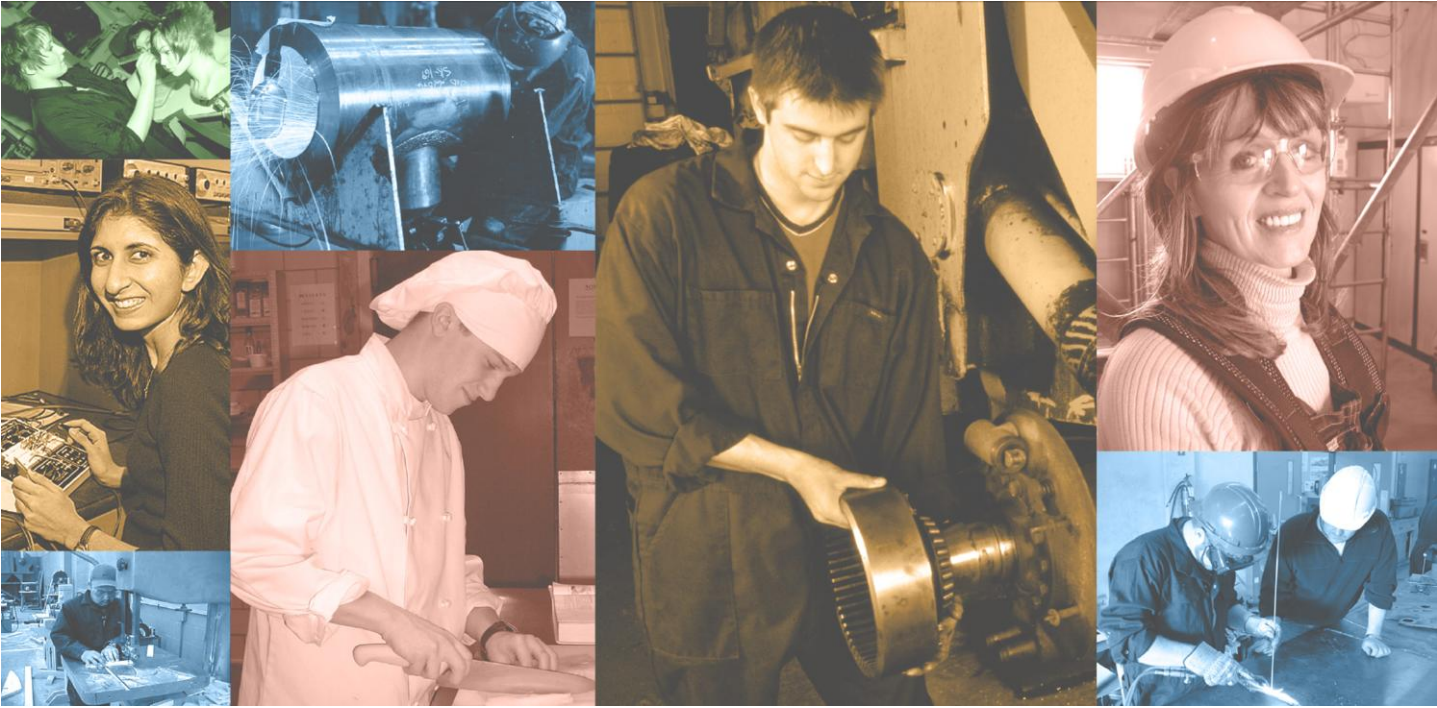


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# Plan of Training



**Government of Newfoundland and Labrador  
Department of Advanced Education and Skills  
Apprenticeship and Trades Certification Division**

# PLAN OF TRAINING

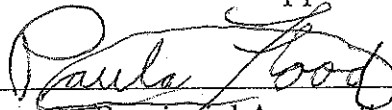
## Welder

March 2013



Government of Newfoundland and Labrador  
Department of Advanced Education and Skills  
Apprenticeship and Trades Certification Division

Approved by:



Chairperson, Provincial Apprenticeship and Certification Board

Date: March 26/13

## Preface

This Apprenticeship Standard is based on the 2009 version of the National Occupational Analysis for the Welder trade.

