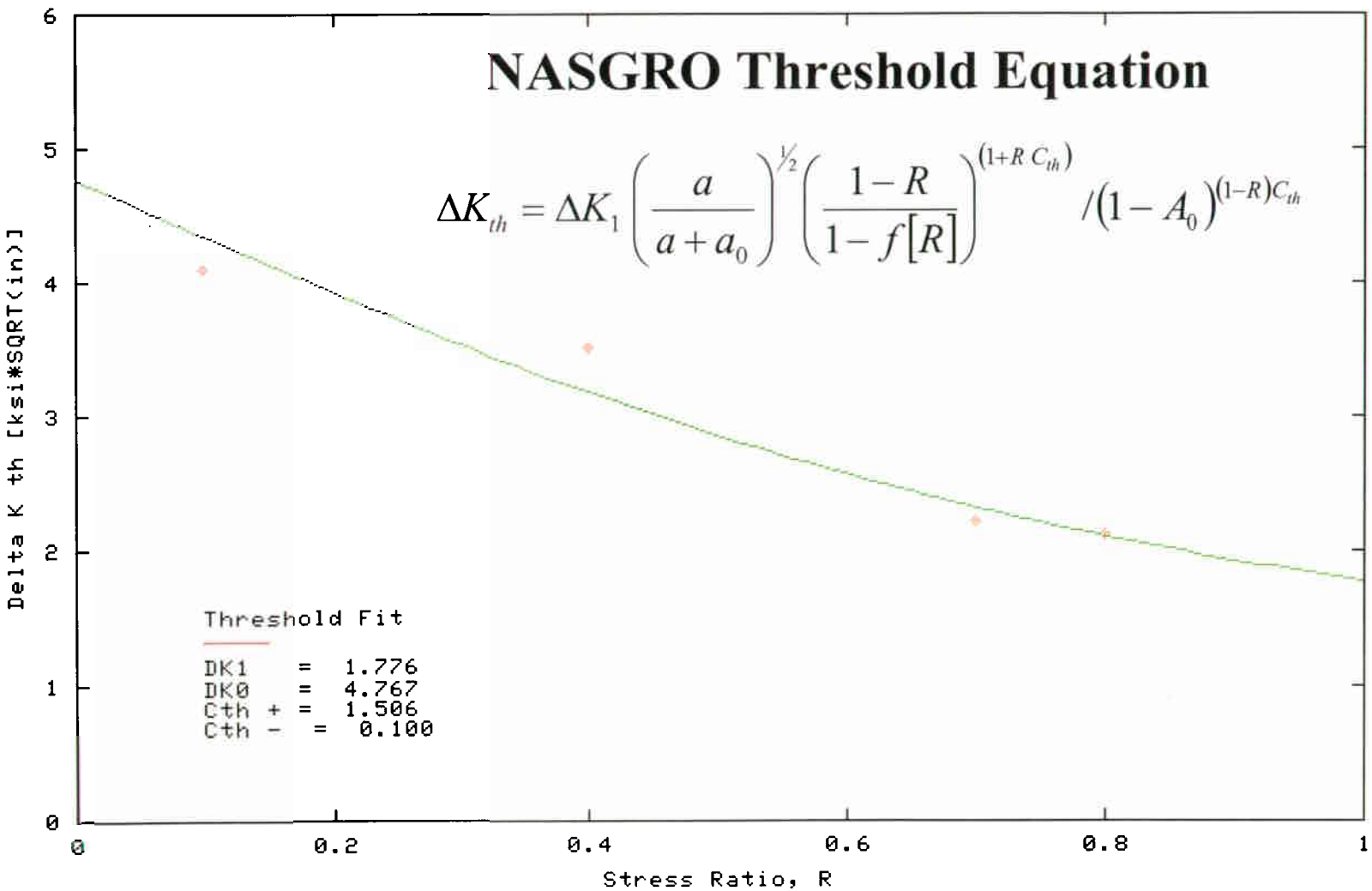
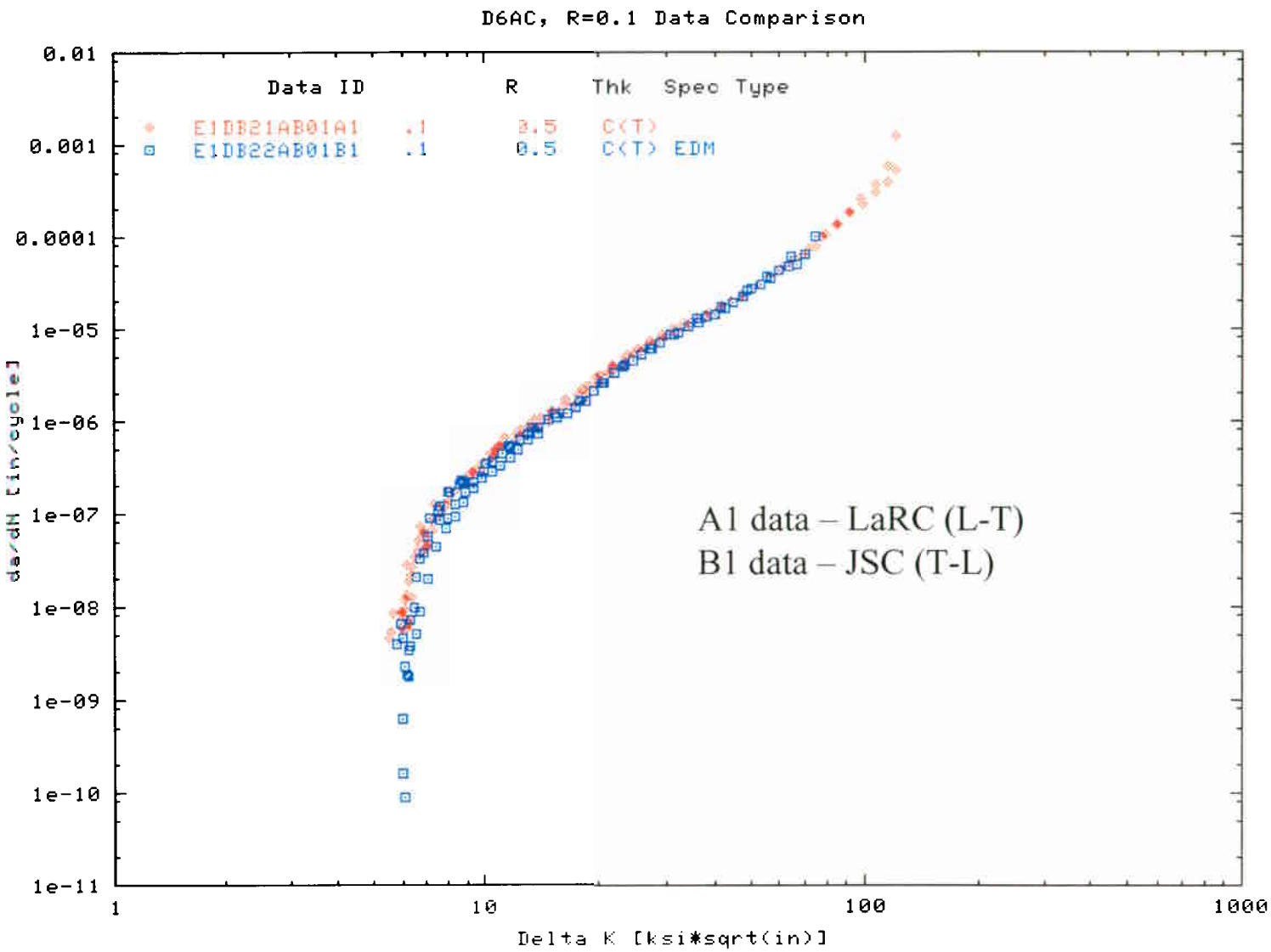
Review of Test Results

