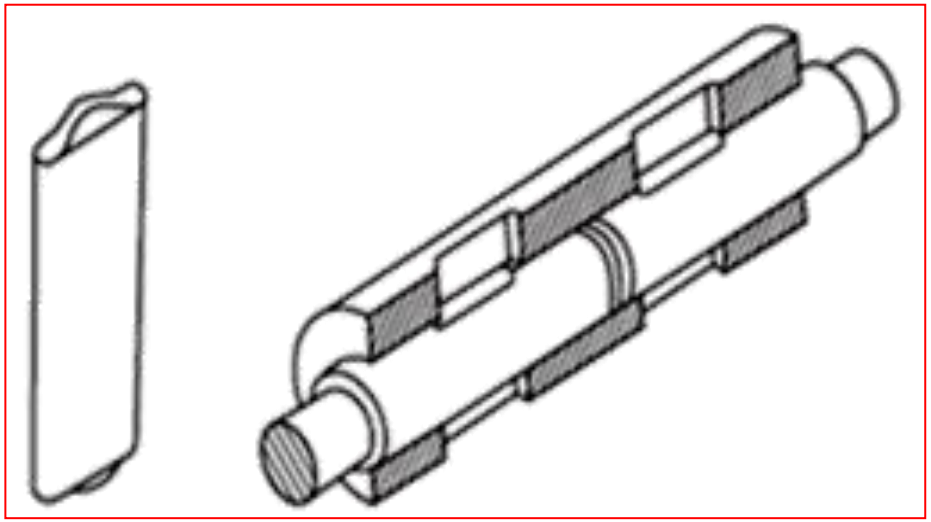
Lecture # 5.3

Cotter Joints - Sleeve Type

Cotter Joints

Cotter Joint With Sleeve:

The rod ends are enlarged to take care of the weakening effect caused by the slots.



The slots in the rods and sleeve are made slightly wider than the width of cotter.

The relative positions of the slots are such, that when a cotter is driven into its position, it permits wedging action and pulls the rod into the sleeve.

Cotter Joints

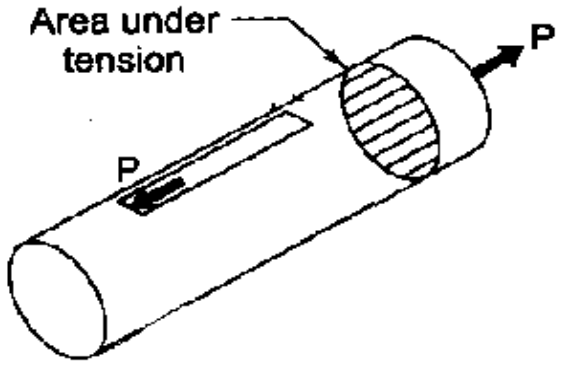
Design of Sleeve and cotter joint

If the allowable stresses in tension, compression and shear for the sleeve, rod and cotter be σ_t, σ_c and τ respectively,

assuming that they are all made of the same material, we may write the following failure criteria:

