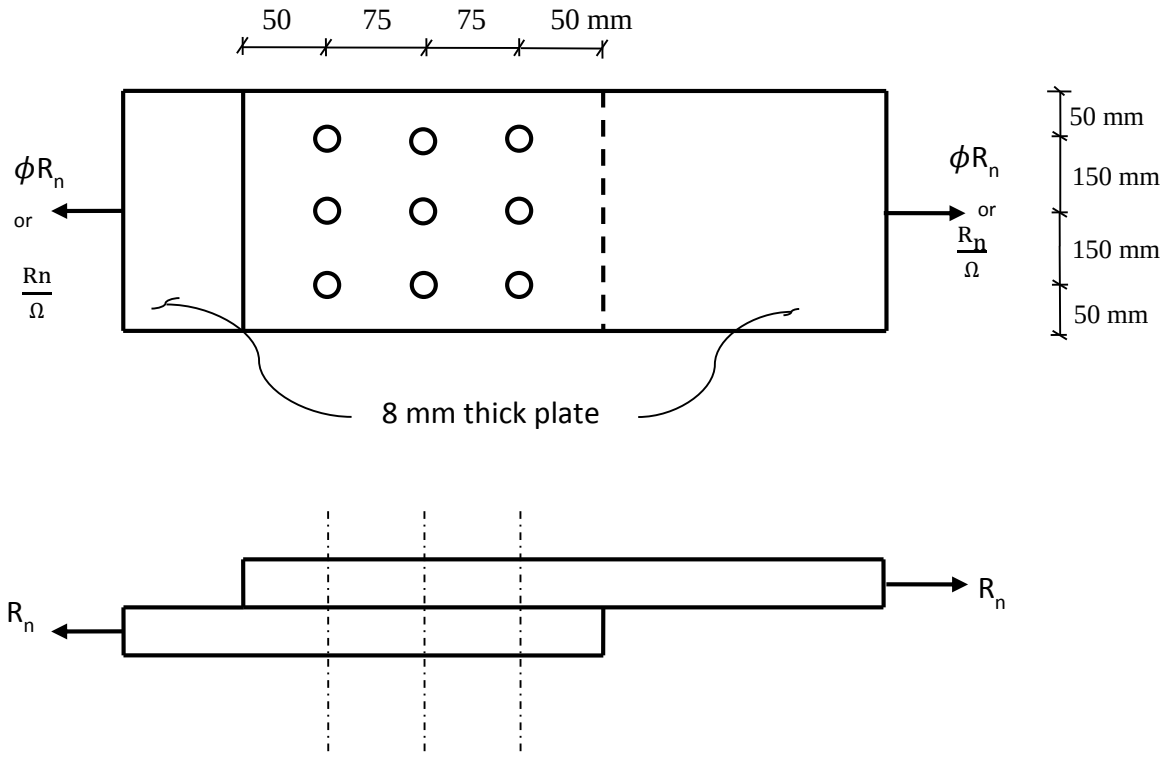
CE388 - FUNDAMENTALS OF STEEL DESIGN

2014-2015 Spring Term

Problem Set 5

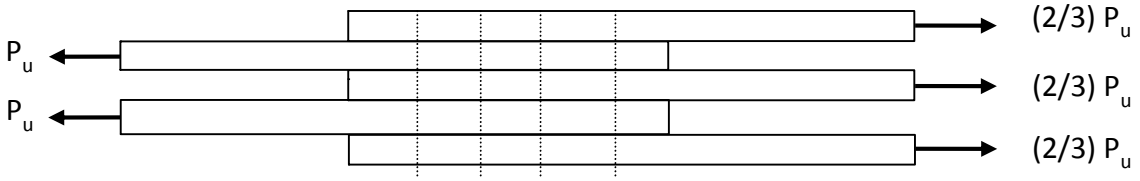
1) Determine ϕR_n and $\frac{Rn}{\Omega}$ for the connection shown below based on bolt limit states (Bearing type connection).

   Standard holes, S275 Steel (F_y = 275MPa, F_u = 430MPa).

