

Wood Component Design

Component Design

- **Tension Members**
- **Compression Members**
- **Bending Members**
- **Combined Bending and Axial Loading**
- **Design for Bearing**

Component Design

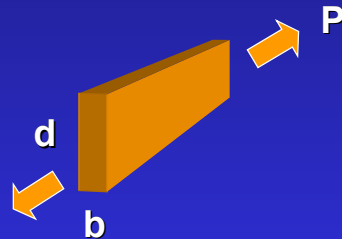
- Net section area is used in calculating load carrying capacity
- Eccentricity of loads is accounted for
- Fasteners (bolts, lag screws, etc.) spaced closer than 4 D are considered to occur at the same section

Tension Member Design

- Use net section area
- Avoid tension perpendicular-to-grain stresses if possible

$$f_t = \frac{P}{bd} \leq F_t'$$

$$F_t' = F_t C_D C_M C_t C_F C_i$$





Tension Design Example

- Given:
 - 10-ft-long truss chord
 - No. 1 southern pine 2x8
 - Axial loads of 9000 lb. Snow and 1000 lb. Dead

←  → 10,000 lb.

- Find:
 - Is member sized properly?
- Assume:
 - Dry conditions
 - Normal temperatures

Solution:

- Check load combinations from Standard Building Code
 - for tension: D + S

Design Data: No. 1 southern pine 2x8

$$A = 10.88 \text{ in}^2$$

$$F_t = 825 \text{ psi}$$

$$S_{xx} = 13.14 \text{ in}^3$$

$$E = 1.7 \times 10^6 \text{ psi}$$

$$I_{xx} = 47.63 \text{ in}^4$$

Design Data: No. 1 southern pine 2x8

$$C_D = 1.15 \text{ for snow load}$$

$$C_M = 1.0$$

$$C_t = 1.0$$

$$C_F = 1.0 \text{ for southern pine 2x8}$$

$$C_i = 1.0 \text{ (not incised)}$$

- Tension Check

$$f_t = \frac{P}{A} = \frac{10,000 \text{ lbs}}{10.88 \text{ in}^2} = 919 \text{ psi}$$

$$F'_t = (825 \text{ psi})(1.15) = 948 \text{ psi}$$

- Since actual stress is less than adjusted allowable stress, the member is sized properly