Metal Working Processes, Tools, and Machines
(sheet and small section steel)

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CHAB Stove Camp
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“Raw” Materials

- Plain steel sheet
- Galvanized steel sheet – flat, corrugated, d-rib
- Stainless steel sheet
- Plain steel rod, rebar, bar, angle
- Slotted angle
- Expanded metal
- Hardware cloth
- Steel pipe, conduit
Why Steel?

• Cheap
• Durable
• Takes high temperatures
• Not too difficult to work
• Stainless - takes heat better but is harder and much more expensive and less heat conductive
“Processed” materials

• Stovepipe
• Steel buckets
• Steel drums/barrels
• Stainless steel “Cornys”
• Pots and bowls
• Cast iron grates
Measuring and Marking

- Scale/ruler
- Tape measure (length and diameter)
- Square
- Protractor
- Scribe (w or w/o blacking and bluing)
- Pens, pencils
- Dividers/compass
- Snap punch
- Center punch
- Sheet metal gauge
Measuring tools
Marking tools
Making Holes

• “Church key” can opener
• Twist drills (lousy in sheet metal)
• Step drills (great in sheet metal) – small
• Hole saws (bimetal and carbide teeth) – large
• Hollow punches
• Hand punches
• Knockout punches
• Foot lever punches
Twist drills

Step drills
Hole saws

Bimetal

Carbide
Hollow punches

Hand punches
Knockout punches

Foot lever punch
Cutting

- Hammer and chisel
- Hand and power snips
- Hand and power nibblers
- Hand notchers
- Hand and foot lever notchers
- Slotted angle shear
- Angle shear, notcher
- Circle cutter
- Circle shear
- Hand lever shear
- Foot shear
- Rotary can openers
- Drum deheader
- Angle grinder
- Hand and power saws (hack, jig, circular, chop, ...
Snips
Nibblers
Hand notchers
Lever notchers

Hand lever notcher: 6”-152mm

Foot lever notcher: 3 1/8”-80mm
Slotted angle shear
Circle cutter – electric drill powered
Hand lever shears
Shear machines

Foot shear

Circle shear - manual
Drum deheaders
Grinding

- Stones
- Files
- Angle grinder (electric, pneumatic)
- Grinding wheel (hand, foot, electric)
Angle grinders
Bending

• Pliers benders
• Cleat bender
• Sheet metal brake
• Angle bender
Pliers benders
Bending machines

Cleat bender
(1/2” (12.5mm) 180° fold)

Sheet metal brake (bender)
Angle iron cutter, notcher, bender
Rolling
(making cylinders and rings)

• Hand rolling
• Slip roller – sheet metal
• Bead roller, edger, flanger
• Ring roller – bar/angle/rod
Manual rolling machines

- Slip roll
- Bead roller
- Ring roller
Joining

• Crimping
• Bending (tab and slot)
• Riveting
• Screwing
• Bolting
• Spot welding
• Welding
Rivet gun
Spot welder