Truss Connections

- gusset plates
- bolts
- welds

Iron & Steel Trusses

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

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

![Load Tables](image)

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
  - 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

<table>
<thead>
<tr>
<th>No. of spans</th>
<th>Depth</th>
<th>Width of web (in)</th>
<th>Allowable live load</th>
<th>Minimum load</th>
<th>Deflection limit</th>
<th>L/240</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>7</td>
<td>144</td>
<td>1.5 B</td>
<td>1.5 B</td>
<td>1.5 B</td>
<td>1.5 B</td>
</tr>
<tr>
<td>2</td>
<td>7</td>
<td>152</td>
<td>2.0 B</td>
<td>2.0 B</td>
<td>2.0 B</td>
<td>2.0 B</td>
</tr>
</tbody>
</table>
Plate Girders

- welds
- web stiffeners

Steel Trusses

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

Web Bearing

- max loads

\[
P_{n(\text{max-end})} = (N + 2.5k)F_yt_w
\]

\[
P_{n(\text{max-interior})} = (N + 5k)F_yw t_w
\]
Space Trusses

Tensegrities
- 3D frame
- discontinuous struts
- continuous cables

Free Ride Home – Kenneth Snelson

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

\[ \text{Diagram} \]