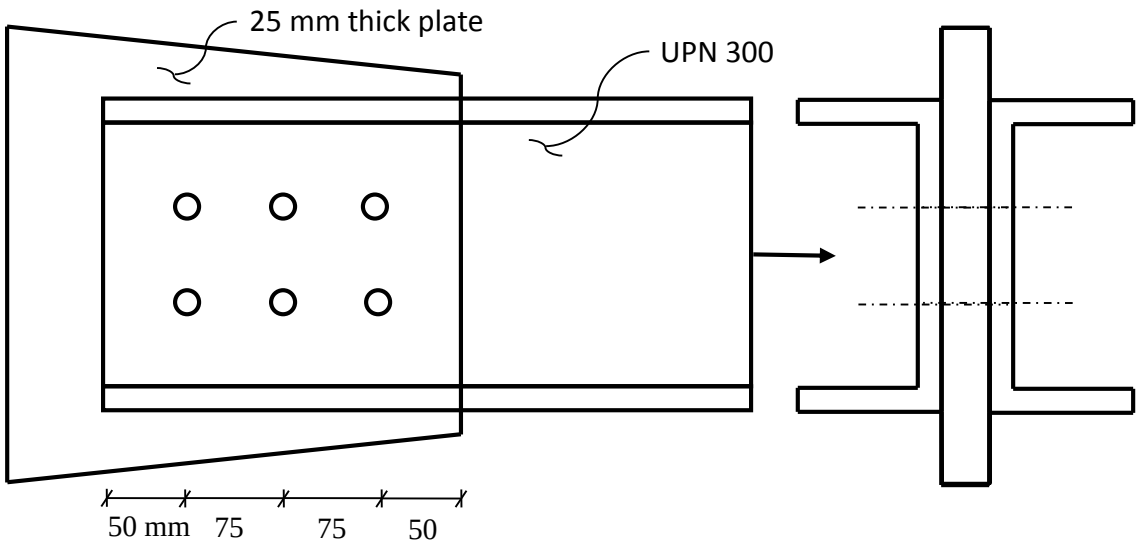


a) M20 bolts Grade 8.8 threads excluded from the shear plane
b) M24 bolts Grade 8.8 threads excluded from the shear plane
c) M22 bolts Grade 8.8 threads included in the shear plane

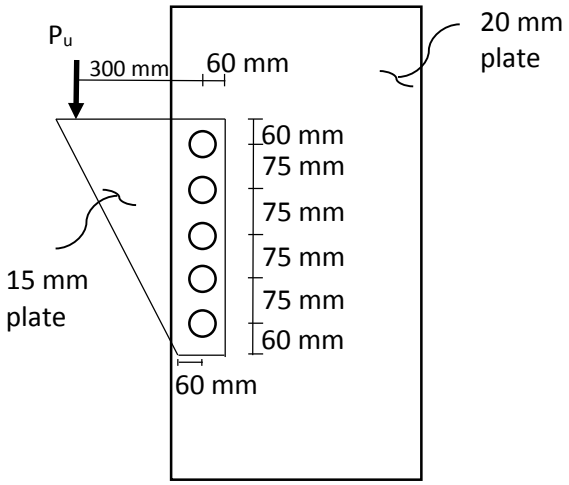
2) For the connection shown below determine the number of M24 Grade 8.8 bolts required for a bearing type connection.
P_u = 1300 kN. Use LRFD threads excluded from shear plane.



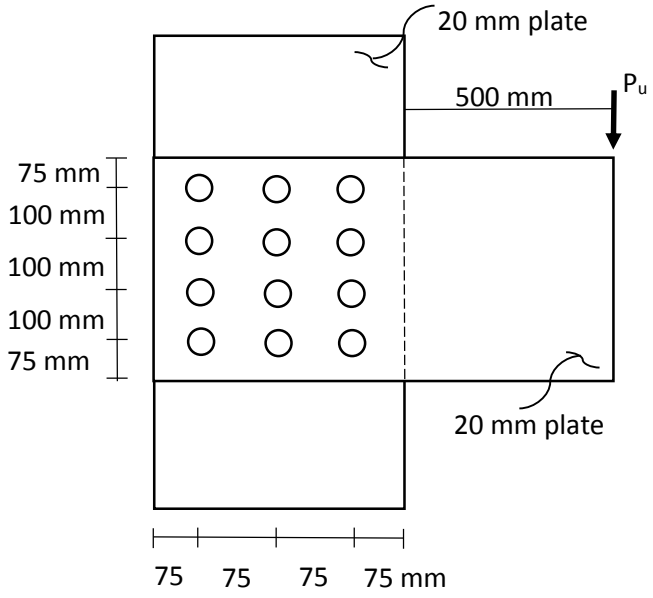
3) Determine the number of M24 Grade 10.9 bolts required to develop full yielding capacity of the UPN300 members. S275 Steel (F_y = 275MPa, F_u = 430MPa). Use LRFD provisions. Consider threads excluded from shear plane. Consider 2 rows of bolts in the longitudinal direction.



4) Determine the maximum value of P_u permitted (Use LRFD).
S275 Steel (F_y = 275MPa, F_u = 430MPa).
Standard holes, M20 Bolts Grades 8.8 threads excluded from shear plane.



5) Determine the maximum value of P_u permitted (Use LRFD).
S275 Steel (F_y = 275MPa, F_u = 430MPa).
Standard holes, M22 Bolts Grades 8.8 threads excluded from shear plane.



6) Determine the number of M20 Grade 8.8 bolts threads excluded from shear plane required in the flange of I shape shown (bearing type connection). Do not consider bearing limit states.
Use LRFD, S355 Steel (F_y = 355MPa, F_u = 510MPa).