1. Tension Failure of rod at diameter d

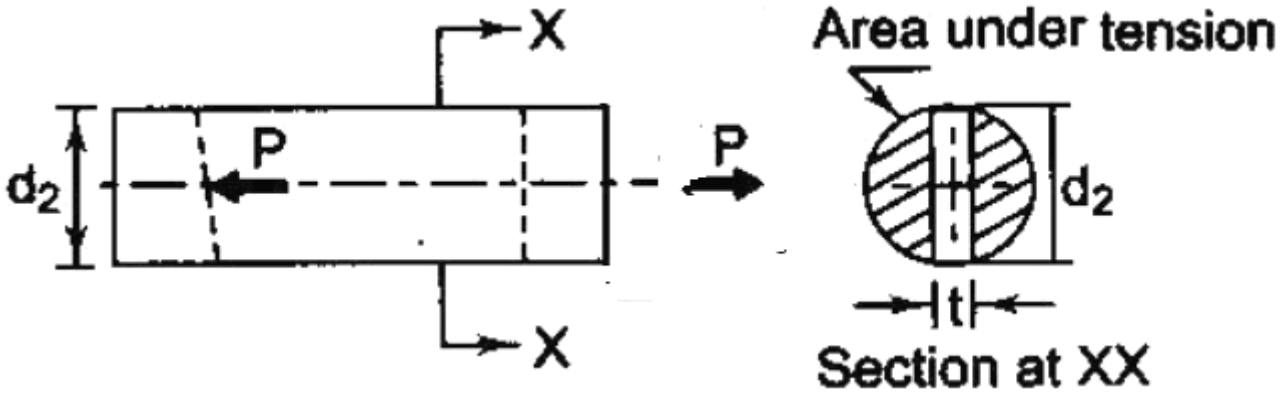
$$\frac{\pi}{4} d^2 \sigma_t = P$$

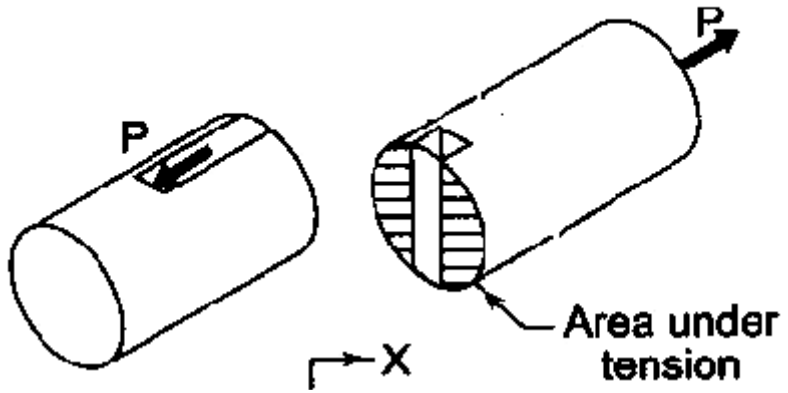


Cotter Joints

2. Tension Failure of rod across slot

$$(\frac{\pi}{4} d_2^2 - d_2 t)\sigma_t = P$$

