Öğrenci No 010030403
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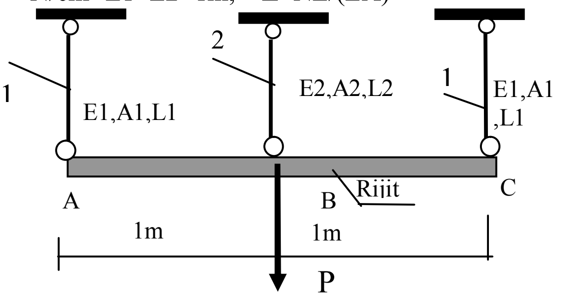
Teslim Tarihi 07-12-2010

MUKAVEMET
ÖDEV 2

1

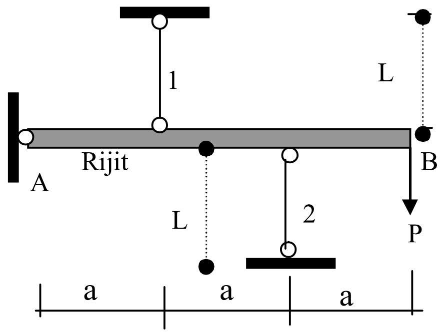
Şekildeki ABC rijit çubuğu, A, B, C noktalarından mafsallı bağlı, P tekili kuvveti etkimektedir. 1 ve 2 numaralı çubuklarda emniyet gerilmesi σ_{em}=4(a+e)N/cm^2 olduğuna göre, sistemin taşıyabileceği P yükünü bulduktan sonra, 1 ve 2 nolu çubuk kuvvetleri ile sistemin aşağı sarkma miktarını milimetre cinsindenbulunuz.
A1=2 cm^2, A2=4cm^2, E1=4000 N/cm^2, E2=8000 N/cm^2 L1=L2=1m, Δ=NL/(EA)



2

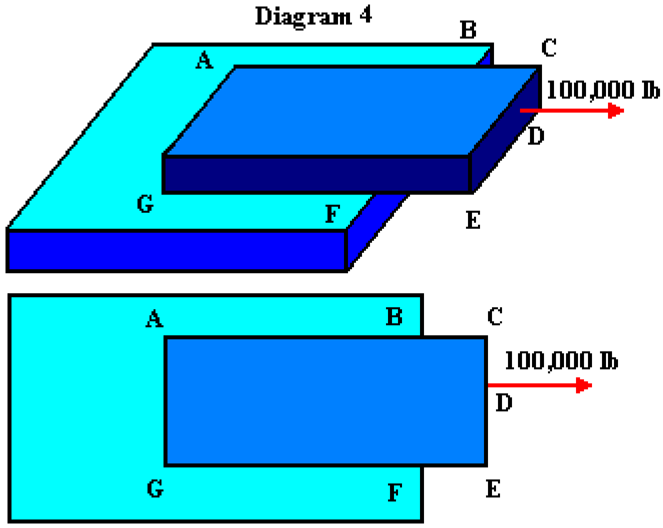
Şekildeki AB rijit çubuğu, A noktasında mafsallı bağlı, B noktasında P kuvveti etkimektedir. 1 ve 2 nolu esnek çubukların kesit alanları A_1= 8cm^2, A_2= 4cm^2, Elastisite modülleri E_1=E_2=E dir. Her iki çubukta σ_{em} bilindiğine göre, P kuvvetinin uygun değerini, B noktasının düşey yer değiştirmesi ile 1 ve 2 nolu çubuk kuvvetlerini bulunuz. Δ=NL/(EA)

σ_{em}= (a +b) kN/cm^2



3. Two metal plates are shown below. The top plate is 3/4 inch thick and 9 inches wide, and is to be welded to the bottom plate with a 45º fillet weld. The top plate is to be weld completely across end AG and partially along sides AB and FG.

Diagram 4



A.) Determine the minimum inches of weld need to carry the 100,000 lb. load and specify how many inches of weld should be placed along each side AB and FG.

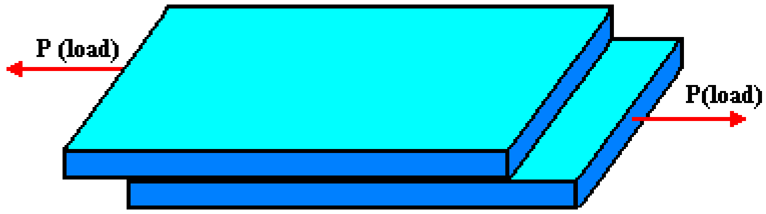
B.) Determine the number of inches of weld needed to make the weld strength as great as the plate strength.

