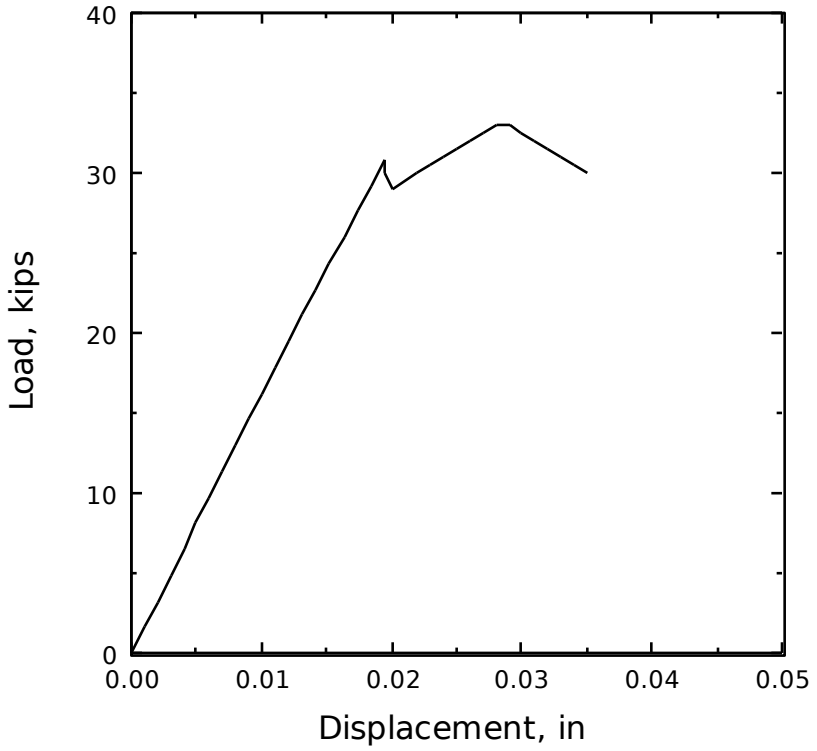
Workshop 2

Analysis of Fracture Data

K_{IC} Test Problem

- 1. A K_{Ic} test was conducted on a compact specimen with W = 4.0 in, B = 2.0 in, a_o = 2.1 in. The test record is given below. (σ_{ys} = 100 ksi)
- Analyze the test according to ASTM E399
- SI: W = 100 mm, B = 50 mm, a_o = 52.5 mm, (σ_{ys} = 700 MPa), 1kip = 4.448kN

Fracture Toughness Test Result



- 2. For the following specimen generate K values at a_o and a_o + 0.2 in
- (load in kips, dimensions in inches, E = 30,000 ksi)
- Compact; W = 2, B = 1, ao = 1, vll = 0.006 (const)

Solution

- Initial
- $a_o/W = 1.0/2.0 = 0.5$, then f = 9.66, BEv/P = 36.98
- $P_o = BEv/36.98 = (1.0)(30{,}000)(0.006)/36.98 = 4.87$ kips
- $K_o = Pf/b\sqrt{W} = (4.87)(9.66)/(1.0)\sqrt{(2.0)} = 33.25$

- Final
- $a_f/W = 1.2/2.0 = 0.6$, then f = 13.65, BEv/P = 63.26
- $P_f = BEv/63.26 = (1.0)(30{,}000)(0.006)/\ 63.26 = 2.845$ kips
- $K_f = Pf/b\sqrt{W} = (2.845)(13.65)/(1.0)\sqrt{(2.0)} = 27.5$
- K is decreasing