This document describes the curriculum content for the Welder apprenticeship training program and outlines each of the technical training units necessary for the completion of apprenticeship.

## Acknowledgements

Advisory committees, industry representatives, instructors and apprenticeship staff provided valuable input to the development of this Apprenticeship Curriculum Standard. Without their dedication to quality apprenticeship training, this document could not have been produced.

We offer you a sincere thank you.

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<b>Document Status</b>	<b>Date Distributed</b>	<b>Mandatory Implementation Date</b>	<b>Comments</b>
Approved		September, 2013	

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**A. Profile Chart**

OCCUPATIONAL SKILLS			
WD1390 Safety	WD1190 Tools and Equipment	WD1701 Stationary Machinery	WD1430 Hoisting, Lifting, Rigging and Access Equipment
WD1790 Work Planning	WD1661 Blueprint Reading 1 (Basic)	WD1670 Blueprint Reading 2 (Welding Symbols)	WD1682 Metallurgy
WD1691 Quality Control			
PREPARATION FOR WELDING PROCESSES			
WD1430 Hoisting, Lifting, Rigging and Access Equipment	WD3020 Shop Drawings and Structural Components for Fabrication	WD1721 Jigs and Fixtures	WD2910 Layout and Template Development Fundamentals
CUTTING AND GOUGING			
WD1602 Oxy-fuel Cutting, Heating, Gouging and Welding	WD1651 Plasma Arc Cutting and Gouging	WD1900 Air Carbon Arc Cutting and Gouging	

WELDING PROCESSES			
WD1610 SMAW (Shielded Metal Arc Welding) 1-Set-up, Strike and Maintain an Arc	WD1620 SMAW (Shielded Metal Arc Welding) 2-Fillet Weld, All Positions	WD1801 SMAW (Shielded Metal Arc Welding) 3 - Groove Weld 1G, 2G, 1GF, 2GF, 3GF, and 4GF	WD1815 Fillet and Groove Weld, Medium and High Carbon Steel using FCAW, GMAW, GTAW, MCAW and SMAW
WD 2142 SMAW (Shielded Metal Arc Welding) 4- Groove Welds Mild Steel Plate, 3G, 4G and 6G	WD2501 SMAW (Shielded Metal Arc Welding) 5-Alloy Steels	WD3040 SMAW (Shielded Metal Arc Welding) 6-Pipe, All Positions, Mild Steel	WD1631 GMAW (Gas Metal Arc Welding) 1-Set-up and Maintain an Arc
WD1821 GMAW (Gas Metal Arc Welding) 2-Fillet Weld All Positions, Mild Steel	WD1832 GMAW (Gas Metal Arc Welding) 3-Groove Weld, All Positions, Mild Steel	WD2521 GMAW (Gas Metal Arc Welding) 4-Pipe and Tubing, All Positions, Mild Steel	WD2531 GMAW (Gas Metal Arc Welding) 5-Aluminum and Stainless Steel
WD1641 GTAW (Gas Tungsten Arc Welding) 1-Set-Up and Deposit a Weld	WD2840 GTAW (Gas Tungsten Arc Welding) 2-Fillet Weld All Positions, Mild Steel	WD2542 GTAW (Gas Tungsten Arc Welding) 3-Alloy and Non-Ferrous Metals	WD3010 GTAW (Gas Tungsten Arc Welding ) 4-Fillet (3F, 4F) and Groove Weld All Positions, Mild Steel Plate
WD3030 GTAW (Gas Tungsten Arc Welding) 5-Pipe and Tubing, All Positions, Mild Steel	WD1741 FCAW (Flux Core Arc Welding) 1-Set-Up and Deposit a Weld	WD1892 FCAW (Flux Core Arc Welding) 2-Fillet and Groove Weld Plate, All Positions	WD2552 FCAW (Flux Core Arc Welding) 3-Pipe and Tubing, All Positions, Mild Steel

