Lab #4: Collect Fatigue Data; Generate a Paris Plot

Background:

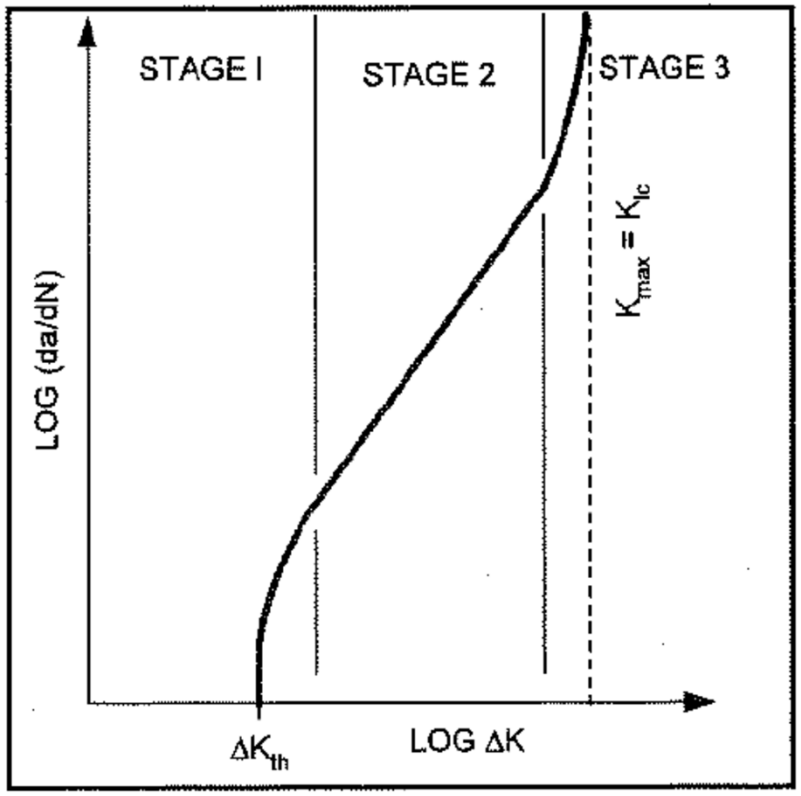
- The growth of fatigue cracks under cyclic loading is discussed in Section 4.9. During cyclic loading crack of length *a* grows a small amount during each load cycle *N*. An experimental observation is that the $\log_{10}(da/dN)$ is related to $\log_{10}(\Delta K_I)$, as shown in Figure 4.20
- In the linear region (stage 2):

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

or, equivalently:

