ME556 LAB EXPERIMENT

Measuring K_I using Strain Gages

General Description: An aluminum plate (E = 10.3 Msi, ν = 0.33) with overall width of ~~7.75~~ 7.70 in and thickness 0.125 in was produced with a single edge notch of length ~~0.75~~ 1.57 in (see Figure 1). A fatigue load was applied to the plate, causing a ~~0.5~~ 0.56 in fatigue crack to grow from the tip of the notch. The crack path was unexpectedly inclined about 10° from the expected path (see Figure 2)…ignore this deviation.

A three element stacked rosette (C2A-13-031WW-350) was bonded near the crack tip, in accordance with the discussion in Section 8.6 (see Figure 3). In particular, the gages are located 0.24 in (6 mm) from the crack tip, and element B is oriented 60° from the expected crack path.

Objective: Compute K_I, using:

(a) Three strain measurements (use Eqs 8.22)

(b) Gage element B only (use Eq 8.27)

- Compare K_I measured during this lab with the expected value (combine Es (4.21, 4.22, 4.23a))

Performing the Test:

The steps to be followed during the test are described in a video available in the lab and on the course website. Although you will collect your own set of load-vs-strain data during the lab, use the "Official Data" from the class website during all subsequent calculations.

Lab Report:

Prepare a brief report describing the lab and a discussion of the results obtained.

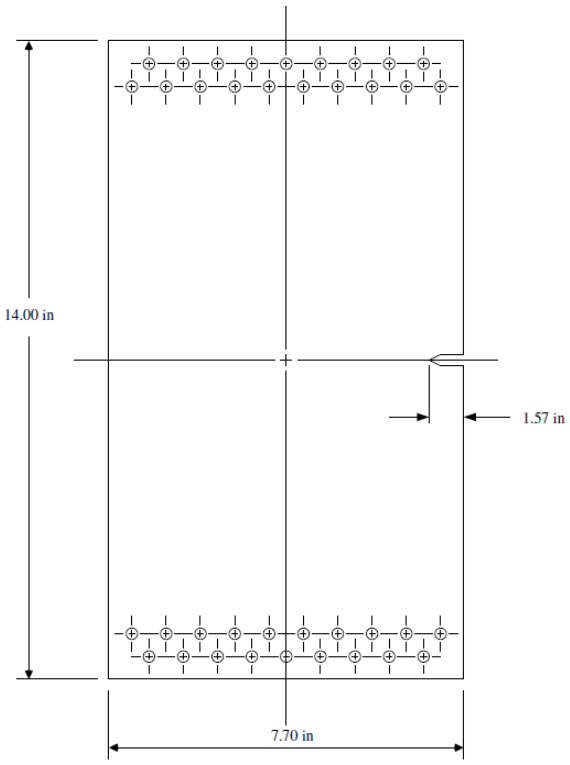

Figure 1: Thin aluminum plate with single edge notch

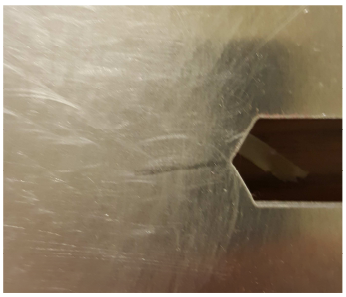

Figure 2: Fatigue crack, inclined ~ 10° from expected path

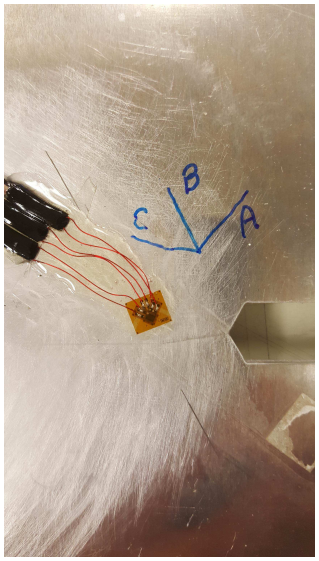

Figure 3: Three-element rosette