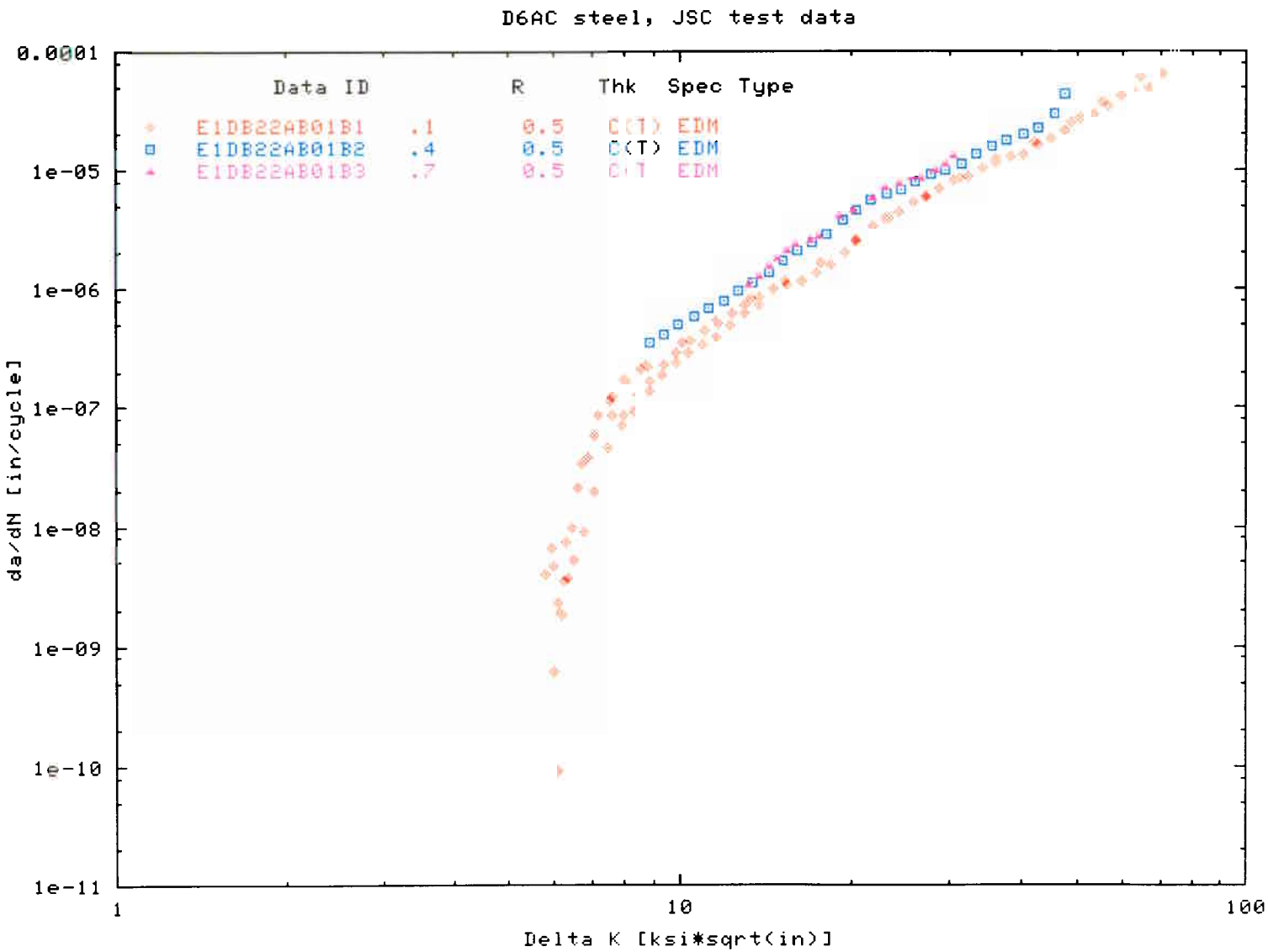
Effects of Notch Sharpness & Specimen Type on da/dN Results



