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
    - diagonal tension counters
  - solvable with statics
    - cables can’t hold compression
  - displacement methods
    - elastic elongation
  - too few members, unstable
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

Load Tables - w

Decks

- sheet steel
- composite
**Light-gage Steel**

- sheet metal
  - shaped
  - studs, panels, window frames
- gage
  - based on weight of 41.82 lb/ft² / inch of thickness
  - 24, 22, 18, 16, i.e.
  - 0.0239, 0.0329, 0.0474, 0.0598 in
  - 0.6, 0.85, 1.0, 1.3, 1.6 mm

**Steel Decks**

- “Texas” style
  - corrugated
- common
  - 1 – 3 spans
  - can be insulated
  - composite
  - with concrete

**Steel Decks**

- common fire proofing
  - cementitious spray
  - composite concrete
- non-composite
  - concrete is fill
- lateral bracing
- diaphragm action

**Load Tables - w**

- live load deflection limit
  - L/240

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**Load Tables - w**

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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

Steel 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 → $\Sigma M = 0$ 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