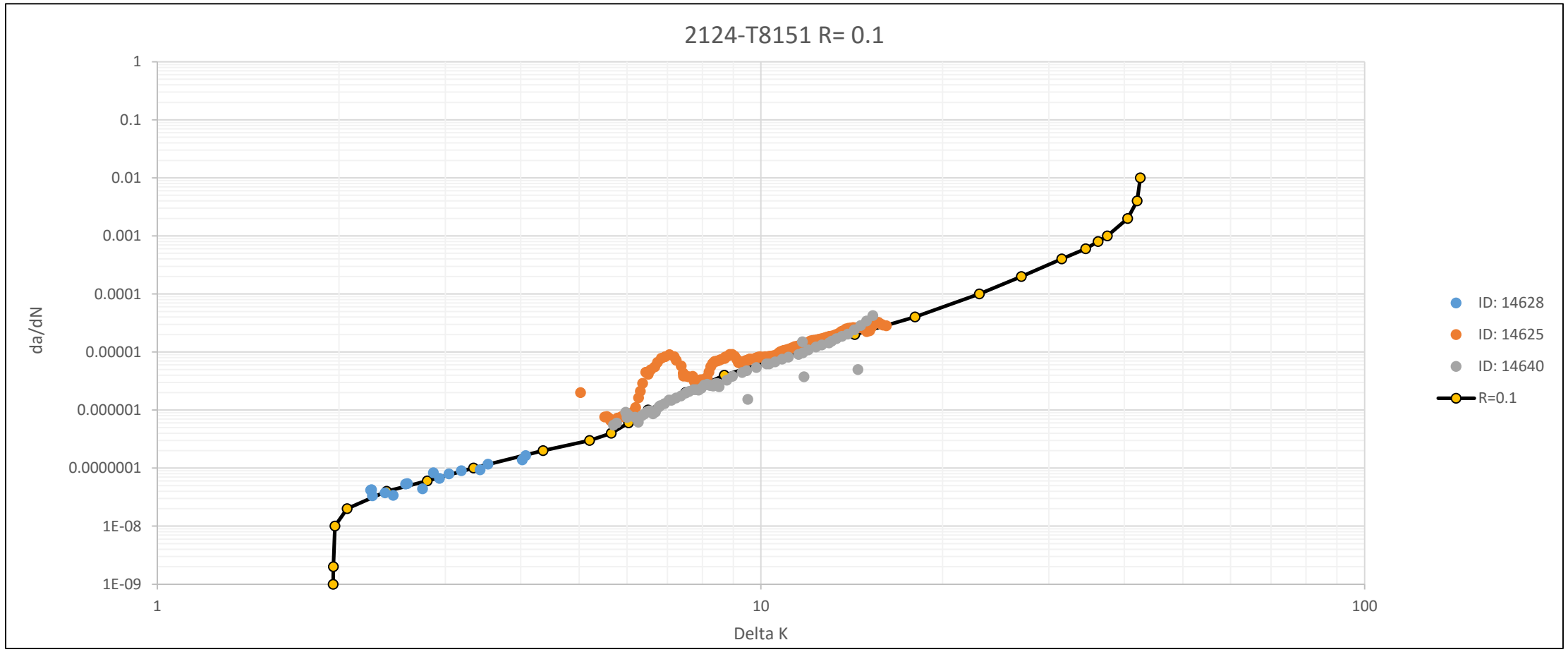


Sample Curve Fit Documentation

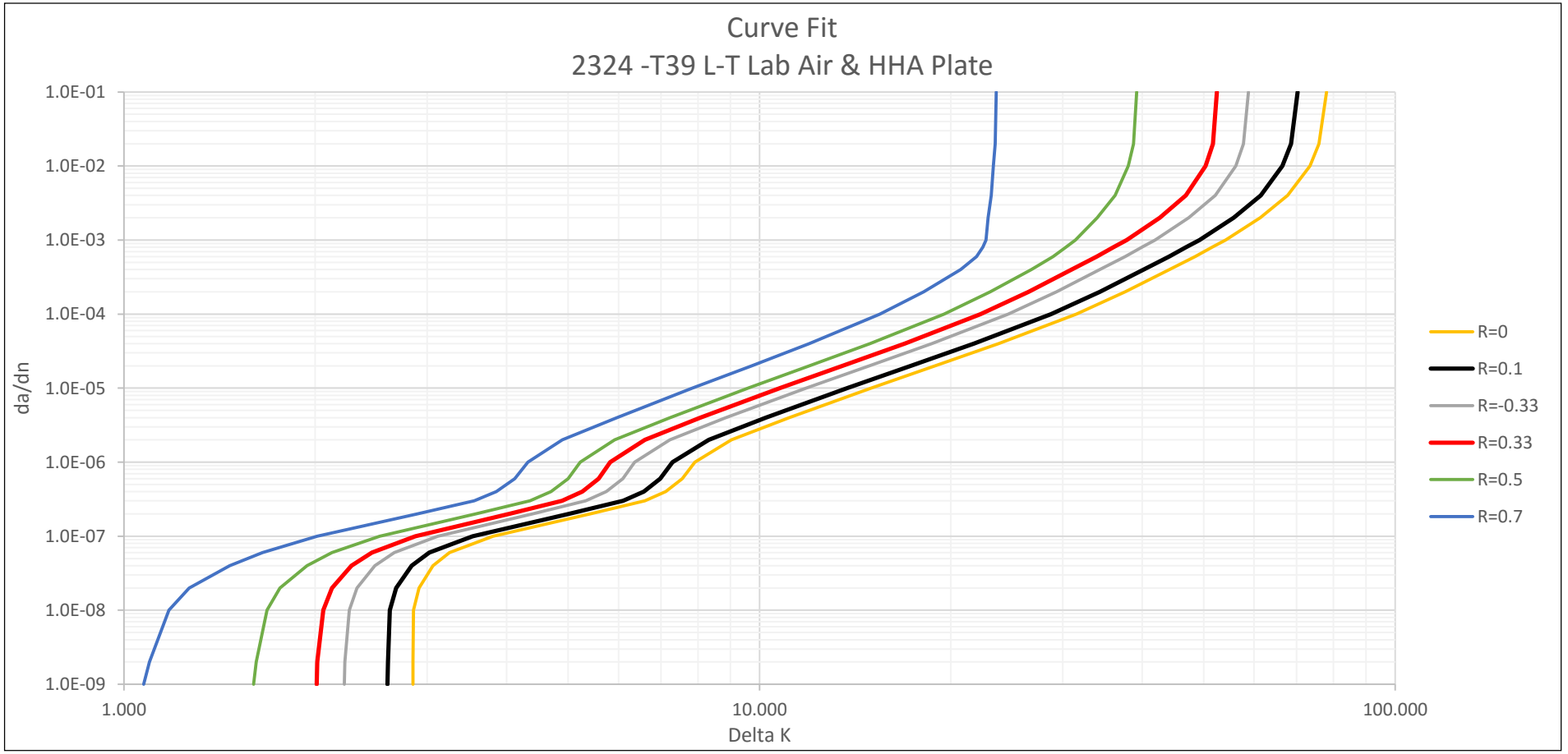


- Individual plots for each stress ratio available for the material
- M plots and neighboring R curve will also be plotted with the data