Effects of Notch Sharpness & Specimen Type on da/dN



Effects of Notch Sharpness & Specimen Type on da/dN Results

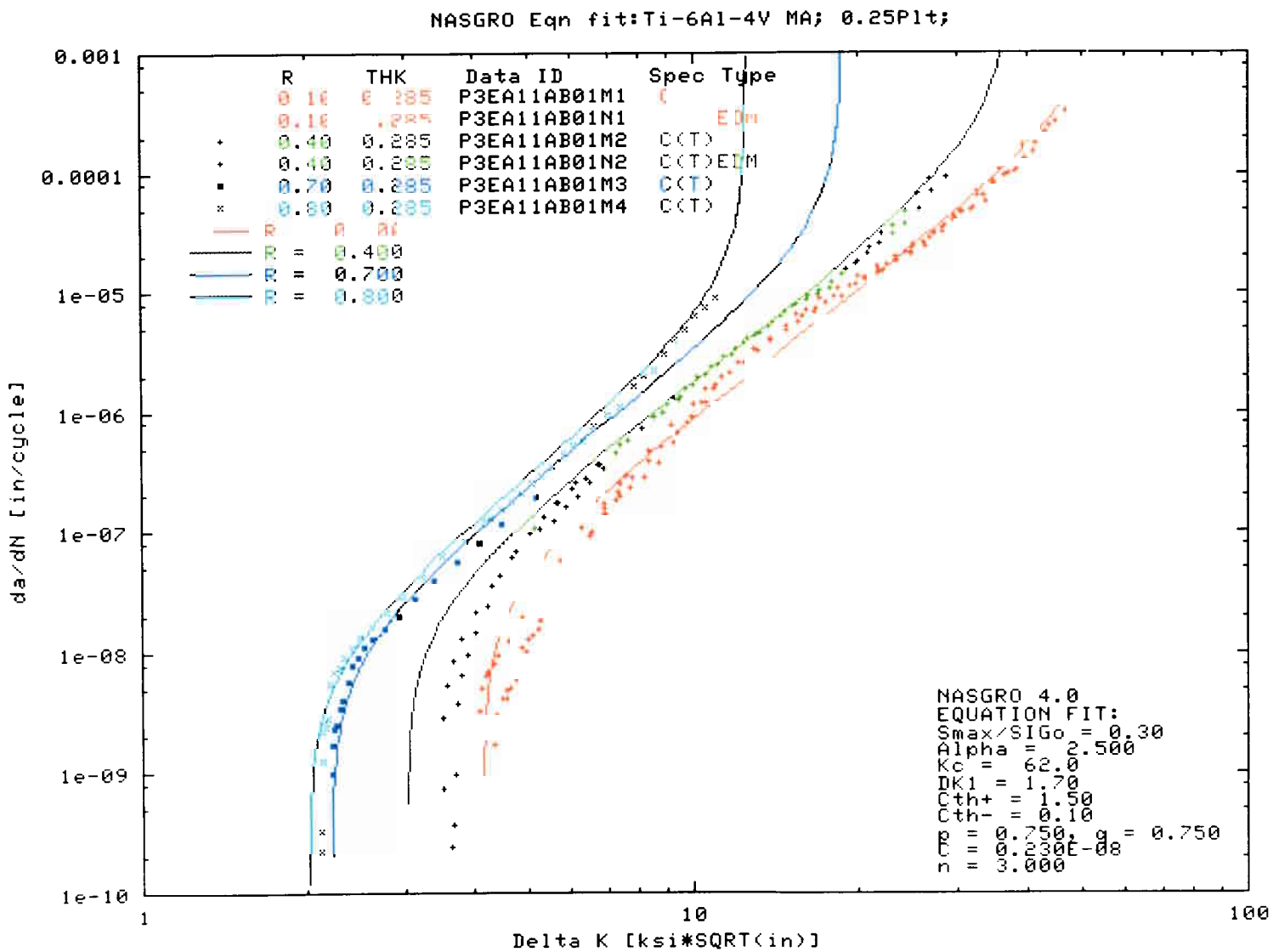


