

Ironworker (Generalist) Level 2

Ironworker (Generalist)

Unit: C3 Welding II

Level: Two

Duration: 35 hours

Theory: 17 hours

Practical: 18 hours

Overview:

Outcomes include improved knowledge of the equipment, accessories, and procedures associated with welding and gouging operations.

Objectives and Content:	<u>Percent of Unit Mark (%)</u>
1. Describe instructor-specified topics associated with welding and gouging.	25%
a. Significant technical terminology	
b. welding processes, including description of characteristics and applications	
• Shielded metal arc welding (SMAW)	
• Gas metal arc welding (GMAW)	
• Gas tungsten arc welding (GTAW)	
• Flux core arc welding (FCAW)	
• Stud welding	
• Arc-spot welding (ASW)	
• Submerged arc welding (SAW)	
c. Types of weld performed using welding equipment	
d. Welding positions and their application	
2. Describe and demonstrate application of industry standards re: welding and gouging.	25%
a. Identification of hazards and precautions	
• Personal;	
• Shop/facility	
• Equipment	
• Ventilation	
• Storage/handling	
b. Codes and standards (including Canadian Welding Bureau [CWB])	
c. Interpreting welding/gouging information (including symbols and abbreviations) communicated <i>via</i> technical drawings	
3. Describe and demonstrate specified procedures and practical requirements re: welding and gouging.	50%
a. Identification of welding equipment, consumables, and accessories, including their application(s) re: FCAW, ASW, and stud-welding	
Identification of welding equipment, consumables, and accessories, including their application(s) re: arc-air gouging	
b. Setting up and adjusting welding equipment re: FCAW, ASW, and stud-welding	
c. Inspection, maintenance, and storage of welding equipment re: FCAW, ASW, and stud-welding	
d. Perform welding using equipment per: FCAW, ASW, and stud-welding requirements	
e. Perform arc-air gouging	

Ironworker (Generalist)

Unit: C4 Plasma-Arc Cutting

Level: Two

Duration: 35 hours

Theory: 17 hours

Practical: 18 hours

Overview:

Outcomes include improved knowledge of plasma-arc cutting equipment, accessories, and associated procedures for cutting.

Objectives and Content:	<u>Percent of Unit Mark (%)</u>
1. Describe procedure for plasma-arc cutting, including associated technical terminology, equipment/accessories, and applications.	25%
2. Describe instructor-specified procedures re: operation of plasma-arc cutting equipment.	25%
a. Identifying hazards, precautions, and safe work practices	
• Personal	
• Shop/facility	
• Equipment	
• ventilation	
• Storage/handling	
b. Set up, adjust, and shut down plasma-arc cutting equipment.	
c. Inspect, maintain, and store plasma-arc cutting equipment.	
3. Describe and demonstrate practical use of plasma-arc cutting equipment.	50%
a. Cutting procedures, including free-hand and straight-edge guided	
b. Recognizing common cutting-faults, and techniques for preventing them	
c. Set-up, operation, and shut-down.	

Ironworker (Generalist)

Unit: D4 Hydraulic & Conventional Cranes

Level: Two

Duration: 7 hours

Theory: 7 hours

Practical: 7 hours

Overview:

This unit's major outcomes include improved knowledge of procedures to erect, set-up and disassemble hydraulic and conventional cranes, including the components and accessories associated with these varieties of modern hoisting-equipment technology.

Objectives and Content:	<u>Percent of Unit Mark (%)</u>
1. Describe the variety of modern crane equipment including such considerations as important components/attachments, including preferred applications, specific limitations, and associated technical terminology.	20%
2. Describe communication procedures associated with the operation of hydraulic and conventional crane. a. Hand signals b. Electronic communications c. Audible/visual	15%
3. Describe and demonstrate procedure for assembling and setting up hydraulic and conventional crane equipment on-site, including hazard assessment. a. Site-hazard assessment · Overhead powerlines · Underground services · Obstructions · Soil/ground conditions b. Crane position · Radius/swing area · Quadrants of operator · headroom	50%
4. Describe and demonstrate procedure for disassembling and transporting hydraulic and conventional crane equipment, including their components, accessories, and attachments.	15%

Ironworker (Generalist)

Unit: D5 Tower Cranes

Level: Two

Duration: 21 hours

Theory: 14 hours

Practical: 7 hours

Overview:

This unit's major outcomes include improved knowledge of procedures to erect, set-up and disassemble hydraulic tower cranes, including the components and accessories associated with this variety of modern hoisting-equipment technology.

Objectives and Content:	<u>Percent of Unit Mark (%)</u>
1. Describe the variety of modern crane equipment including such considerations as important components/attachments, including preferred applications, specific limitations, and associated technical terminology.	35%
a. Fixed	
b. Mobile	
2. Describe communication procedures associated with the operation of tower cranes.	10%
a. Hand signals	
b. Electronic communications	
c. Audible/visual	
3. Describe procedure for assembling and setting up tower-crane equipment on-site, including hazard assessment.	55%
a. Important considerations re: on-site assembly and set-up on-site, including:	
• Site-hazard assessment (overhead powerlines, obstructions, etc.)	
• Crane position, including crane radius/swing area	
b. Procedures to erect, set-up, and climb/jump tower cranes	
c. Procedures to disassemble tower cranes, including their components, accessories, and attachments	
d. Procedure to prepare tower cranes for transport	

Ironworker (Generalist)

Unit: E2 Reinforcing II

Level: Two

Duration: 35 hours

Theory: 14 hours

Practical: 21 hours

Overview:

This unit's major outcomes include improved ability to demonstrate knowledge of trade procedures for assembling and installing reinforcing material.