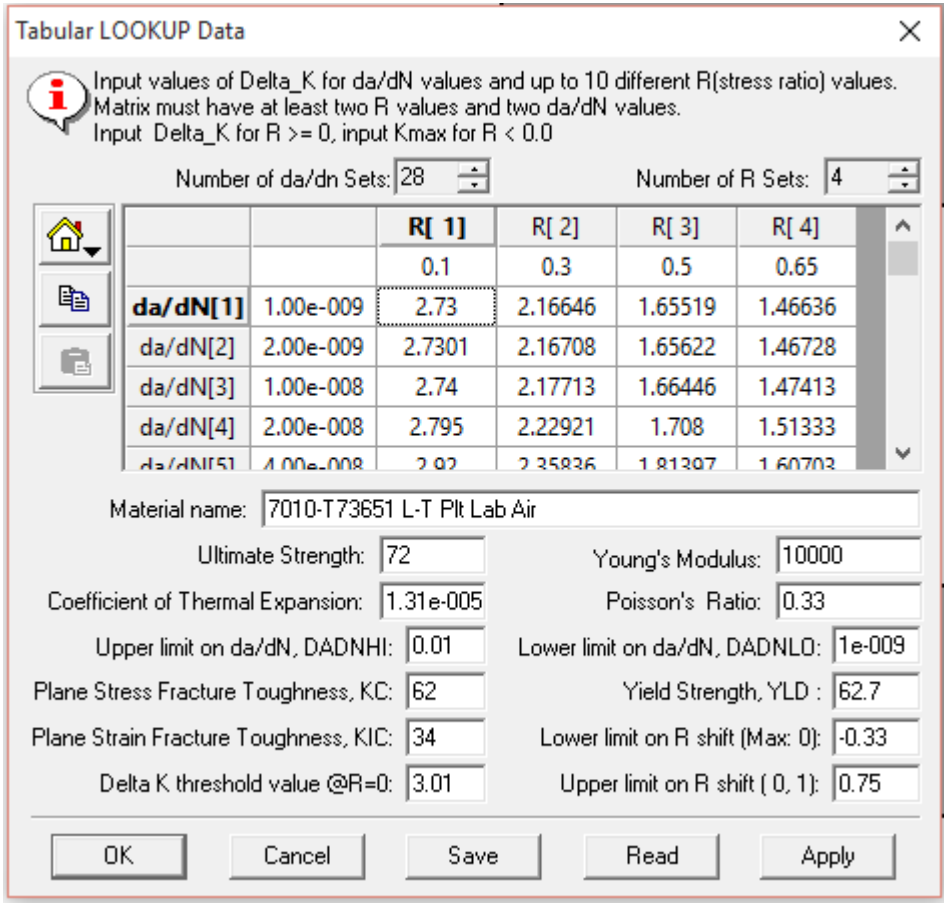
Sample Curve Fit Documentation



Sample Curve Fit Documentation

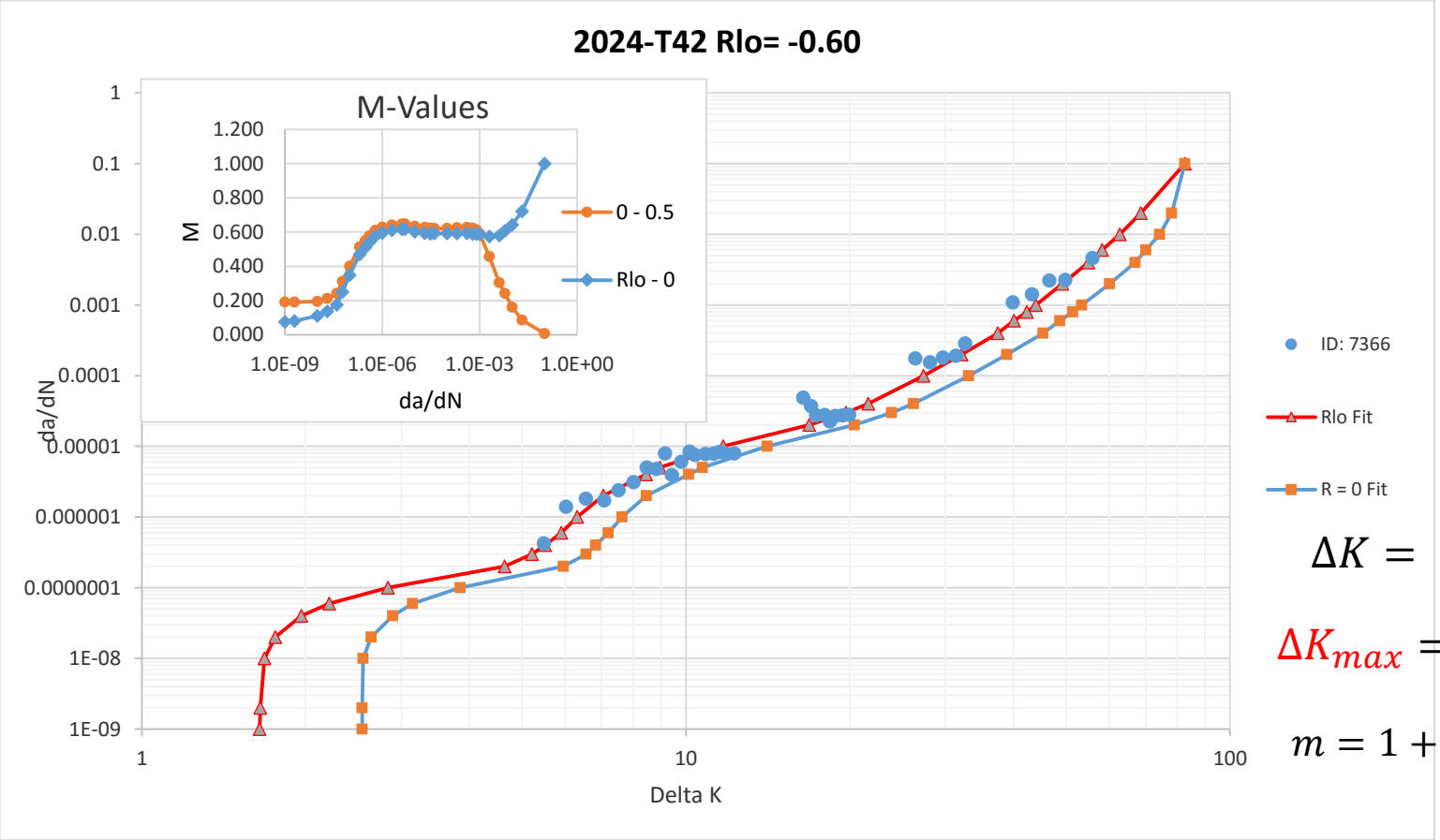


Tabular Look-up



- All files have material properties specific to the material.
- To load curve fits, select the read button in the bottom of