WD1360 MCAW (Metal Core Arc Welding) 1-Set-up and Deposit a Weld	WD2740 MCAW (Metal Core Arc Welding) 2-Fillet and Groove Weld Plate, Flat and Horizontal, Mild Steel	WD2561 SAW (Submerged Arc Welding)	WD2411 Stud Welding and Resistance Spot Welding
WD1871 Build Up of Metal Parts			



## B. NOA Comparison Chart

NOA 2009 Tasks		2013 POT	
<b>Task 1 – Maintains and uses tools and equipment.</b>			
1.01	Uses personal protective equipment (PPE) and safety equipment.	WD1390	Safety
1.02	Maintains hand tools.	WD1190	Tools and Equipment
1.03	Maintains power tools.		
1.04	Maintains stationary machinery.	WD1701	Stationary Machinery
1.05	Maintains layout and measuring tools.	WD1190	Tools and Equipment
1.06	Maintains cutting and welding equipment.	WD1651	Plasma Arc Cutting and Gouging
		WD1900	Air Carbon Arc Cutting and Gouging
		WD1610	SMAW 1 - Set-up, Strike and Maintain an Arc
		WD1631	GMAW 1 - Set-up and Maintain an Arc
		WD1641	GTAW 1 - Set-up and Deposit a Weld
		WD1741	FCAW 1 - Set-up and Deposit a Weld
1.06		WD1360	MCAW 1 - Set-up and Deposit a Weld
1.07	Uses access equipment.	WD1430	Hoisting, Lifting, Rigging and Access Equipment
<b>Task 2 - Organizes work.</b>			
2.01	Maintains safe work environment.	WD1390	Safety
2.02	Uses documentation and reference material.	CM2160	Communication Essentials
		SD1760	Workplace Essentials
2.03	Interprets plans, drawings and specifications.	WD1661	Blue Print Reading 1 (Basic)
		WD1670	Blue Print Reading 2 (Welding Symbols)

NOA 2009 Tasks		2013 POT	
2.04	Communicates with others.	CM2160	Communication Essentials
2.05	Compiles a list of materials and supplies.	WD1790	Work Planning
2.06	Plans project tasks.		
<b>Task 3 - Performs quality control.</b>			
3.01	Performs inspection.	WD1691	Quality Control
3.02	Marks materials and parts.		
3.03	Verifies layout.		
3.04	Verifies measurements.		
3.05	Performs heat treatment.	WD1682	Metallurgy
3.06	Stores consumables.		Throughout
<b>Task 4 - Performs routine trade activities.</b>			
4.01	Performs hazard assessments.	WD1390	Safety
4.02	Selects power source for welding processes.	WD1610	SMAW 1- Set-up, Strike and Maintain an Arc)
		WD1631	GMAW 1 - Set-up and Maintain an Arc
		WD1641	GTAW 1 - Set-up and Deposit a Weld
		WD1741	FCAW 1 - Set-up and Deposit a Weld
		WD1360	MCAW 1 - Set-up and Deposit a Weld
4.03	Performs equipment start-up and shut down.	WD1610	SMAW 1- Set-up, Strike and Maintain an Arc
		WD1741	FCAW 1 - Set-up and Deposit a Weld
		WD1631	GMAW 1 - Set-up and Maintain an Arc
		WD1641	GTAW 1 - Set-up and Deposit a Weld
		WD1360	MCAW 1 - Set-up and Deposit a Weld
		WD2411	Stud Welding and Resistance Spot Welding
		WD2561	SAW (Submerged Arc Welding)