Effects of Notch Sharpness & Specimen Type on da/dN Results

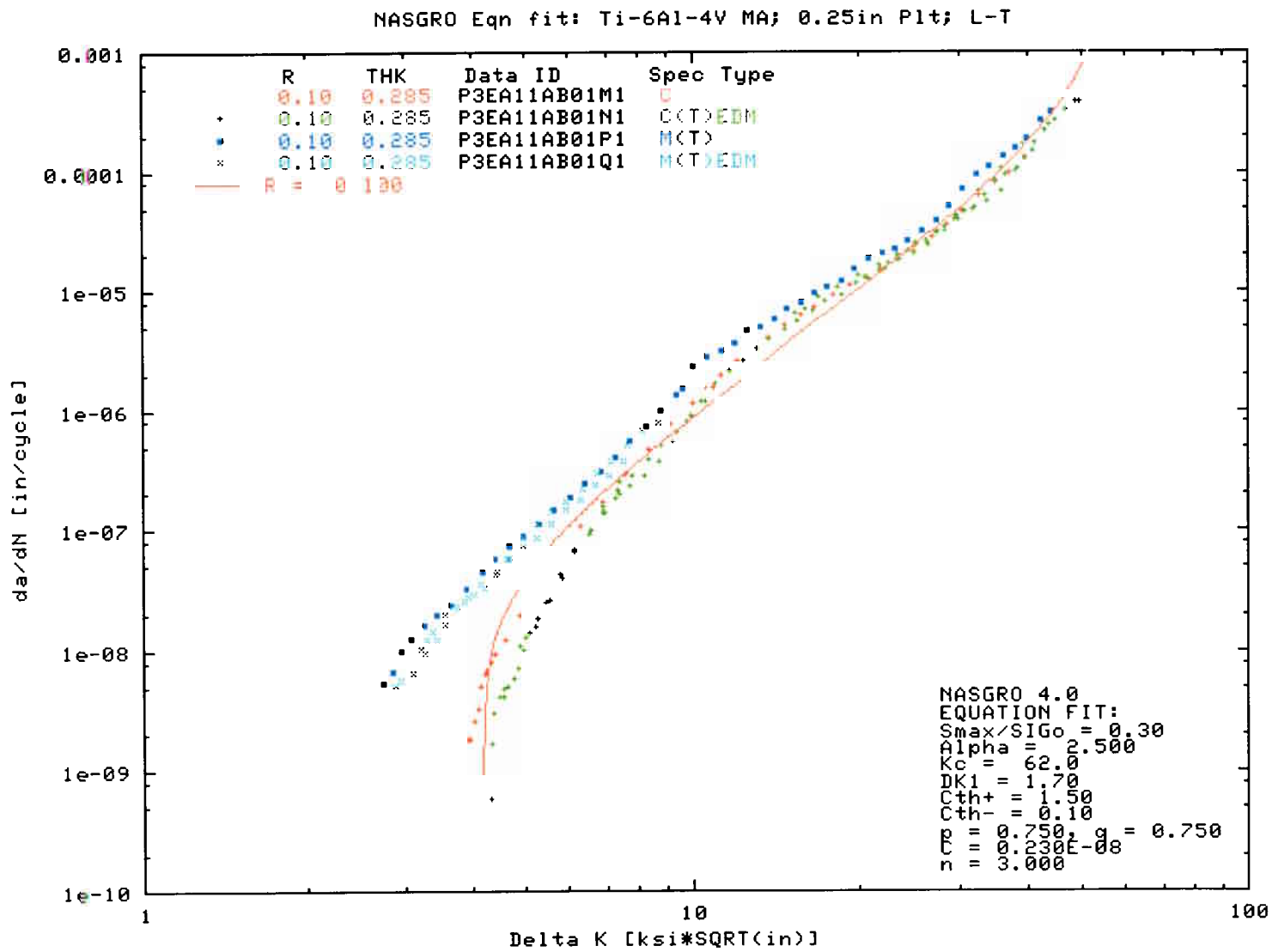
Pre-cracking of First D6AC Specimens –
R = 0.1 Loading, EDM Extended Notch (0.30 inches)