the look-up dialog and choose the file's location.

Curve Fits Explained



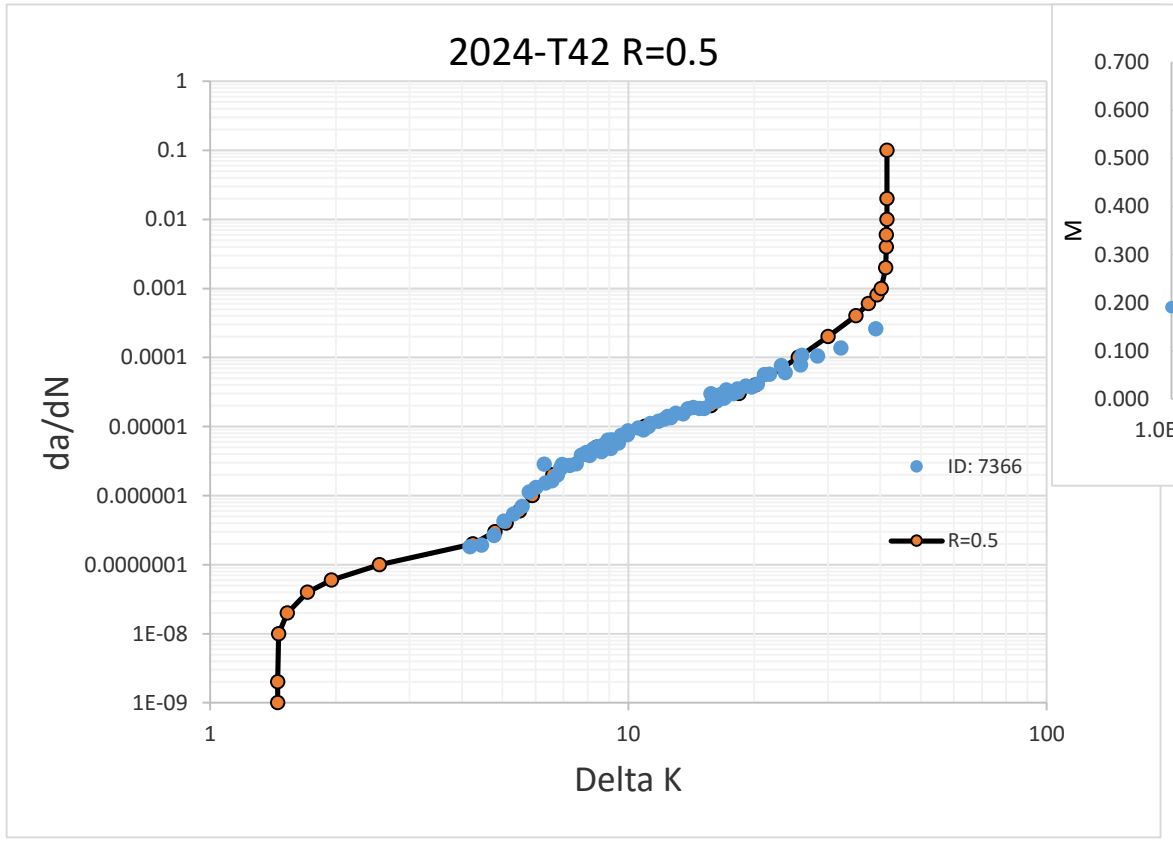
- 2024-T42 had data for R=-1 in AFMAT database
- Determined that Rlo stopped shifting at R=-0.6
- Since negative R curves are plotted with Kmax we made Rlo fail at Kmax at R=0