NOA 2009 Tasks		2013 POT	
<b>Task 5 - Handles materials.</b>			
5.01	Obtains materials.	WD1691	Quality Control
5.02	Verifies bill of materials.	CM2160	Communication Essentials
		SD1760	Workplace Essentials
5.03	Organizes materials.	WD1790	Work Planning
5.04	Uses rigging, hoisting and lifting equipment.	WD1430	Hoisting, Lifting, Rigging and Access Equipment
5.05	Operates material handling equipment.		
<b>Task 6 - Performs layout.</b>			
6.01	Develops templates.	WD3020	Shop Drawings and Structural Components for Fabrication
		WD2910	Layout and Template Development Fundamentals
6.02	Transfers dimensions from drawings to materials.	WD1661	Blueprint Reading 1 (Basic)
		WD1670	Blueprint Reading 2 (Welding Symbols)
		WD3020	Shop Drawings and Structural Components for Fabrication
		WD2910	Layout and Template Development Fundamentals
<b>Task 7 - Fabricates components.</b>			
7.01	Prepares materials.	WD3020	Shop Drawings and Structural Components for Fabrication
7.02	Fits components.		
7.03	Tacks components.		
7.04	Assembles components.		
7.05	Finishes final product.		
<b>Task 8 - Uses mechanical and power tools for cutting and grinding.</b>			
8.01	Selects cutting and grinding tools.	WD1190	Tools and Equipment
		WD1701	Stationary Machinery
8.02	Cuts using stationary band saws and power hacksaws.	WD1701	Stationary Machinery

NOA 2009 Tasks		2013 POT	
8.03	Cuts using mechanical and hydraulic shears.	WD1190	Tools and Equipment
8.04	Cuts using hand tools.		
8.05	Cuts using grinders.	WD1190	Tools and Equipment
		WD1701	Stationary Machinery
8.06	Cuts using circular saws.	WD1190	Tools and Equipment
8.07	Cuts using reciprocating saws.		
<b>Task 9 - Uses oxy-fuel gas cutting process (OFC) for cutting and gouging.</b>			
9.01	Selects oxy-fuel gas and equipment.	WD1602	Oxy-fuel Cutting, Heating, Gouging and Welding
9.02	Sets up oxy-fuel equipment.		
9.03	Sets operating parameters for oxy-fuel equipment.		
9.04	Operates oxy-fuel equipment.		
<b>Task 10 - Uses plasma arc cutting process (PAC) for cutting and gouging.</b>			
10.01	Selects PAC gas, equipment and consumables.	WD1651	Plasma Arc Cutting and Gouging
10.02	Sets up PAC equipment.		
10.03	Sets operating parameters for PAC.		
10.04	Operates PAC equipment.		
<b>Task 11 - Uses air carbon arc cutting (CAC-A) process.</b>			
11.01	Selects CAC-A equipment and consumables.	WD1900	Air Carbon Arc Cutting and Gouging
11.02	Sets up CAC-A equipment.		
11.03	Sets operating parameters for CAC-A.		
11.04	Operates CAC-A equipment.		
<b>Task 12 - Welds using oxy-acetylene welding process.</b>			
12.01	Selects oxy-acetylene equipment and consumables.	WD1602	Oxy-fuel Cutting, Heating, Gouging and Welding
12.02	Sets operating parameters for oxy-acetylene process.		
12.03	Operates oxy-acetylene equipment.		
<b>Task 13 Welds using shielded metal arc welding process (SMAW).</b>			
13.01	Selects SMAW equipment and consumables.	WD1610	SMAW 1 - Set-up, Strike and Maintain an Arc
		WD1620	SMAW 2 - Fillet Weld, All Positions

NOA 2009 Tasks		2013 POT	
		WD1801	SMAW 3 - Groove Weld 1G, 2G, 1GF, 2 GF, 3GF and 4GF
		WD1815	Fillet and Groove Weld, Medium Carbon Steel using FCAW, GMAW, GTAW, MCAW and SMAW
		WD2142	SMAW 4 - Groove Welds Mild Steel Plate, 3G, 4G and 6G
		WD2501	SMAW 5 - Alloy Steels
		WD3040	SMAW 6 - Pipe, All Positions, Mild Steel
13.02	Sets up SMAW equipment.	WD1610	SMAW 1 - Set-up, Strike and Maintain an Arc
		WD1620	SMAW 2 - Fillet Weld, All Positions
		WD1801	SMAW 3 - Groove Weld 1G, 2G, 1GF, 2 GF, 3GF and 4GF
		WD1815	Fillet and Groove Weld, Medium Carbon Steel using FCAW, GMAW, GTAW, MCAW and SMAW
		WD2142	SMAW 4 - Groove Welds Mild Steel Plate, 3G, 4G and 6G
		WD2501	SMAW 5 - Alloy Steels
		WD3040	SMAW 6 - Pipe, All Positions, Mild Steel
13.03	Sets operating parameters for SMAW.	WD1610	SMAW 1 - Set-up, Strike and Maintain an Arc
		WD1620	SMAW 2 - Fillet Weld, All Positions
		WD1801	SMAW 3 - Groove Weld 1G, 2G, 1GF, 2 GF, 3GF and 4GF

