Welded Connection Design

- considerations
  - shear stress
  - yielding
  - rupture

Welded Connection Design

- weld terms
  - butt weld
  - fillet weld
  - plug weld
  - throat
- field welding
- shop welding
Welded Connection Design

- **weld process**
  - melting of material
  - melted filler - electrode
  - shielding gas / flux
  - potential defects

- **weld materials**
  - E60XX
  - E70XX
  - \( F_{EXX} = 70 \text{ ksi} \)

Welded Connection Design

- **minimum**
  - table

- **maximum**
  - material thickness ( to \( \frac{1}{4}'' \))
  - 1/16” less

- **min. length**
  - 4 x size min.
  - \( \geq 1 \frac{1}{2}'' \)

- **shear**
  - table for \( \phi S \)

Welded Connection Design

- **shear failure assumed**

- **throat**
  - \( T = 0.707 \times \text{weld size} \)

- **area**
  - \( A = T \times \text{length of weld} \)

- **weld metal generally stronger than base metal** (ex. \( F_y = 50 \text{ ksi} \))
Framed Beam Connections

• welded example (shear)

(AISC - Steel Structures of the Everyday)

Framed Beam Connections

• welded moment example

(AISC - Steel Structures of the Everyday)

Framed Beam Connections

• welded/bolted moment example

(AISC - Steel Structures of the Everyday)
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

- load tables

Steel Decks

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

Steel Decks

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