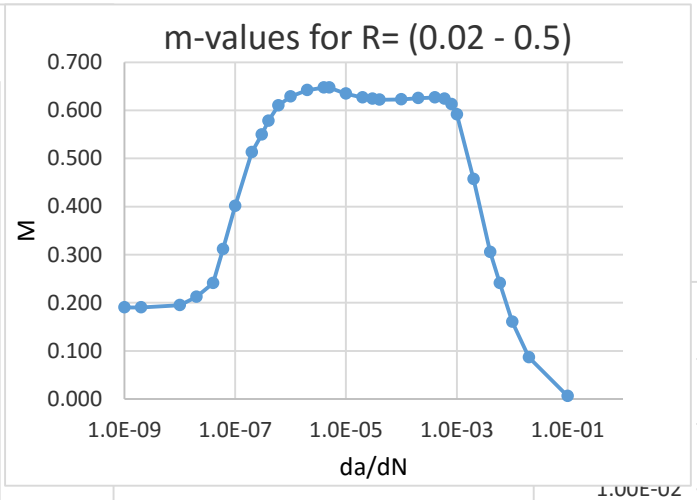
$$\Delta K = \Delta K_{R=0}(1-R)^{(1-m)}; for\ R \geq 0$$

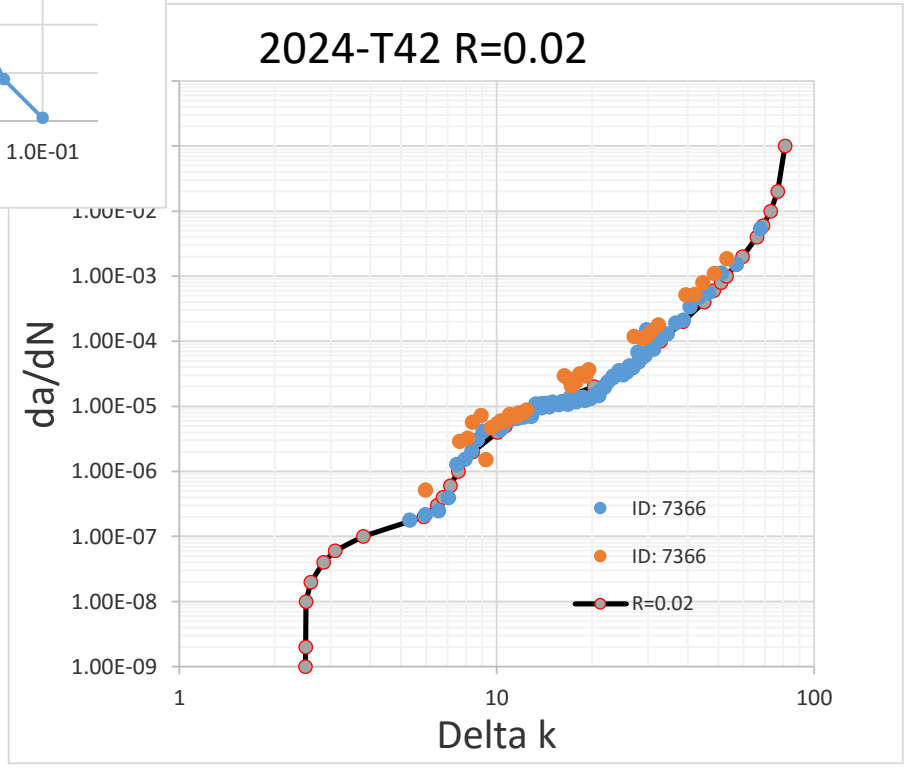
$$\Delta K_{max} = \Delta K_{R=0}(1-R)^{(m-1)}; for\ R < 0$$

$$m = 1 + \left[Log_{10}\left(\frac{K_{max}}{\Delta K}\right) / Log_{10}\left((1-R_1)(1-R_2)\right) \right]$$