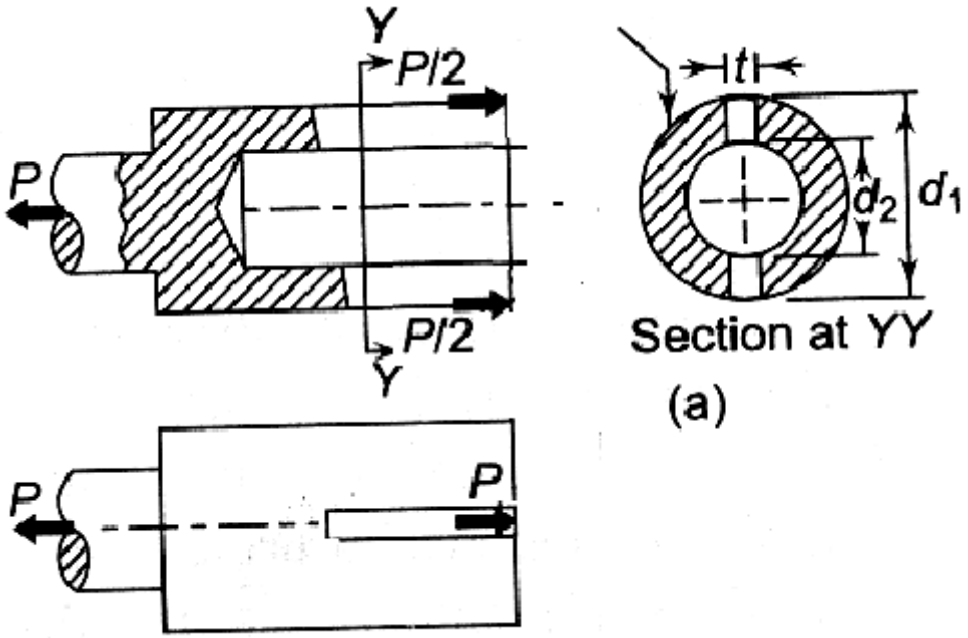


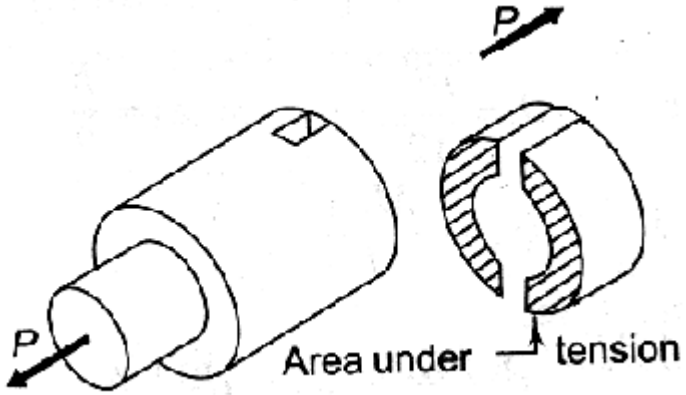


Cotter Joints

3. Tension Failure of Socket across slot

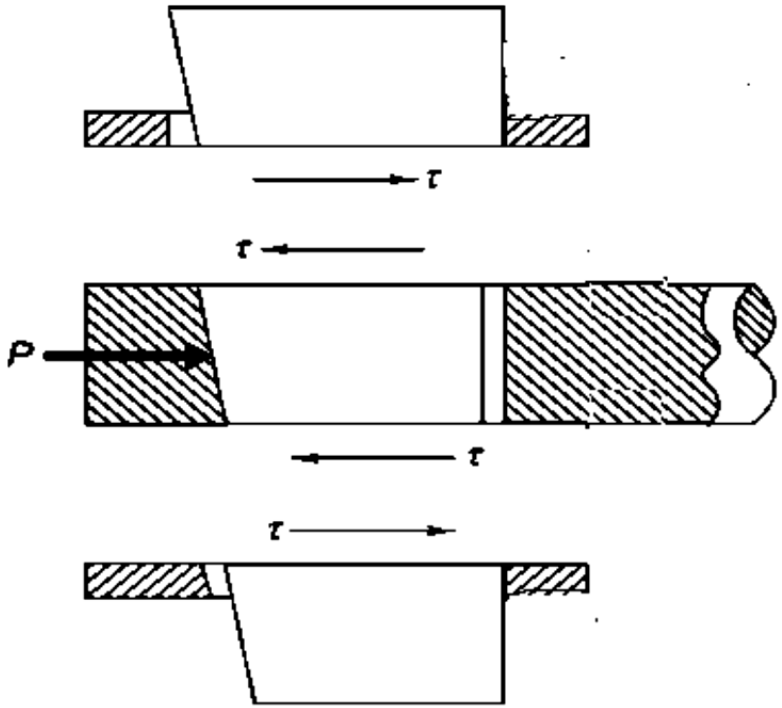
$$\{\frac{\pi}{4}(d_1^2 - d_2^2) - (d_1 - d_2)t\}\sigma_t = \mathrm{P}$$

