

When is a Crack a Crack?

When it acts like a crack – Dr. Socie

Spring FD&E Meeting

June 15, 2022

Bill De Porter

When is a Crack a Crack?

Total Life Concept:

Total Life = Crack Initiation Life + Crack Propagation Life

Crack Initiation Life (Not thinking about short cracks)

- Strain Based
- Well Known and Documented

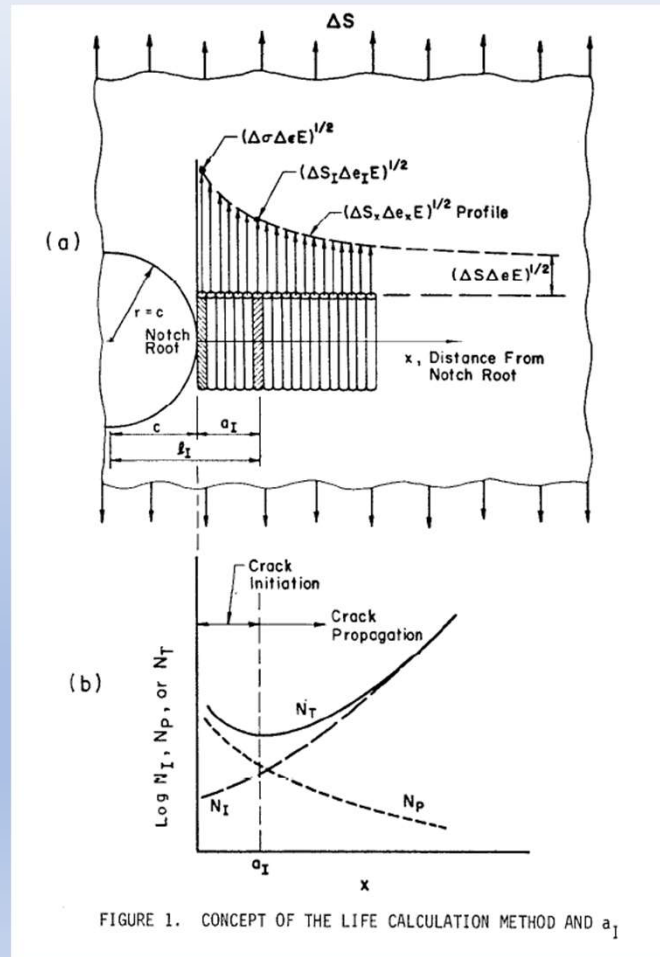
Crack Propagation Life

- LEFM
 - Well Known and Documented
 - Software available
- EPFM
 - Not as well know and documented
 - Not a great deal of software

When is a Crack a Crack?