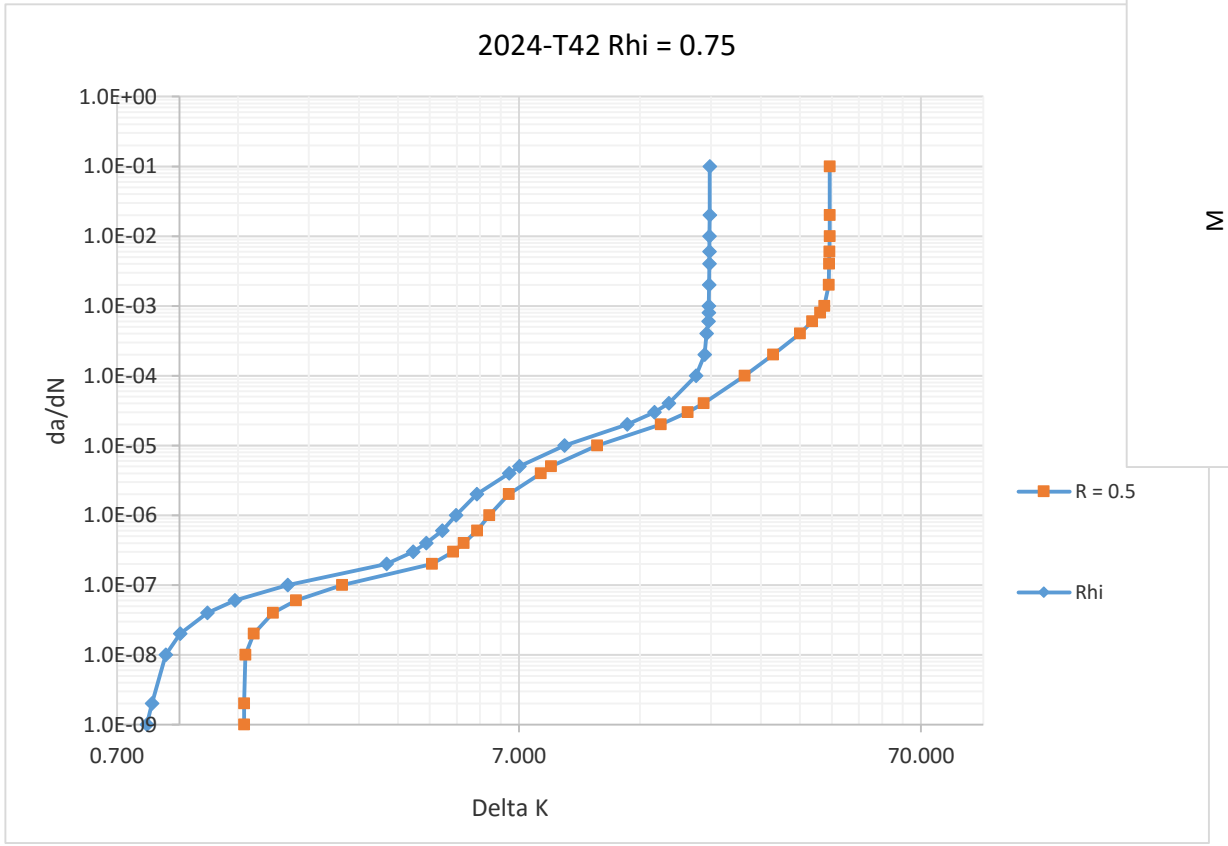
2024-T42 L-T Lab air Plate

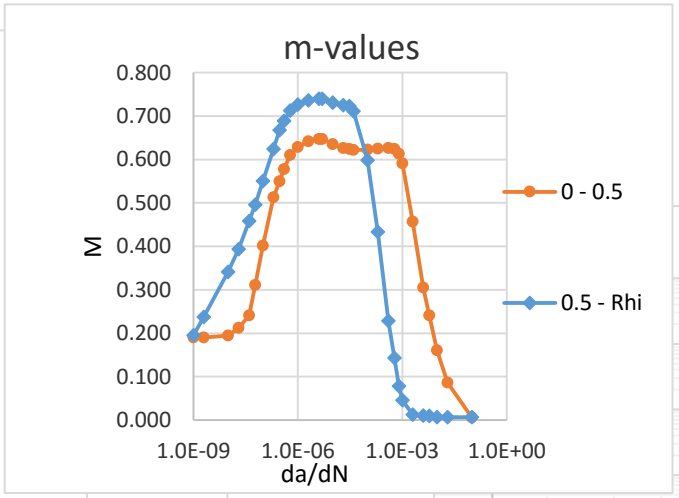


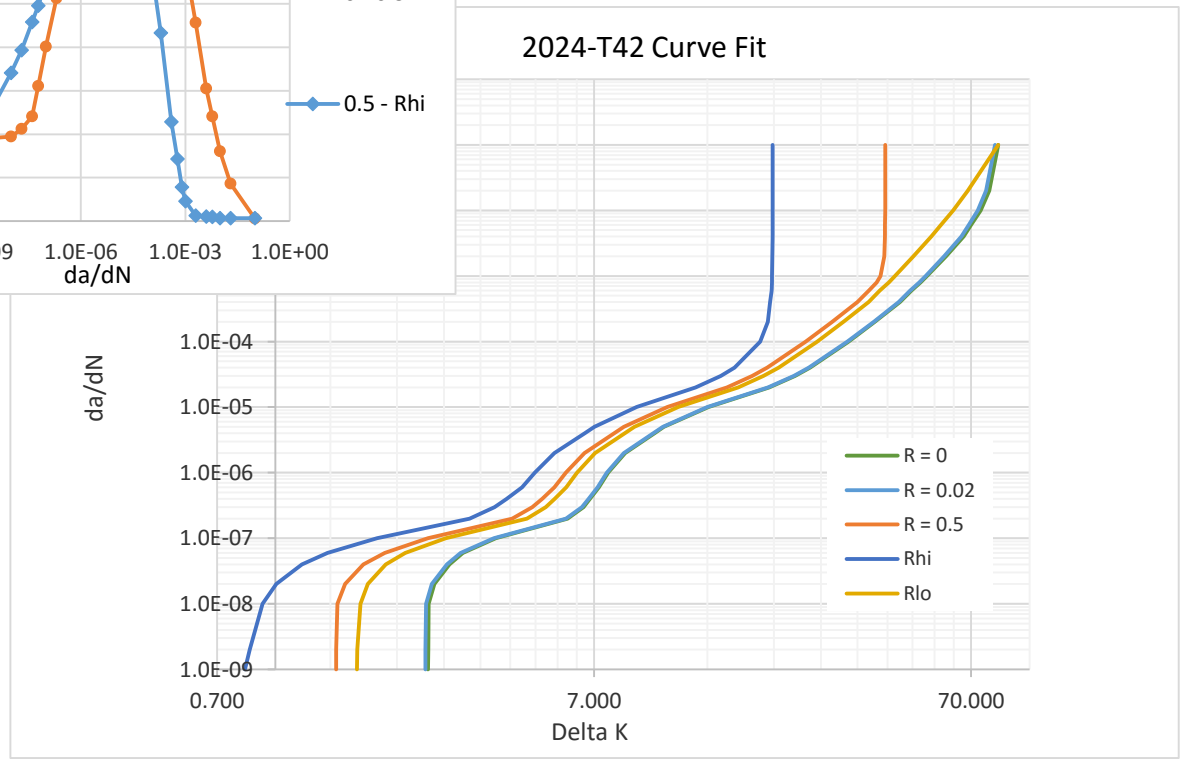




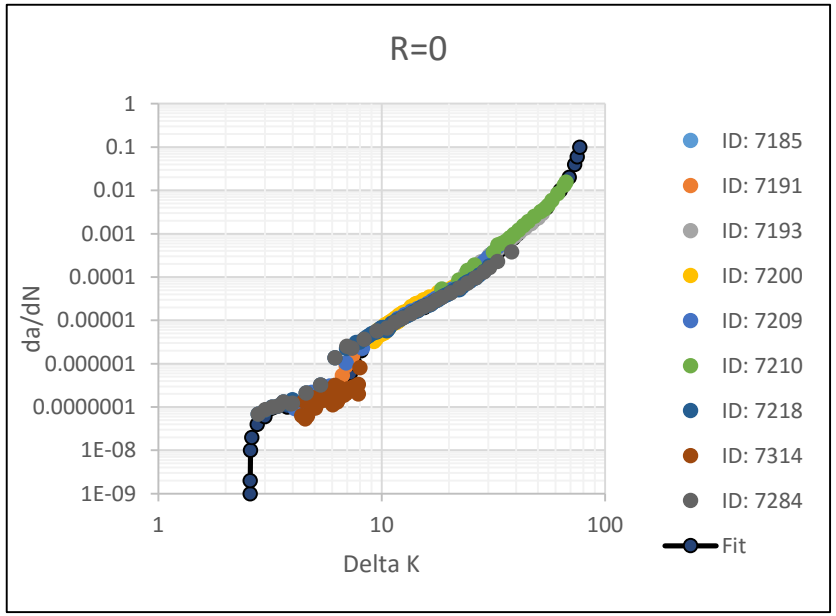