NOA 2009 Tasks		2013 POT	
		WD1815	Fillet and Groove Weld, Medium Carbon Steel using FCAW, GMAW, GTAW, MCAW and SMAW
		WD2142	SMAW 4 - Groove Welds Mild Steel Plate, 3G, 4G and 6G
		WD2501	SMAW 5 - Alloy Steels
		WD3040	SMAW 6 - Pipe, All Positions, Mild Steel
		WD1610	SMAW 1 - Set-up, Strike and Maintain an Arc
		WD1620	SMAW 2 - Fillet Weld, All Positions
13.04	Operates SMAW equipment.	WD1801	SMAW 3 - Groove Weld 1G, 2G, 1GF, 2 GF, 3GF and 4GF
		WD1815	Fillet and Groove Weld, Medium Carbon Steel using FCAW, GMAW, GTAW, MCAW and SMAW
		WD2142	SMAW 4 - Groove Welds Mild Steel Plate, 3G, 4G and 6G
		WD2501	SMAW 5 - Alloy Steels
		WD3040	SMAW 6 - Pipe, All Positions, Mild Steel
		<b>Task 14 - Welds using flux cored arc welding process (FCAW), metal core arc welding process (MCAW) and gas metal arc welding process (GMAW).</b>	
14.01	Selects FCAW, MCAW and GMAW gas, equipment and consumables.	WD1631	GMAW 1 - Set-up and Maintain an Arc
		WD1821	GMAW 2 - Fillet Weld, All Positions, Mild Steel
		WD1832	GMAW 3 - Groove Weld, All Positions, Mild Steel

NOA 2009 Tasks		2013 POT	
		WD1815	Fillet and Groove Weld, Medium Carbon Steel using FCAW, GMAW, GTAW, MCAW and SMAW
		WD2521	GMAW 4 - Pipe and Tubing, All Positions, Mild Steel
		WD2531	GMAW 5 - Aluminum and Stainless Steel
		WD1741	FCAW 1 - Set-up and Deposit a Weld
		WD1892	FCAW 2 - Fillet and Groove Weld Plate, All Positions
		WD2552	FCAW 3 - Pipe and Tubing, All Positions, Mild Steel
		WD1360	MCAW 1 - Set-up and Deposit a Weld
		WD2740	MCAW 2 - Fillet and Groove Weld Plate, Flat and Horizontal, Mild Steel
14.02	Sets up FCAW, MCAW and GMAW equipment.	WD1631	GMAW 1 - Set-up and Maintain an Arc
		WD1821	GMAW 2 - Fillet Weld, All Positions, Mild Steel
		WD1832	GMAW 3 - Groove Weld, All Positions, Mild Steel
		WD1815	Fillet and Groove Weld, Medium Carbon Steel using FCAW, GMAW, GTAW, MCAW and SMAW

NOA 2009 Tasks		2013 POT	
		WD2521	GMAW 4 - Pipe and Tubing, All Positions, Mild Steel
		WD2531	GMAW 5 - Aluminum and Stainless Steel
		WD1741	FCAW 1 - Set-up and Deposit a Weld
		WD1892	FCAW 2 - Fillet and Groove Weld Plate, All Positions
		WD2552	FCAW 3 - Pipe and Tubing, All Positions, Mild Steel
		WD1360	MCAW 1 - Set-up and Deposit a Weld
		WD2740	MCAW 2 - Fillet and Groove Weld Plate, Flat and Horizontal, Mild Steel
14.03	Sets operating parameters for FCAW, MCAW and GMAW.	WD1631	GMAW 1 - Set-up and Maintain an Arc
		WD1821	GMAW 2 - Fillet Weld, All Positions, Mild Steel
		WD1832	GMAW 3 - Groove Weld, All Positions, Mild Steel
		WD1815	Fillet and Groove Weld, Medium Carbon Steel using FCAW, GMAW, GTAW, MCAW and SMAW
		WD2521	GMAW 4 - Pipe and Tubing, All Positions, Mild Steel
		WD2531	GMAW 5 - Aluminum and Stainless Steel
		WD1741	FCAW 1 - Set-up and Deposit a Weld