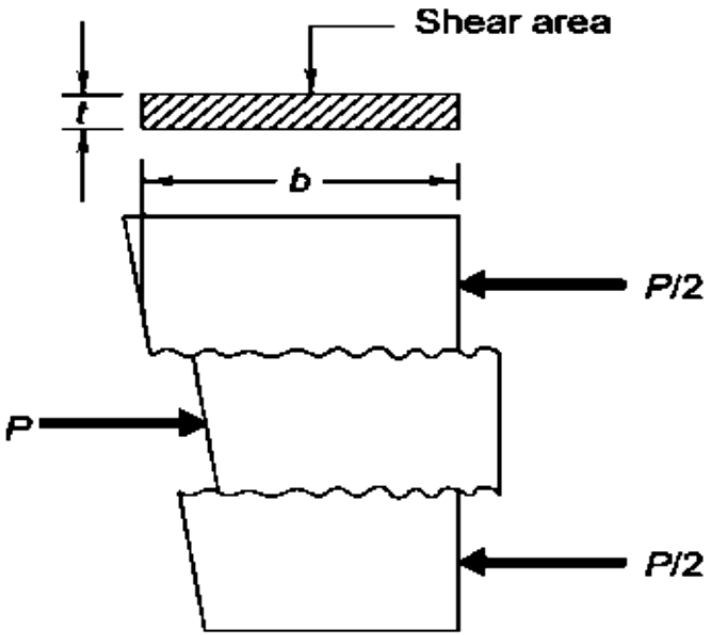




Cotter Joints

4. Shear Failure of Cotter



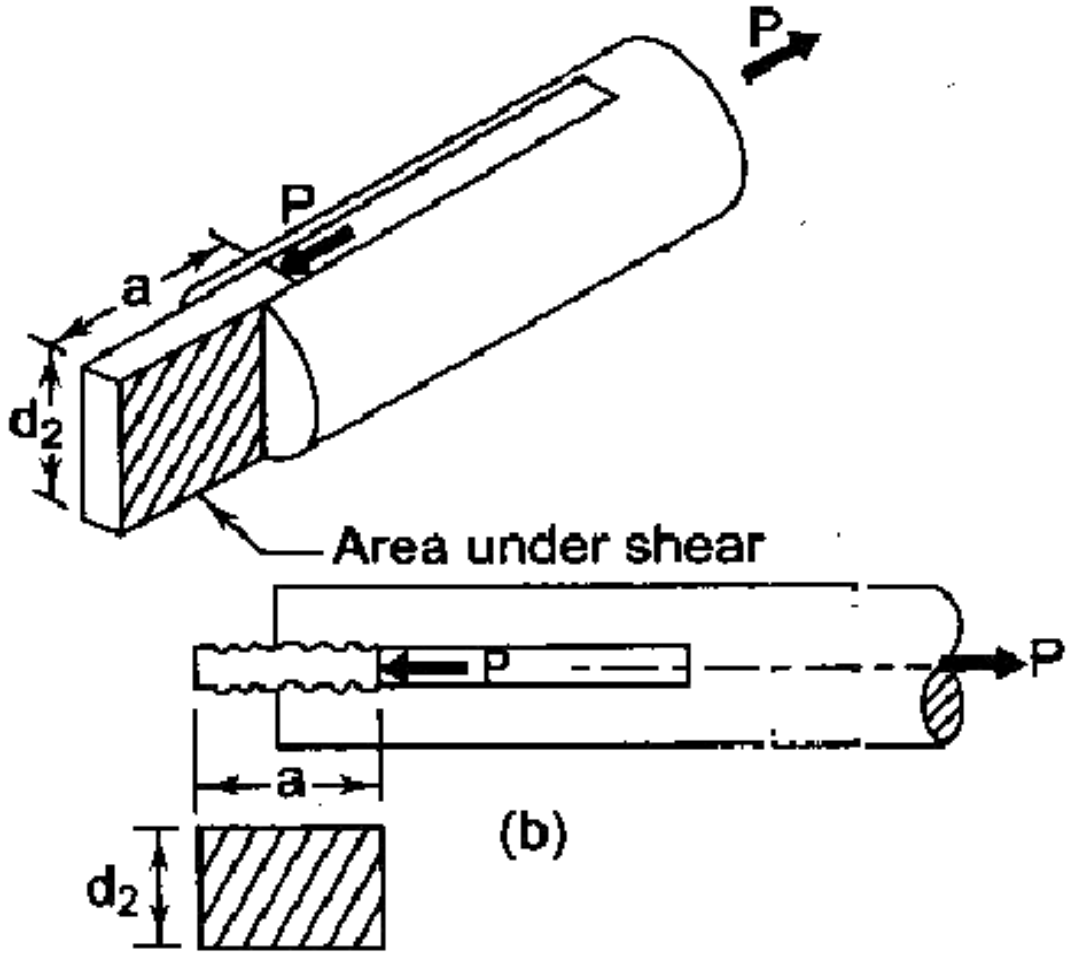


$$2btτ = P$$

Cotter Joints

5. Shear Failure of rod end

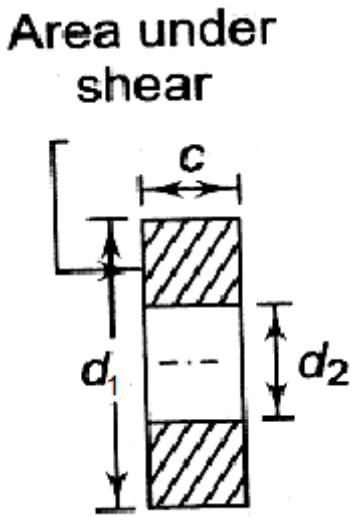
$$2adt = P$$

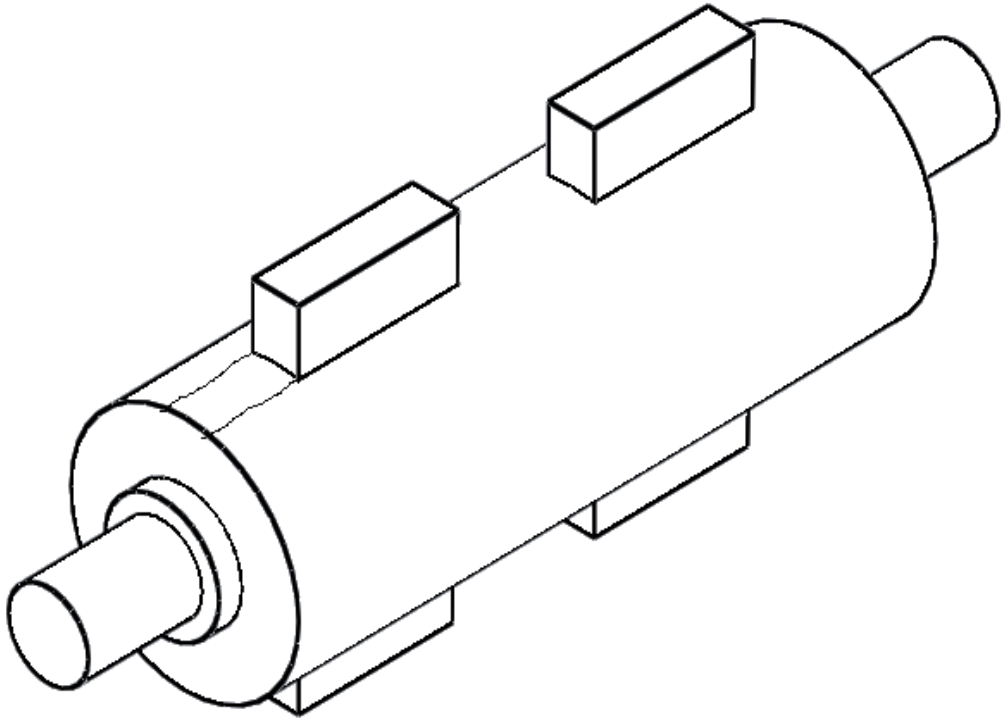


Cotter Joints

6. Shear Failure of Socket end

$$(d_1 - d_2)c = \mathrm{P}$$

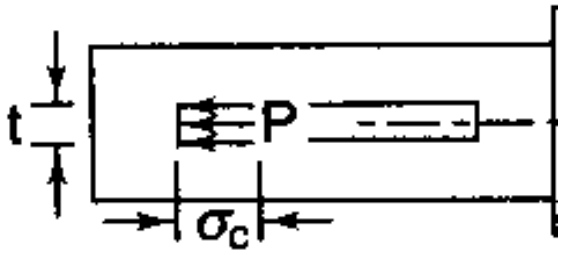