Objectives and Content:	<u>Percent of Unit Mark (%)</u>
1. Interpret standards that are prescribed re: the bending of reinforcing material.	10%
a. Canadian Standards Association (CSA)	
b. Concrete Reinforcing Steel Institute (CRSI)	
c. American Concrete Institute (ACI)	
d. American National Standards Institute	
2. Perform calculations re: reinforcing concrete.	40%
a. Length	
b. Cover	
c. Splices	
d. Weights	
a. Quantities	
b. Bar Spacing	
3. Describe and demonstrate procedures for fabricating, installing, and stabilizing reinforcing materials.	50%
a. Procedure for pre-fabricating, including:	
• Lay out of materials	
• Cutting, bending, and splicing materials	
b. Procedure for installing, including:	
• Placement of materials	
• Securement of materials	
c. Procedure for ensuring that reinforcing materials remain stable during concrete-pouring operations.	

Ironworker (Generalist)

Unit: E3 Pre-Stressing & Post-Tensioning

Level: Two

Duration: 35 hours

Theory: 14 hours

Practical: 21 hours

Overview:

This unit's major outcomes include improved ability to demonstrate knowledge of pre-stressing and post-tensioning systems, system components, and procedures for placing and stressing post-tensioning systems.

Objectives and Content:	<u>Percent of Unit Mark (%)</u>
1. Explain the purpose and effects of pre-stressing and post-tensioning re: built structures.	5%
2. Describe the significant terminology, components, variations, and applications associated with pre-stressing and post-tensioning.	10%
a. Types of pre-stressing/post-tensioning systems, including their defining characteristics and chief applications <ul style="list-style-type: none">• Bonded (strand; wire; bar)• Unbonded (strand; wire; bar)	
b. Materials, components, and accessories, including their defining characteristics and chief applications <ul style="list-style-type: none">• Tendons• Bursting steel• Anchoring devices• Conduits• Supports• Grout• Connectors	
3. Describe and interpret codes, regulations, and other technical documents that govern the Ironworker trade's pre-stressing and post-tensioning practices.	20%
a. Standards and related technical considerations re: special hazards, precautions and safe work-practices re: pre-stressing and post-tensioning procedure, including: <ul style="list-style-type: none">• Engineered products and specifications• Restricted access to work zone	
b. Hazards, including: <ul style="list-style-type: none">• Danger zones• Structural failure• Equipment failure	
c. Interpreting codes and regulations	
b. Interpreting drawings and specifications to derive technical information about pre-	

stressing/post-tensioning.

- Danger zones
- Structural failure
- Equipment failure

4. Describe and demonstrate instructor-specified procedures for completing pre-stressing/post-tensioning job assignments with particular emphasis upon tool-equipment use. 40%

- a. Identification of tools/equipment for pre-stressing and post-tensioning and explanation of their preferred applications, including:
 - Lay-out tools and equipment
 - Stressing equipment (e.g. single-strand and multi-strand jacks)
 - Grouting equipment (including mixer; storage hopper; screen; pump; pressure gauges; hoses)
- b. Procedure to set-up, operate, and dismantle pre-stressing/post-tensioning equipment.
- c. Procedure to inspect, maintain, and store pre-stressing/post-tensioning equipment
- d. Procedure to place pre-stressing/post-tensioning systems
 - Layout profile
 - Place tendons and accessories
 - Install bursting steel and anchorage
 - Connect tendons to anchors
 - Protect exposed tendons
- e. Procedure to stress tendons
 - Tension tendons
 - Cut and couple tendons
 - Document elongation and gauge pressure
 - Depressurize and remove equipment

5. Describe and demonstrate procedures for finishing tendons and for grouting tendons in bonded systems. 25%

- a. Finishing tendons (including bonded *versus* unbounded)
- b. Grouting tendons in bonded system
 - Verifying post-tensioning duct system
 - Batching and mixing grout
 - Testing grout
 - Injecting grout
 - Releasing trapped air
 - Post-grouting inspection
 - Sealing of grout inlets/outlets

Ironworker (Generalist)

Unit: F3 Structural-Steel Erection & Dismantling

Level: Two

Duration: 35 hours

Theory: 14 hours

Practical: 21 hours

Overview:

This unit's major outcomes include improved knowledge of structural steel components and their characteristics, with particular reference to procedures, standards, and practices associated with erecting, dismantling, and removing these members.

Objectives and Content:	Percent of Unit Mark (%)
1. Describe the erection, dismantling, and removal of instructor-specified structural members.	10%
a. Major structural steel shapes	
• I-beam	
• H-beam	
• Wide flange	
• Welded wide flange	
• Angle	
• Channel	
• Tee	
• Hollow structural shapes (HSS)	
• Miscellaneous shapes	
b. Primary Steel structural components	
• Columns	
• Girders	
• Beams	
• Trusses	
• joists	
c. Secondary Steel structural components	
• Decking	
• Girts	
• Purlins	
• Sag rods	
• Bracing	
• Bridging	
• Lintels	
d. Miscellaneous structural components	
• Precast	
• Glued laminated timber products	
• Composite	
e. Significant technical terminology associated with structural-steel projects	
f. Major structural steel shapes, including their designation, characteristics, and application(s)	

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| 2. Interpret instructor-specified technical documents to identify special hazards and fulfill other technical requirements associated with erecting and dismantling structural-steel components. | 10% |
| a. Special hazards, precautions and safe work-practices | |
| b. Identification and use of relevant codes, regulations, and standards | |
| c. Practical use of technical drawings and project specifications | |
| d. Practical procedure to inspect structural steel and ensure conformity with standards | |
| • Visual | |
| • Mechanical | |
| s | |
| 3. Demonstrate procedures to erect, install, level, plumb, and align structural steel members. | 40% |
| 4. Demonstrate procedure to dismantle and remove structural steel members and components. | 40% |