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

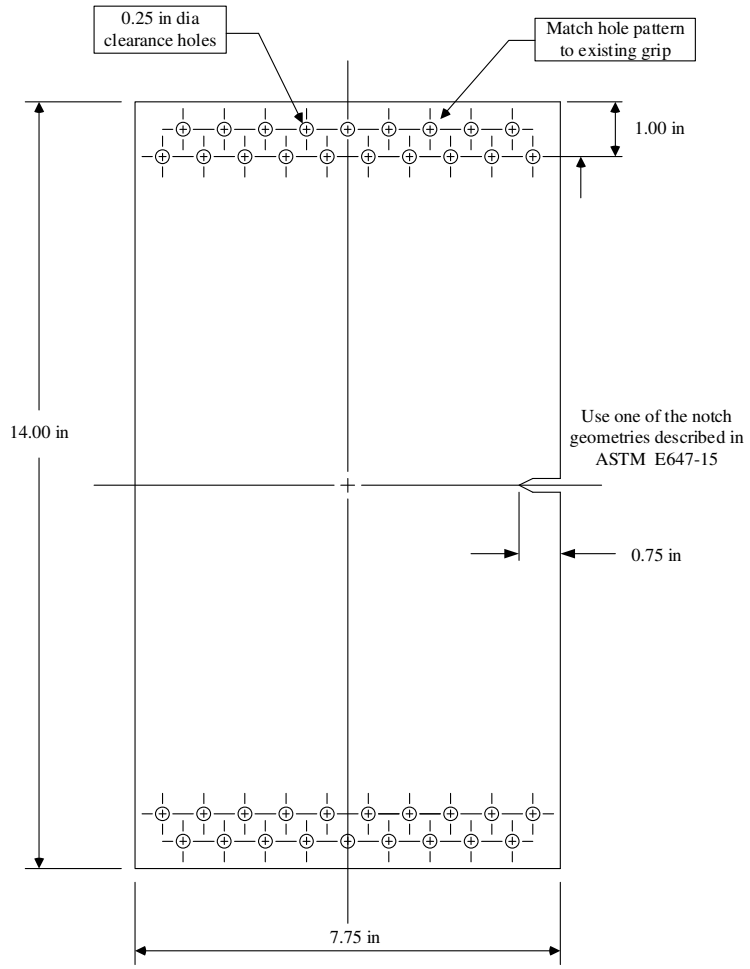
…known as the Paris Law



Lab #3 : Measure K_I using Strain Gage(s)
Lab #4: Collect Fatigue Data; Generate a Paris Plot

"The Plan":

- Subject (uninstrumented) panel to fatigue loading
- Apply fatigue loading continuously from 31 Oct-3 Nov (next Tue-Frid)
- Have on-campus students record *a* vs *N* throughout fatigue test
- Provide data to all students; generate Paris plot and determine *C* and *n*.



Lab #4: Collect Fatigue Data; Generate a Paris Plot

- Lab #4 conducted between 31 Oct–3 Nov (Tuesday-Friday)
- Cyclic loading began about 10am on Tues 31 Oct
- Initial crack length = 5.30 cm = 2.09 in
- Loading: P_{max} = 4000 lbf, P_{min} = 100 lbf @ 0.5 Hz ($R = 0.025$, P_{mean} = 2050 lbf)
- Crack vs number of cycles will be collected throughout the week
- Objective: generate Paris plot and determine *C* and *n*.

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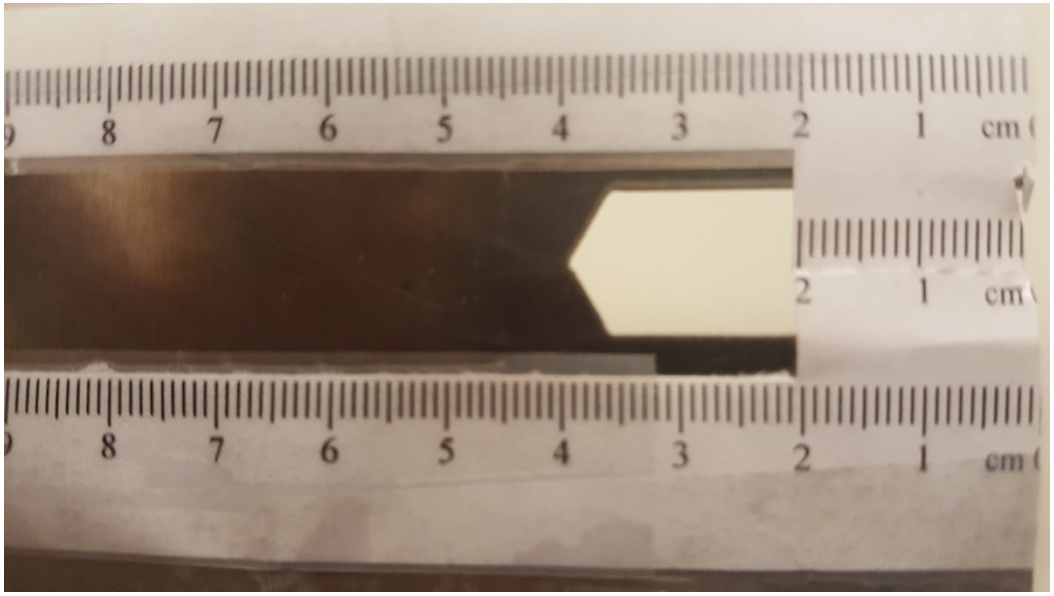

