High Cycle Fatigue and Fatigue Crack Growth

Materials Lab 11

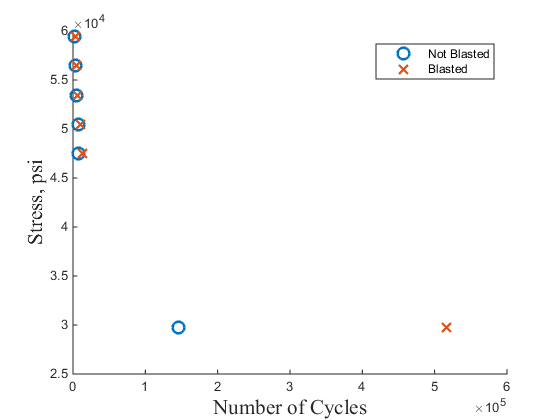
Luke Bury

Lgb544

**1) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

a) Stress Amplitude = 1.4850e+04 psi

b)



c)

Not Sand-blasted: c =0.1721  
 b = 2.2962e+05

Sand-blasted: c = 0.1362  
 b = 1.7683e+05

\*assuming sigma-fat = 0 psi, because no shift was needed for the fit





d) 4.9502e+04 psi

**2)\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

a) The failure most likely initiates at the location of the highest shear stress, which is at the root of the wing.

b)

c)

**3) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

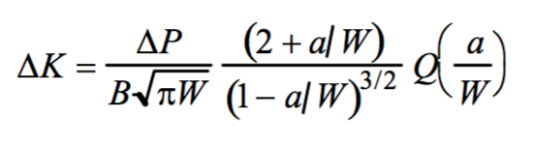
a)



b)

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **a** | 1.25 | 1.375 | 1.5 | 1.625 | 1.75 | 1.875 | 2 | 2.125 |
| **da/dN** | 8.11e-05 | 1.04e-04 | 1.79e-04 | 2.72e-04 | 4.31e-04 | 1.14e-03 | 4.17e-03 | 4.17e-03 |

c)



|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| a/w | .2 | .3 | .4 | .5 | .6 | .7 | .75 | .8 |
|  |  |  |  |  |  |  |  |  |
| Q(a/w) | 2.07 | 2.09 | 1.836 | 1.634 | 1.46 | 1.351 | 1.3325 | 1.314 |
| ΔK | 7966 | 10274 | 11867 | 14462 | 18782 | 27787 | 36694 | 51488 |

d)



e)

**4) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**5) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

a)

b)