EWCE-211
Assignment 02
Desing Factor of Safety and Stress
Total Marks 50

1. Two wooden members of a uniform rectangular cross-section are joined by the simple glued scarf splice shown. If P= 11 kN, determine the normal and shearing stresses in the glued splice.

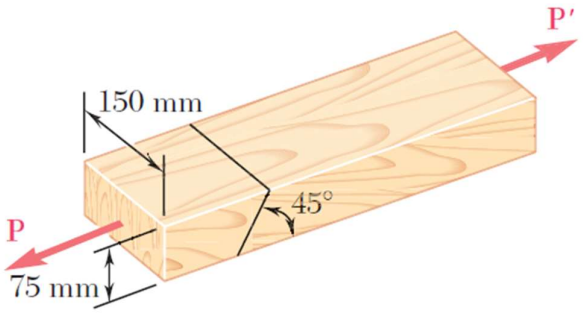


Fig 01

2. Two wooden members of a uniform rectangular cross-section are joined by the simple glued scarf splice shown in Fig 02. If the maximum allowable shearing stress in the glued splice is 500 kPa, determine (a) the largest load P that can be safely applied, and (b) the corresponding tensile stress in the splice.

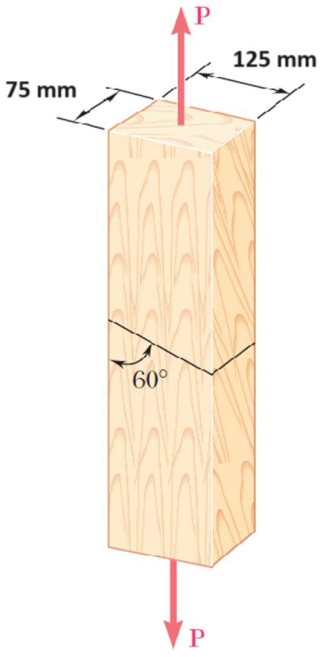


Fig 02

3. Three steel bolts are used to attach the steel plate to a wooden beam (see Fig 03). If the plate supports a load P= 110-kN, the ultimate shearing stress for the steel used is 360 MPa and a factor of safety of 3.35 is desired. Determine the required diameter of the bolts.

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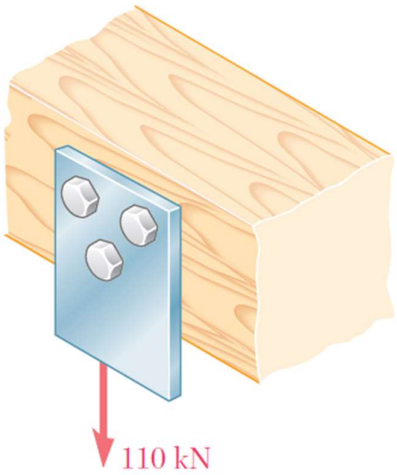


Fig 03

4. A load P is supported as shown by a steel pin that has been inserted in a short wooden member hanging from the ceiling. The ultimate strength of the wood used is 60 MPa in tension and 7.5 MPa in shear, while the ultimate strength of the steel is 145 MPa in shear. If b= 40 mmm, c= 55 mm, and d-= 12 mm, determine the load P for an overall factor of safety of 3.2.

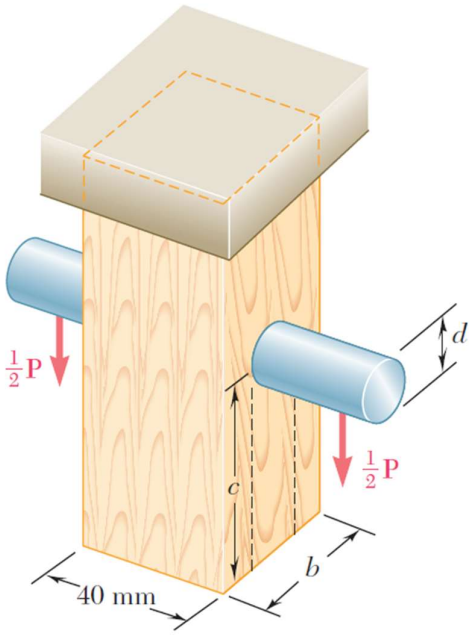


Fig 04

5. A steel plate 5/6 in. thick is embedded in a horizontal concrete slab and is used to anchor a high-strength vertical cable as shown in Fig 05. The diameter of the hole in the plate

is ¾ in., the ultimate strength of the steel used is 36 ksi, and the ultimate bonding stress between plate and concrete is 300 psi. Determine the factor of safety for the cable anchor when P = 3 kips, a =2 in. and b =7.5 in.

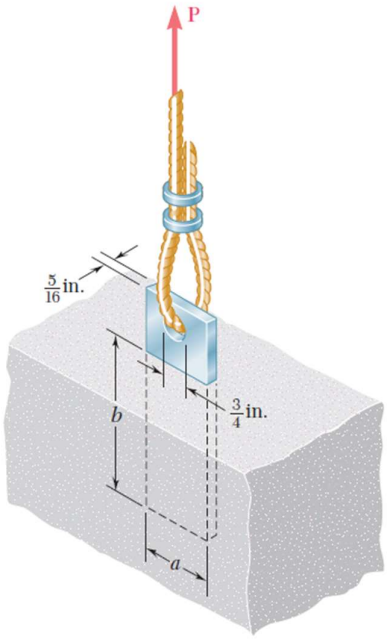


Fig 05

Notice the steel is fully bored into the concrete. Hence, the total area is (a + depth) times height.