Iron & Steel Trusses

- cast iron
  - 18th century
  - chain links
- wrought-iron
- rivets

Truss Connections

- gusset plates
- bolts
- welds

Trusses

- require lateral bracing
- consider buckling
- indeterminate trusses
  - extra members
  - solvable with statics
    - cables can’t hold compression
  - displacement methods
  - elastic elongation
  - too few members, unstable

Steel Trusses
- require lateral bracing
- consider buckling
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Manufactured Trusses

- open web joists
- parallel chord

Open Web Joists

- SJI: www.steeljoist.com
- Vulcraft: www.vulcraft.com
  - K Series (Standard)
    - 8-30” deep, spans 8-50 ft
  - LH Series (Long span)
    - 18-48” deep, spans 25-96 ft
  - DLH (Deep Long Spans)
    - 52-72” deep, spans 89-144 ft
  - SLH (Long spans with high strength steel)
    - pitched top chord
    - 80-120” deep, spans 111-240 ft

Decks

- sheet steel
- composite

Plate Girders

- welds
- web stiffeners
**Web Bearing**

- max loads

\[ P_{n(max-end)} = (N + 2.5k)F_{yw}t_w \]

\[ P_{n(max-interior)} = (N + 5k)F_{yw}t_w \]

**Space Trusses**

- 3D with 2 force bodies and pins
  - pyramid
  - tetrahedron
- “frames” have fixed joints
- layers
- 40’s

**Space Trusses**

- connections
- supports
Space Trusses

Tensegrities
- 3D frame
- discontinuous struts
- continuous cables

Method of Sections
- relies on internal forces being in equilibrium on a section
- cut to expose 3 or less members
- coplanar forces \( \sum M = 0 \) too

Method of Sections
- joints on or off the section are good to sum moments
- quick for few members
- not always obvious where to cut or sum