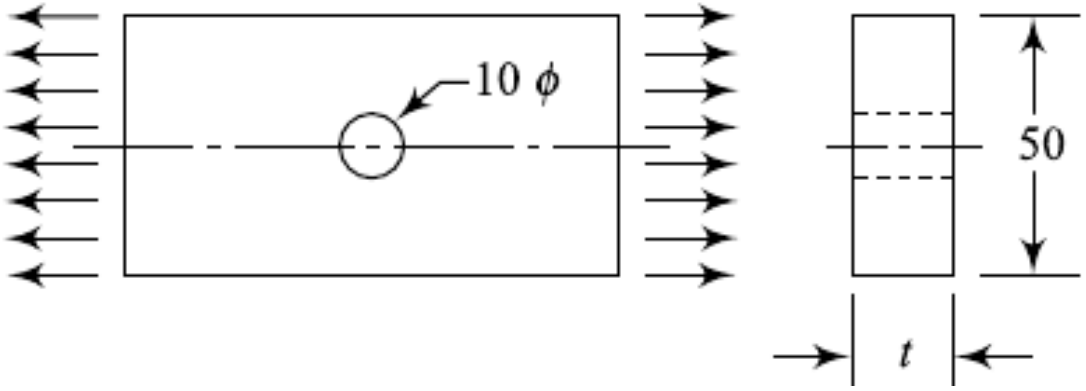
Design exercise 1

Determine the plate thickness for infinite life when a completely reversible load of 16kN acts on the plate in the Figure (all dimensions in mm). Given S_u = 440MPa, steel plate is forged and is operating at room temperature, 90% reliability, notch sensitivity q = 0.8, and factor of safety = 1.5



S_{ut} = 440MPa < 1400MPa

$S'_e = 0.5S_{ut} = 220$MPa

Design exercise 2

Estimate the following design information for a machine element made of a particular steel, where S_{ut} is 630 MPa and S_y is 490 MPa.:

a. Rotating-beam endurance limit
b. Fatigue strength (S_f) at 10^5 cycles
c. Expected life for a stress level of 420 MPa