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

\[ f_t = \frac{P}{bd} \leq F_t' \]

\[ F_t' = F_t C_D C_M C_t C_F C_i \]
Bottom chords and some webs will be in tension

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

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**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

- \(C_D = 1.15\) for snow load
- \(C_M = 1.0\)
- \(C_t = 1.0\)
- \(C_F = 1.0\) for southern pine 2x8
- \(C_i = 1.0\) (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}
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- Since actual stress is less than adjusted allowable stress, the member is sized properly