Glued-Laminated Timber

- Structural glued-laminated timber (glulam) is a highly engineered, stress-rated product
- Made from selected lumber laminations bonded together on wide faces with structural adhesive
- End joints are used to splice lumber together longitudinally to form laminations
- Can be fabricated in typical rectangular shapes or in pitched, tapered, or curved shapes
Glued-Laminated Timber

- Most common species groups:
  - southern pine
  - Western species (Douglas fir, Hem fir)
- Two types of products:
  - stock beams
    - used as a commodity product
  - custom beams
    - laminators provide engineering services
- Two industry agencies:
  - American Institute of Timber Construction (AITC)
  - American Plywood Association (APA-EWS)

Stock beams
Custom beams
Glued-Laminated Timber

- Lamination process removes or disperses strength-reducing characteristics found in sawn lumber

Sawn Lumber

Knot

Glulam

A-A
Glued-Laminated Timber

- Glulam specified by
  - Combination symbol
  - Stress Class

- Bending combinations
  - intended for use as a beam
  - examples:
    - 24F-V3  (2400 psi allowable bending value, fabricated from visually graded lumber)
    - 24F-E3  (2400 psi allowable bending value, fabricated from mechanically graded lumber)
Glued-Laminated Timber

- Stress Class
  - Simplifies selection of beams
  - Allows the engineer to select a general stress level without selecting particular combination
  - examples:
    - **24F-1.8E**
      - 2400 psi allowable bending value,
      - 1.8 million psi MOE,
      - fabricated from visually graded or E-Rated lumber
      - Contains several actual combinations

Glulam Bending Combinations

- Lower quality laminations used in low stress regions of beams
- High quality laminations used in compression and tension zones of beams
Custom beams
**Glued-Laminated Timber**

- **Axial combinations**
  - intended for use as columns, tension members, truss chords, bridge deck panels
  - examples:
    - Combination 48

**Glulam Axial Combinations**

Uniform grade of lumber used throughout the cross section
Sample Glulam Quality Mark

Intended structural use
(B = simple span beam, C = compression member, T = tension member, CB = cantilever or continuous)

Appearance Grade
(IND = industrial, FRAMING=framing, ARCH = architectural, PREM = premium)

Indicates designated plant met all qualification and QC requirements of AITC

Plant number

Species Group

Combination Symbol (24F-V4)

Conformance to AITC/ANSI A190
Specifying Glued-Laminated Timber

- Glulam combination symbol
- Lamination species group
- Manufacturing standard (ANSI/AITC A190)
- Size of member
- Adhesives (wet use for exterior)
- Moisture Content
- Appearance grade (Premium, Architectural, Industrial)
- Quality marks and certificates