2024-T42 L-T Lab air Plate

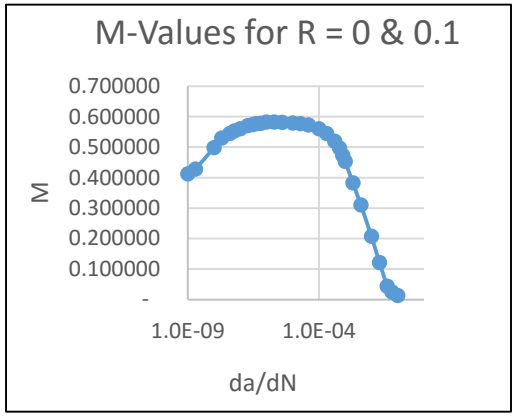


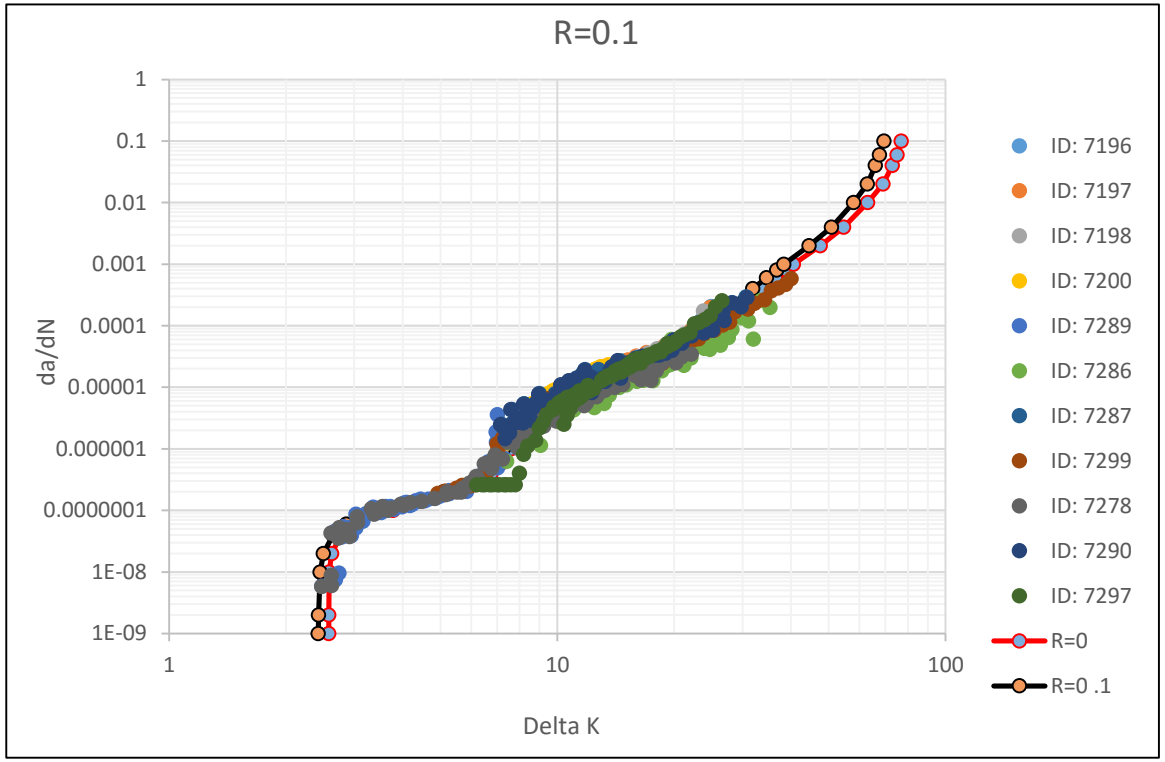


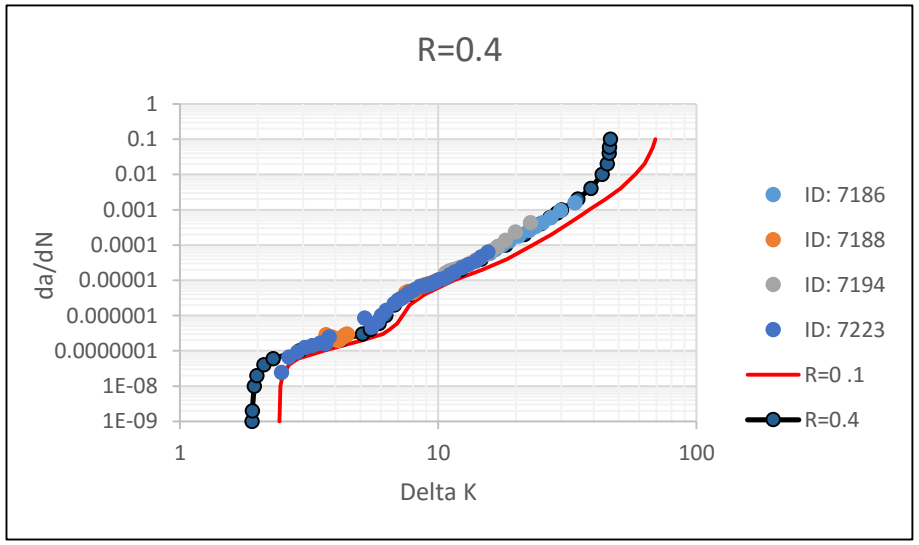


