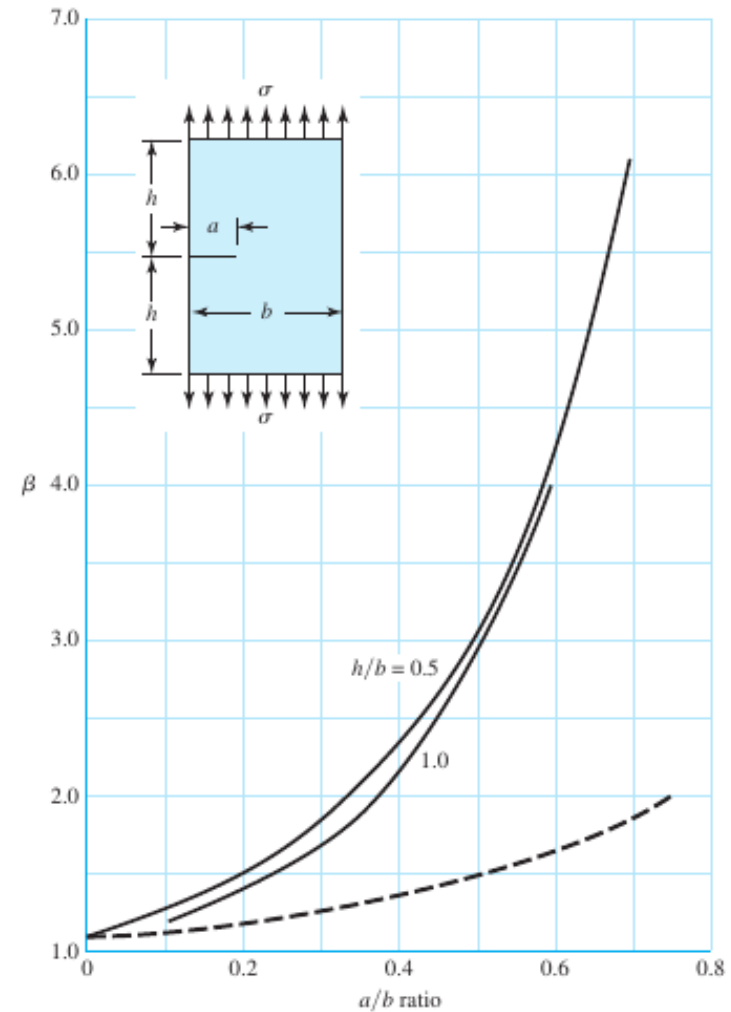
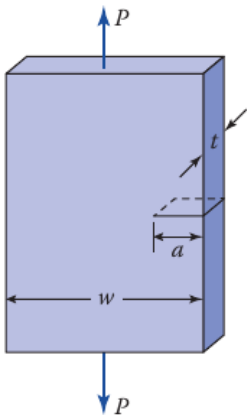


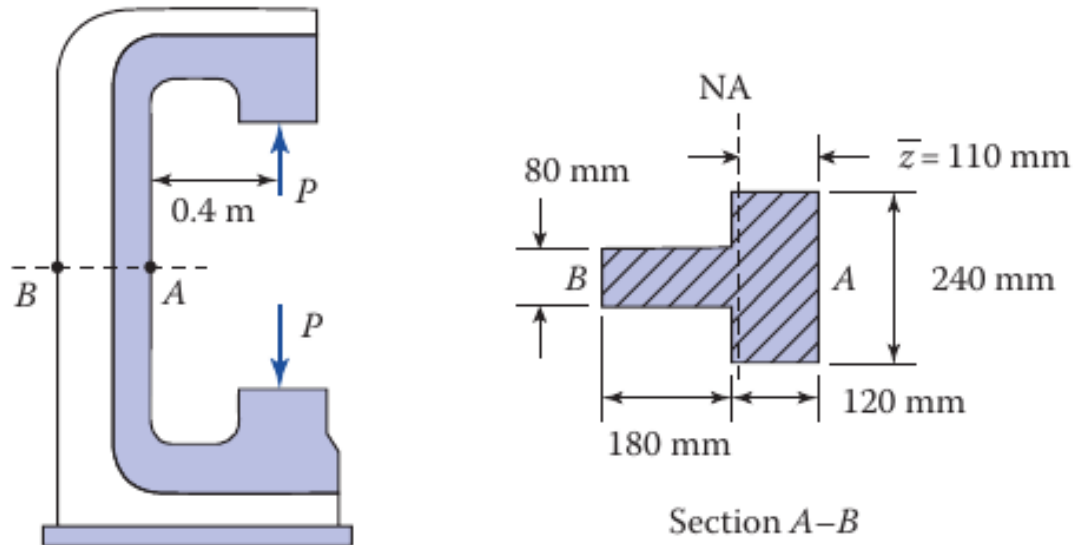
# Design exercise 1

An aircraft panel made of 7075-T7351 aluminum alloy, with width  $w = 100\text{mm}$  and thickness  $t = 16\text{mm}$  is loaded in tension as shown. Estimate the maximum load  $P$  that can be applied without causing sudden fracture when an edge crack grows to length of  $a = 20\text{mm}$ . Given  $K_{Ic} = 31\text{MPa}\sqrt{\text{m}}$ ; and  $S_y = 392\text{MPa}$  and  $h = 100\text{mm}$



# Design exercise 2

A punch press frame is made of ASTM A-48 gray cast iron having ultimate tensile strengths  $S_u = 170\text{MPa}$  and compressive strength  $S_c = 650\text{MPa}$ . Calculate the allowable load  $P$  based on the Coulomb–Mohr theory and a factor of safety of  $n = 2.5$



# Design exercise 3

A large plate of width  $2w = 120\text{mm}$  carries a uniformly distributed tensile force  $P = 160\text{kN}$  in a longitudinal direction with a safety factor of  $n = 2.5$ . The plate has a central transverse crack that is  $2a = 18\text{mm}$  long. Calculate the thickness  $t$  required.

Given  $K_{Ic} = 66\text{MPa}\sqrt{\text{m}}$ ; and  $S_y = 1149\text{MPa}$

1. To resist yielding
2. To prevent sudden fracture