- **First Pre-crack Loading:** ΔK = 6.63 – No growth in 10 million cycles
- **Second Pre-crack loading:** ΔK = 9.14 – Cracked 0.05" in less than 1 million cycles
- **Final** ΔK_{th} = 5.77

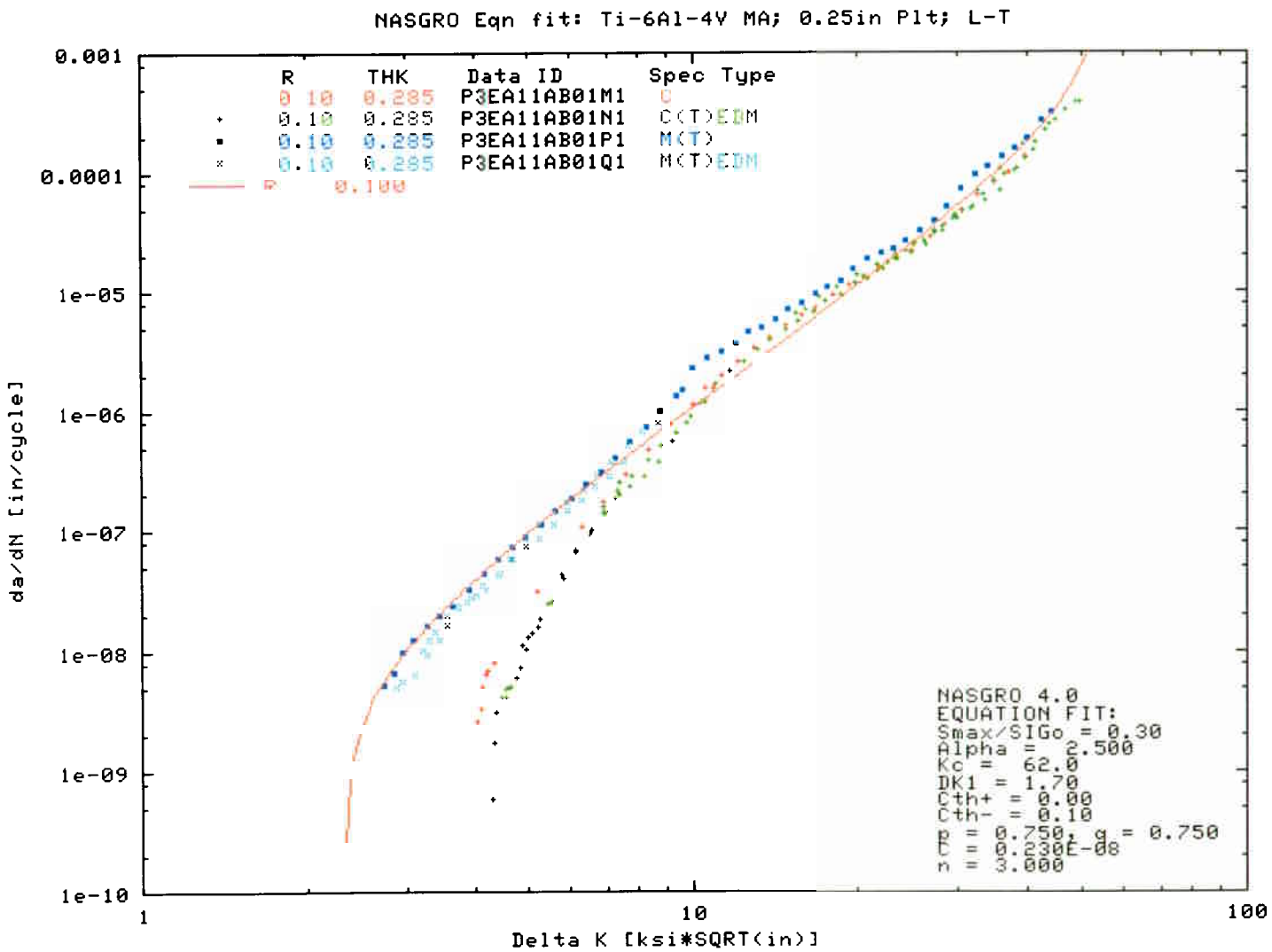
Effects of Notch Sharpness & Specimen Type on da/dN Results