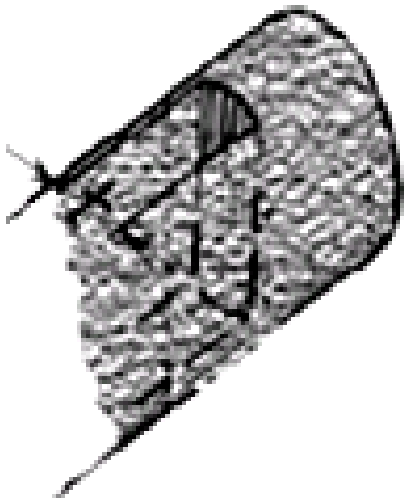


Cotter Joints

7. Crushing Failure of rod or cotter

$$d_2 t \sigma_c = P$$

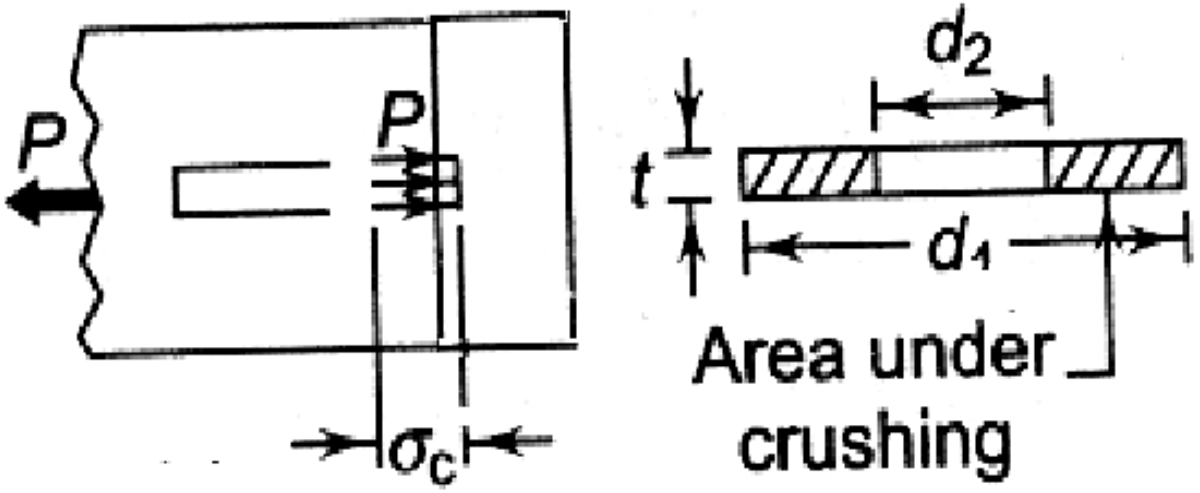




Cotter Joints

8. Crushing Failure of Sleeve or cotter

$$(d_1 - d_2)t\sigma_c = \mathrm{P}$$



Cotter Joints

Problem 2

Design a sleeve type cotter joint which may be subjected to a pull or push of 40KN. All the parts of the joint are made of the same material.

References

ABDULLA SHARIF, Design of Machine Elements, Dhanpat Rai Publications (P) Ltd, New Delhi, 1995.

V. B. Bhandari, Design of Machine Elements, Third Ed., The McGraw-Hills Companies, New Delhi

R. S. KHURMI and J.K.GUPTA, A Text Book of Machine Design, S.Chand and company ltd., New Delhi, 2000.

http://www.nptel.iitm.ac.in

https://machinedesign.top/content/Introduction%20to%20Machine%20Design