From Chen and
Lawrence

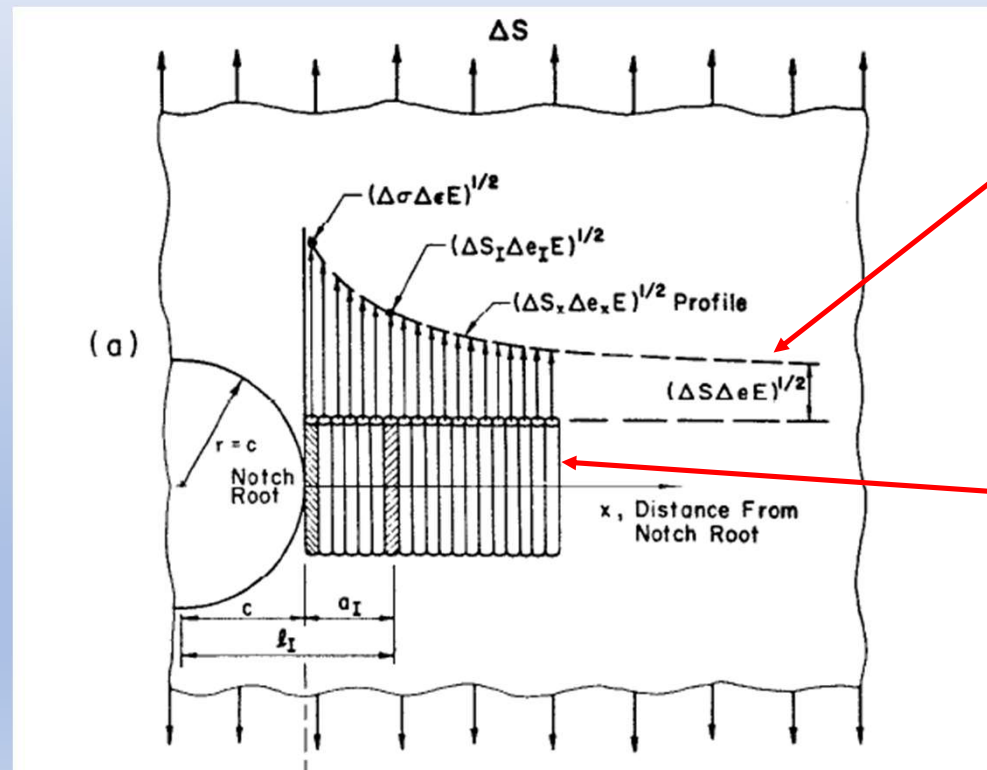
“A Model for Joining
the Fatigue
Crack Initiation and
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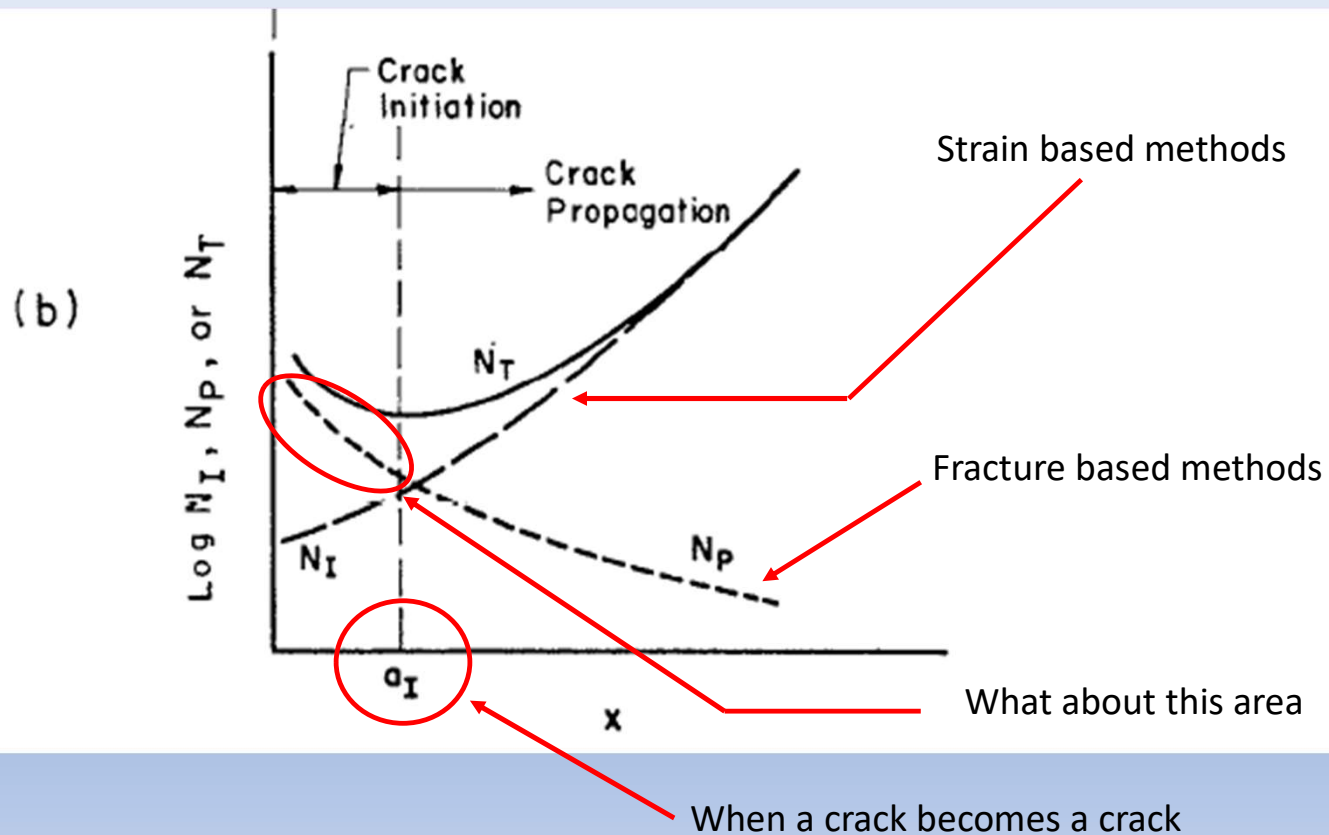
FEA Solutions as well as
classical approaches

Elementary material blocks of
finite dimension

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My Thoughts:

Begin with Paris Law

$$da/dN = C(\Delta K)^n$$

Now Use the J-Integral instead

$$da/dN = A(\Delta J)^m$$

Issues:

- Minimal Software - ABAQUS
- J Estimation Schemes – EPRI
- Kink angle direction