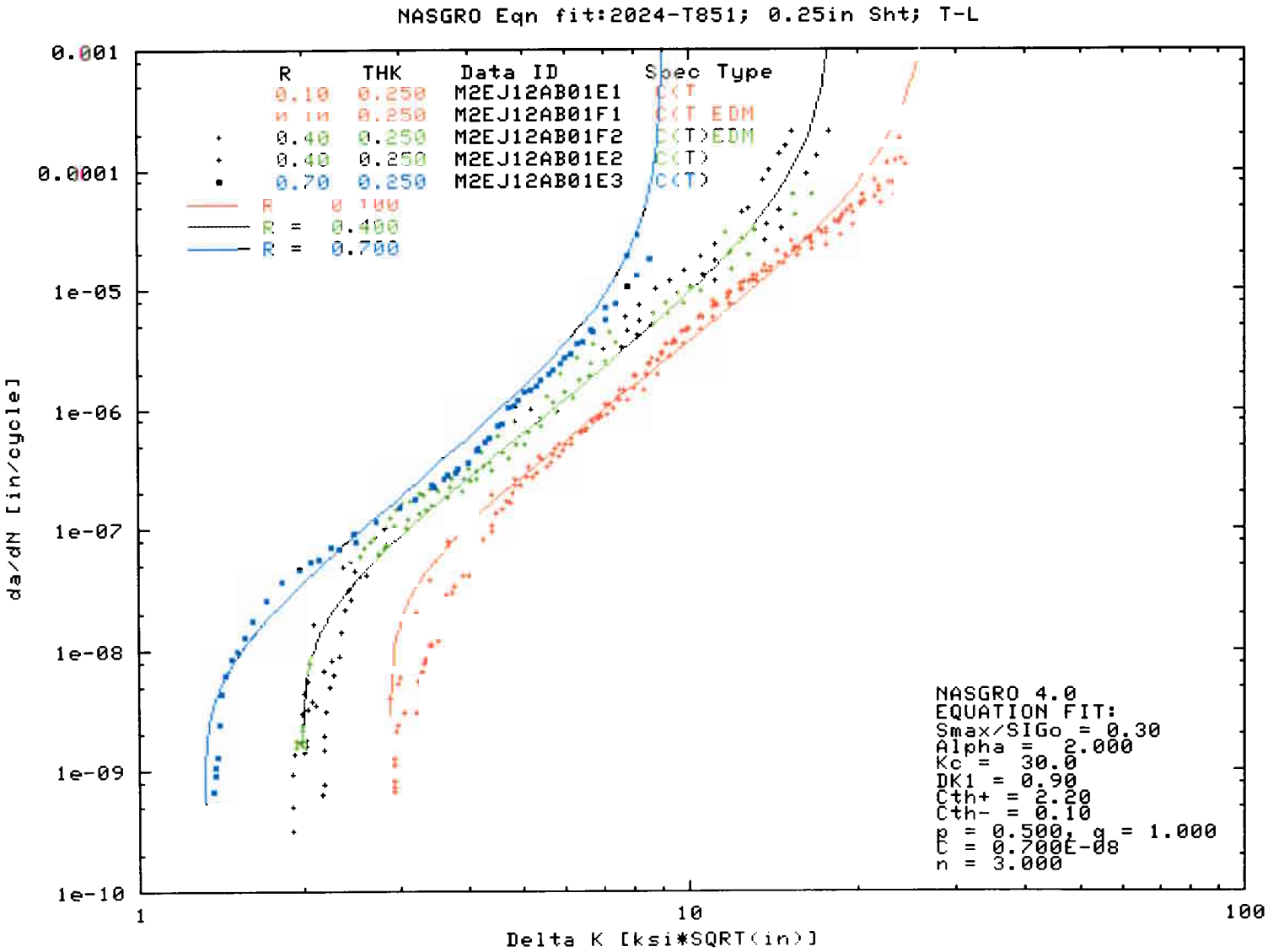
Effects of Notch Sharpness & Specimen Type on da/dN Results



