

4)

- a) An S/N curve is formed on experimental data where, $S = \text{Stress } (\sigma, y \text{ axis})$
 $N_f = N^\circ \text{ of cycles to failure } (x \text{ axis})$

A line of best fit would be used for the curve, where this is based on probability and is limited to the experiment equivalent.

The Wohler machine simulates fatigue where the applied stress by a weight at end of a shaft will cause a fatigue failure after ~~an~~ under conditions where fluctuating stress is below the tensile strength of the material or the elastic limit.

- ∴ As the shaft spins, weight pulls down on the shaft, so cross section point will go from compression to neutral axis to tension. Thus producing a sine wave.

Define:

A single such test would produce one point on an S/N curve. Where repeat tests with varying ~~different~~ stress amplitude could thus be plotted/compared and a line of best fit overlaid on top of these points. How the line of best fit is fitted to these experimental results would relate to the probability of failure.