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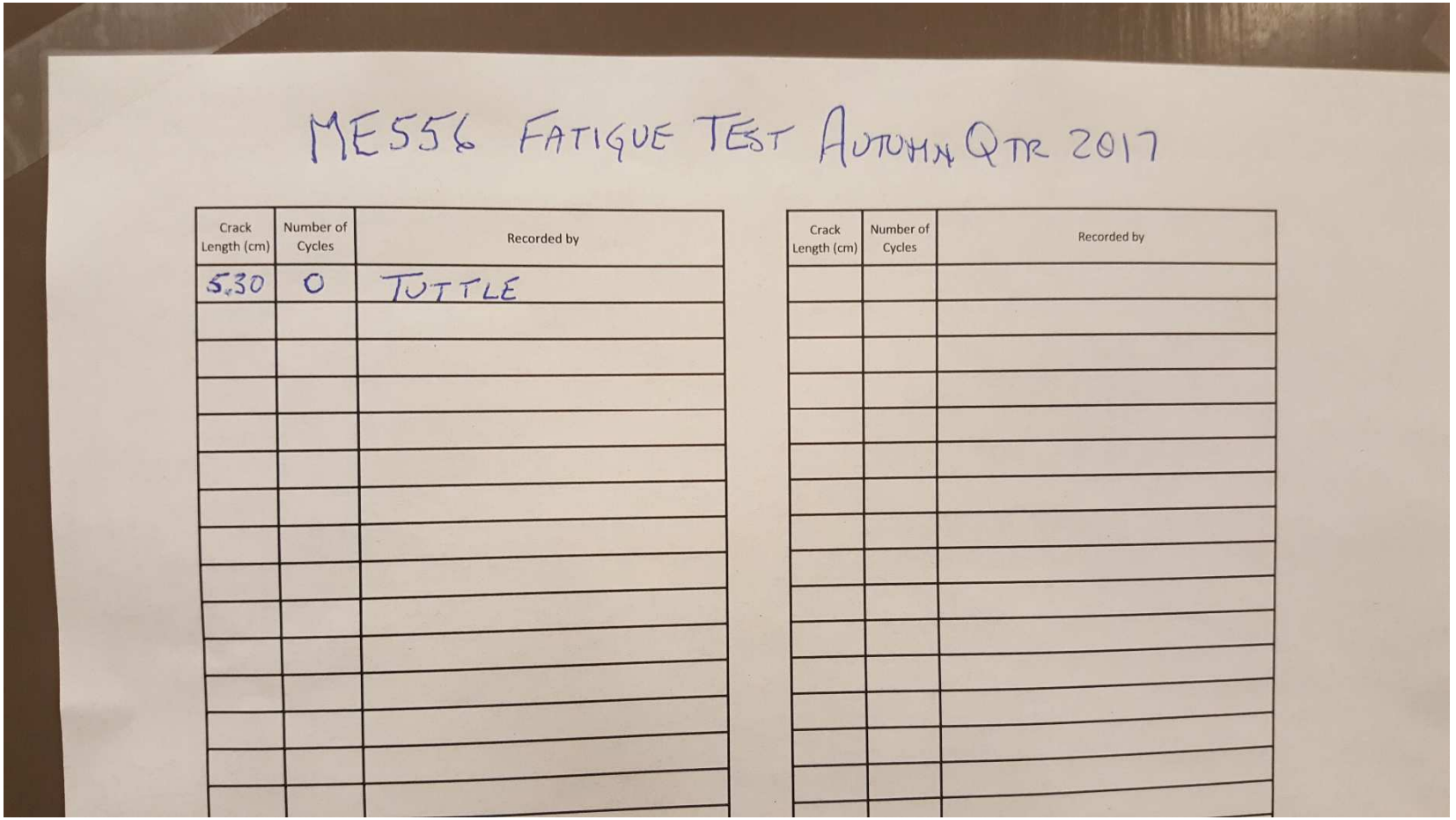

ME556 FATIGUE TEST AUTUMN QTR 2017

Crack Length (cm)	Number of Cycles	Recorded by
5.30	0	TUTTLE

Crack Length (cm)	Number of Cycles	Recorded by