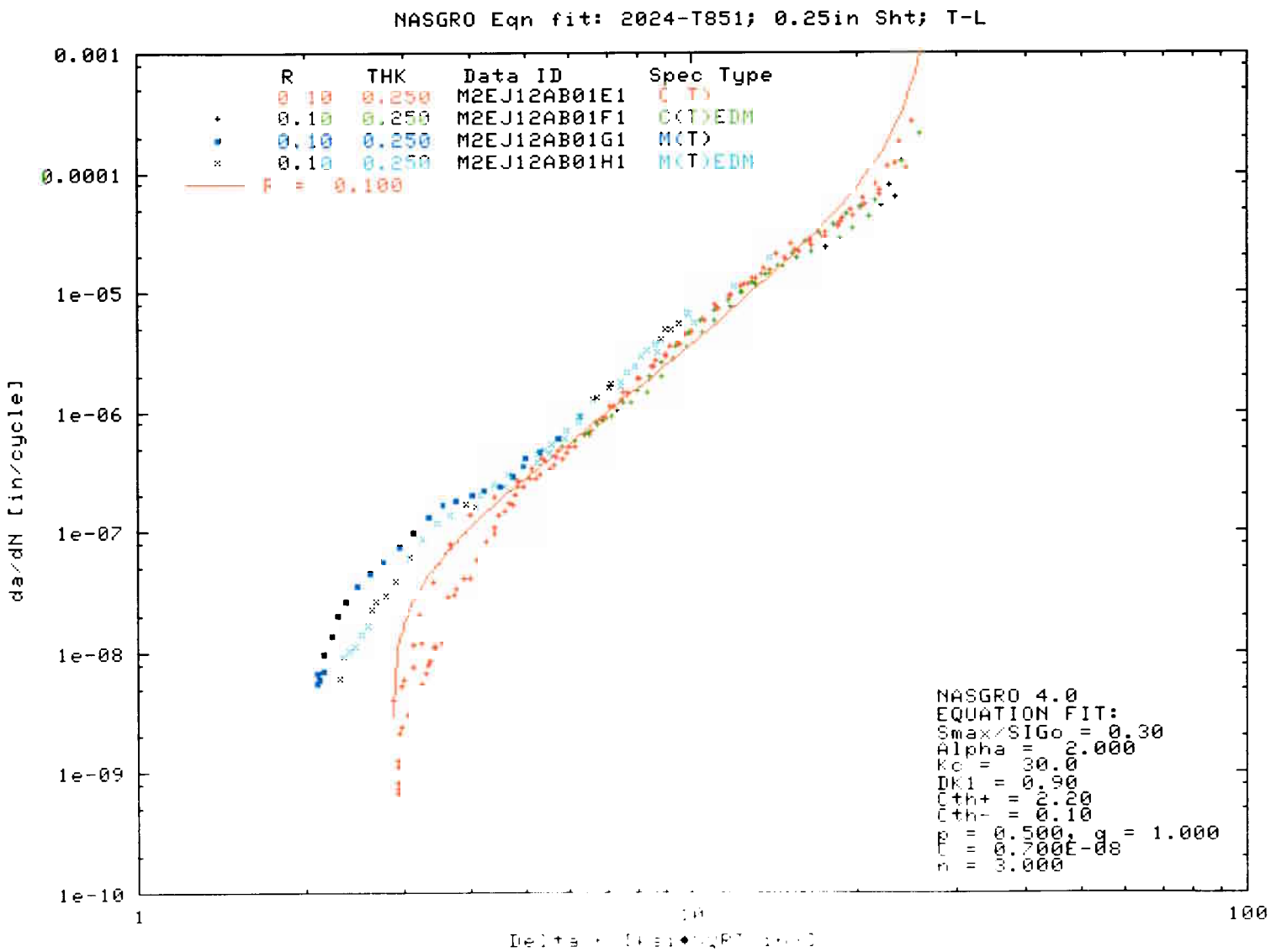
Effects of Notch Sharpness & Specimen Type on da/dN Results