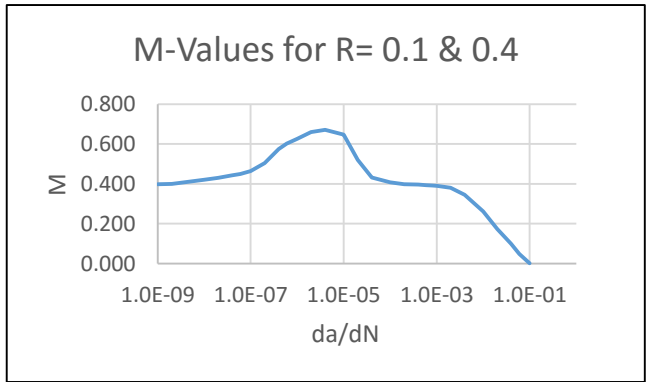
2024- T351 L-T Plate



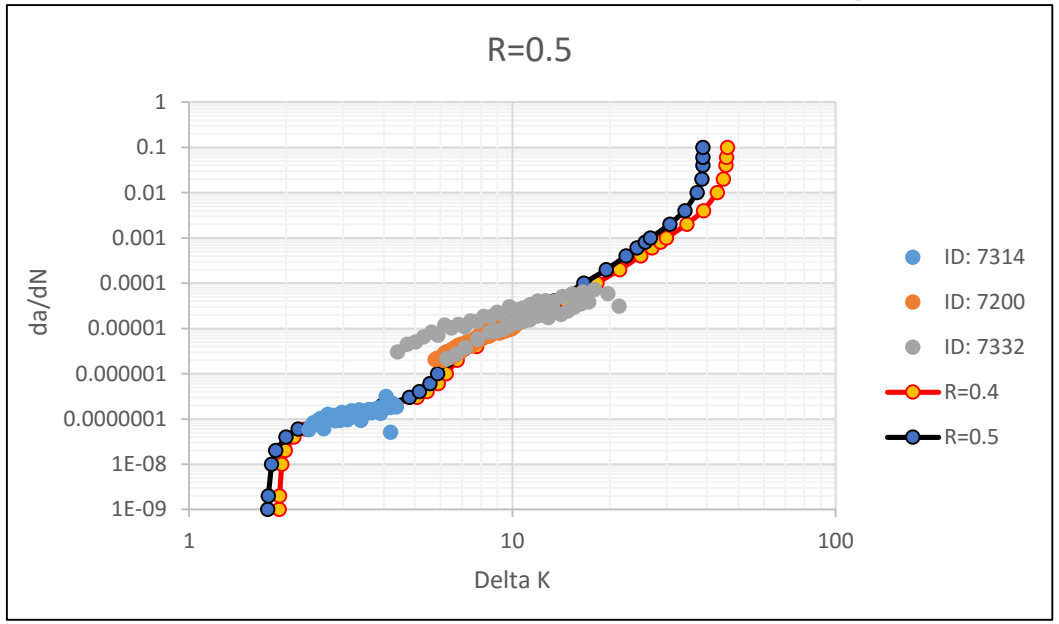


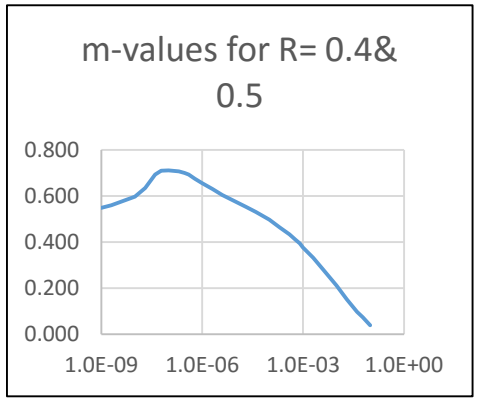


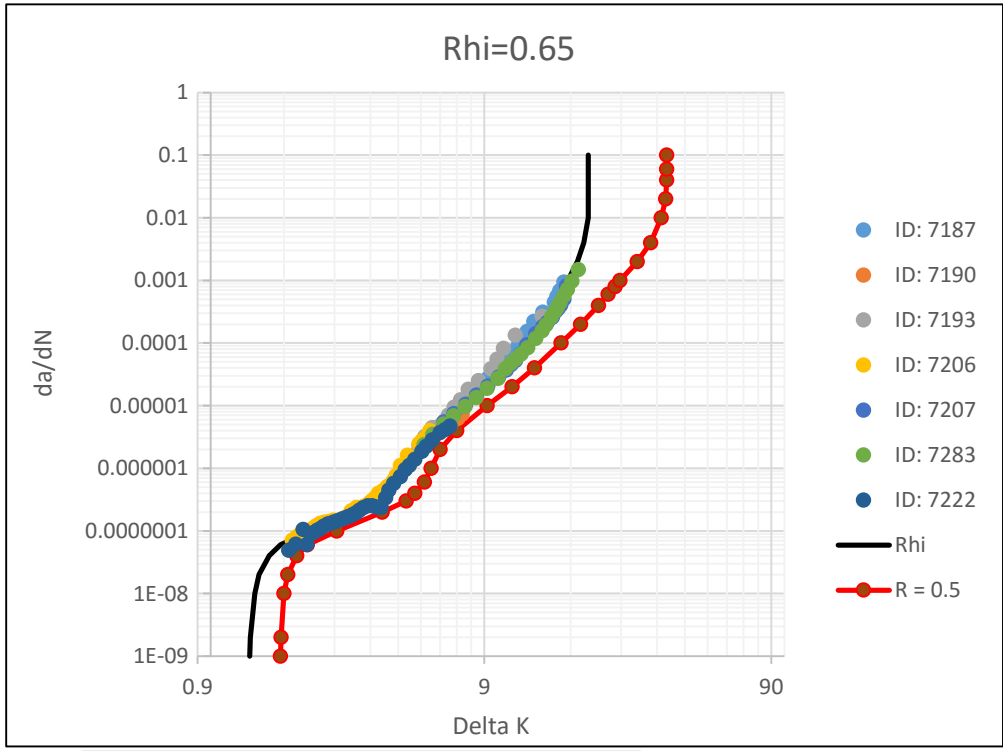