The allowable stresses are as follows;
Weld Material: τ = 12,000 lb/in^2 ; σ_t = 24, 000 lb/in^2
Plate Material: τ = 13,000 lb/in^2 ; σ_t = 22,000 lb/in^2

Dimensions: AB = GF = 20 inches; CD = 3 inches; DE = 6 inches

4. A lap joint (Diagram 3) is to connect two steel plates both with a width of 7 inches and a thickness of 5/8 inch. The rivets to be used have a diameter of 3/4 inch. The maximum allowable stresses for the rivet and plate materials are as follows:

Diagram 3



Rivets: τ = 20, 000 lb/in^2, σ_t = 21, 000 lb/in^2, σ_c = 23, 000 lb/in^2

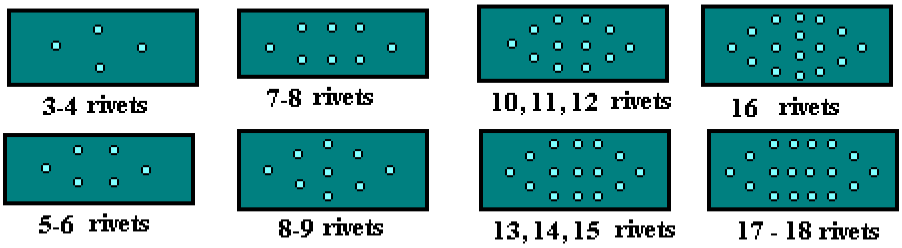
Plate: τ = 17,000 lb/in^2, σ_t = 22, 000 lb/in^2, σ_c = 25, 000 lb/in^2

A. Determine the number of rivets for the most efficient joint.

B. Select the best pattern from those shown in Diagram 4.

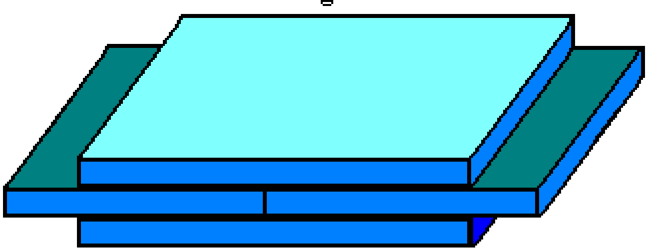
C. Calculate the strength and efficiency of the joint.

Diagram 4 Lap Joint Patterns



5. A double cover plate butt joint (Diagram 5) is to connect two steel plates both with a width of 10 inches and a thickness of 5/8 inch.

Diagram 5



The rivets to be used have a diameter of 3/4 inch. The maximum allowable stresses for the rivet and plate materials are as follows:

Rivets: τ = 16, 000 lb/in^2, σ_t = 22, 000 lb/in^2, σ_c = 23, 000 lb/in^2

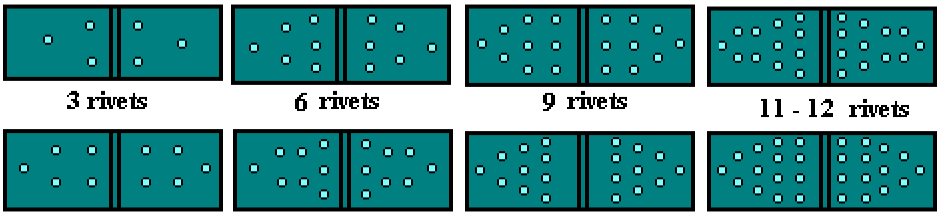
Plate: τ = 14,000 lb/in², σ_t = 20, 000 lb/in², σ_c = 21, 000 lb/in²

A. Determine the number of rivets for the most efficient joint.

B. Select the best pattern from the patterns in Diagram 6.

C. Calculate the strength and efficiency of the joint.

Diagram 6 Butt Joint Patterns



6. In the structure shown, steel rod AB, aluminum rod BC, and brass rod CD are joined together and then held between two rigid walls as shown. A force of 40,000 lb acting to the left is applied at junction B, and a force of 20,000 lb acting to the left is applied at junction C. The cross sectional areas and lengths of the steel, aluminum, and brass rods are respectively 1.5 in^2, 6 ft; 1 in^2, 10 ft; .75 in^2, 8 ft as shown in the diagram. Young's modulus for steel is 30 x 10^6 lb/in^2; Young's modulus for aluminum is 10 x 10^6 lb/in^2; Young's modulus for brass is 15 x 10^6 lb/in^2. Determine the stress that develops in each member, and determine the deformation of the aluminum rod.