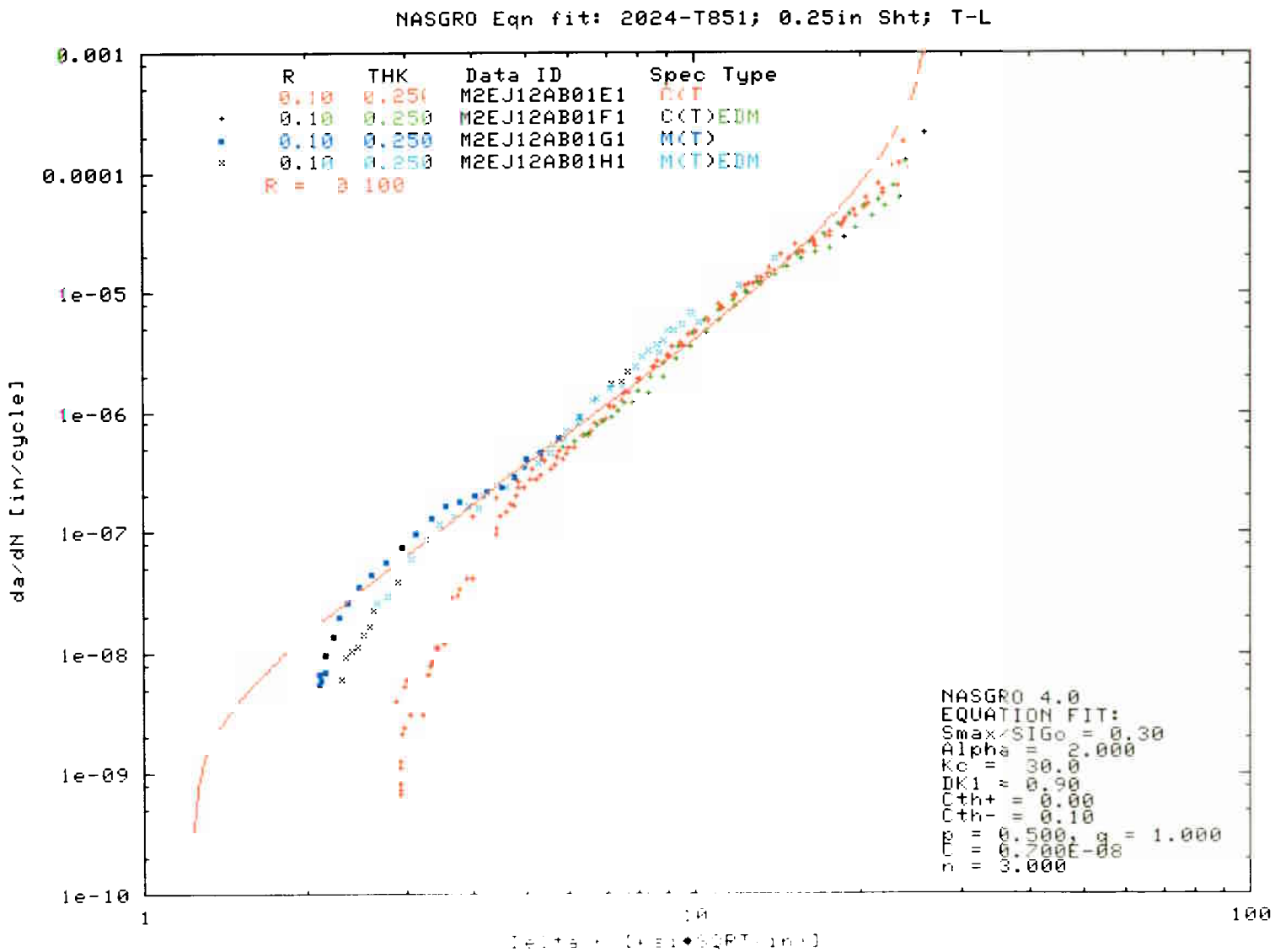
Effects of Notch Sharpness & Specimen Type on da/dN Results



Effects of Notch Sharpness & Specimen Type on da/dN Results



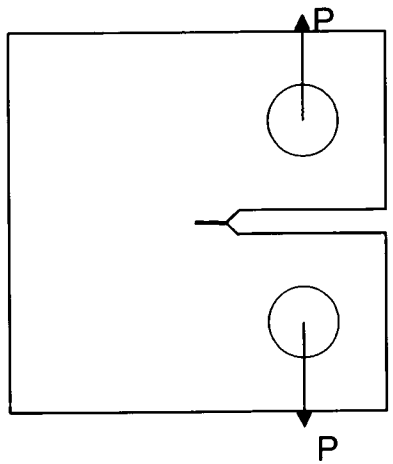
Effects of Notch Sharpness & Specimen Type on da/dN Results



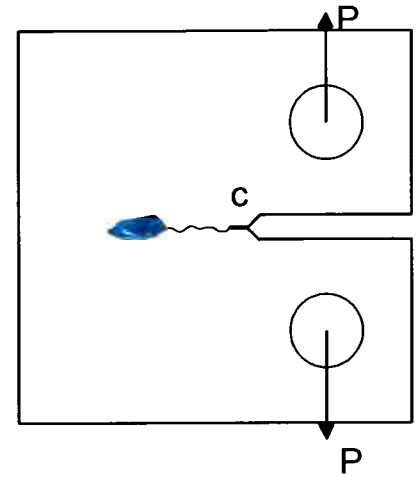
Summary Comments

Improved Test Methods for Generating Threshold Data

Load Shedding & Initial Flaw Type Considerations:



(a) Specimen with very narrow (crack like) EDM notch



(b) Specimen with ΔK_{th} crack & yield zone extending from narrow EDM notch

Questions:

(1) Does the highly fatigued yield zone in case (b) cause a lower ΔK_{th} for crack arrest than the ΔK_{th} for crack initiation in case (a) ?

(2) What is the practical criteria for ΔK_{th} – crack arrest of a growing fatigue crack or crack initiation of an initial flaw-like defect?

Improved Test Methods for Generating Threshold Data

Suggested ΔK_{th} criteria (using NASGRO):

(a) Initial Damage Flaws (non-fatigue) – load shedding ΔK_{th} values in NASGRO are acceptable

(b) Parts with fatigue history – Set $C_{th} = 0$

(c) High-cycle/highly critical parts – Set $\Delta K_{th} = 0$

Improved Test Methods for Generating Threshold Data

Final Comments:

- The FAA project is especially beneficial for improving crack growth analysis technology used by NASA (e.g., threshold values), and also for improving technology implemented into the NASGRO software.

- Planned testing at JSC for support of the flowliner crack problem on the Shuttle main engines will postpone use of the in-house built fatigue machines for the FAA project (e.g., the small crack study) for approximately 6 months.