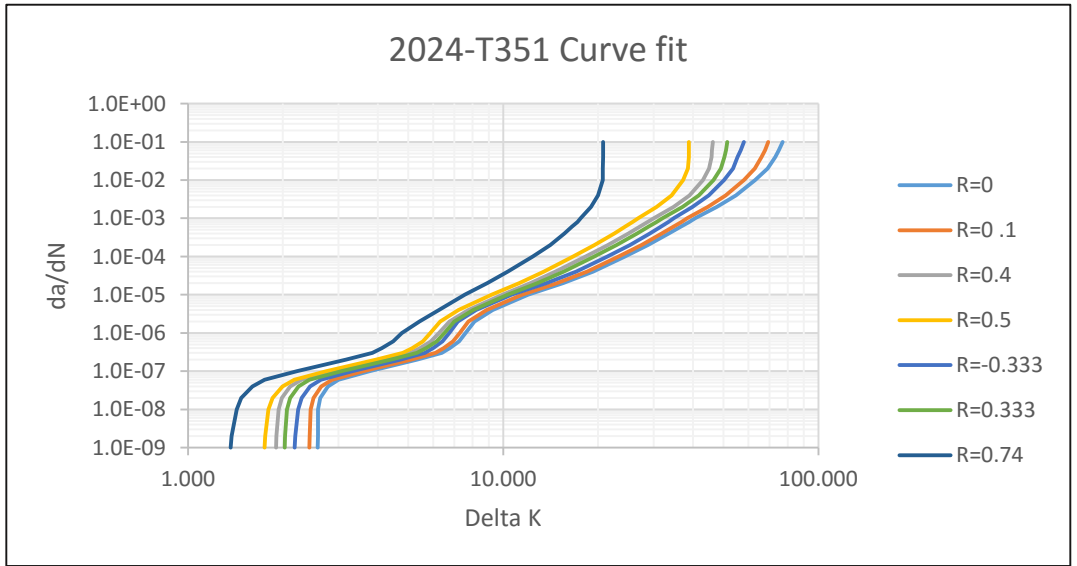


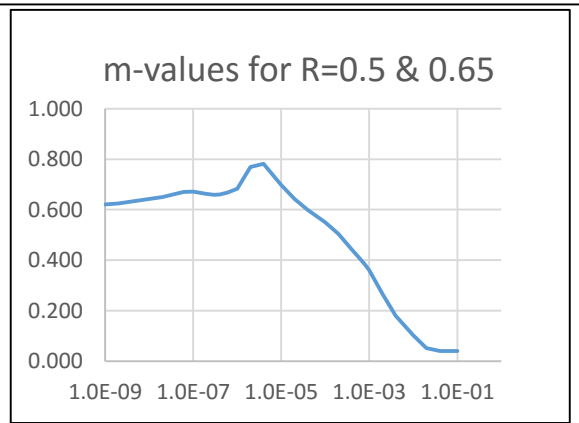
2024- T351 L-T Plate











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Questions/Comments?