NOA 2009 Tasks		2013 POT	
		WD1892	FCAW 2 - Fillet and Groove Weld Plate, All Positions
		WD2552	FCAW 3 - Pipe and Tubing, All Positions, Mild Steel
		WD1360	MCAW 1 - Set-up and Deposit a Weld
		WD2740	MCAW 2 - Fillet and Groove Weld Plate, Flat and Horizontal, Mild Steel
14.04	Operates FCAW, MCAW and GMAW equipment.	WD1631	GMAW 1 - Set-up and Maintain an Arc
		WD1821	GMAW 2 - Fillet Weld, All Positions, Mild Steel
		WD1832	GMAW 3 - Groove Weld, All Positions, Mild Steel
		WD1815	Fillet and Groove Weld, Medium Carbon Steel using FCAW, GMAW, GTAW, MCAW and SMAW
		WD2521	GMAW 4 - Pipe and Tubing, All Positions, Mild Steel
		WD2531	GMAW 5 - Aluminum and Stainless Steel
		WD1741	FCAW 1 - Set-up and Deposit a Weld
		WD1892	FCAW 2 - Fillet and Groove Weld Plate, All Positions
		WD2552	FCAW 3 - Pipe and Tubing, All Positions, Mild Steel
		WD1360	MCAW 1 - Set-up and Deposit a Weld

NOA 2009 Tasks		2013 POT	
		WD2740	MCAW 2 - Fillet and Groove Weld Plate, Flat and Horizontal, Mild Steel
<b>Task 15 - Welds using gas tungsten arc welding process (GTAW).</b>			
15.01	Selects GTAW gas, equipment and consumables.	WD1641	GTAW 1 - Set-up and Deposit a Weld
		WD2840	GTAW 2 - Fillet Weld All Positions, Mild Steel
		WD2542	GTAW 3 - Alloy and Non-Ferrous Metals
		WD1815	Fillet and Groove Weld, Medium Carbon Steel using FCAW, GMAW, GTAW, MCAW and SMAW
		WD3010	GTAW 4 - Fillet (3F, 4F) and Groove Weld All Positions, Mild Steel Plate
		WD3030	GTAW 5 - Pipe and Tubing, All Positions, Mild Steel
15.02	Sets up GTAW equipment.	WD1641	GTAW 1 - Set-up and Deposit a Weld
		WD2840	GTAW 2 - Fillet Weld All Positions, Mild Steel
		WD2542	GTAW 3 - Alloy and Non-Ferrous Metals
		WD1815	Fillet and Groove Weld, Medium Carbon Steel using FCAW, GMAW, GTAW, MCAW and SMAW
		WD3010	GTAW 4 - Fillet (3F, 4F) and Groove Weld All Positions, Mild Steel Plate

NOA 2009 Tasks		2013 POT	
		WD3030	GTAW 5 - Pipe and Tubing, All Positions, Mild Steel
15.03	Sets operating parameters for GTAW.	WD1641	GTAW 1 - Set-up and Deposit a Weld
		WD2840	GTAW 2 - Fillet Weld All Positions, Mild Steel
		WD2542	GTAW 3 - Alloy and Non-Ferrous Metals
		WD1815	Fillet and Groove Weld, Medium Carbon Steel using FCAW, GMAW, GTAW, MCAW and SMAW
		WD3010	GTAW 4 - Fillet (3F, 4F) and Groove Weld All Positions, Mild Steel Plate
		WD3030	GTAW 5 - Pipe and Tubing, All Positions, Mild Steel
15.04	Operates GTAW equipment.	WD1641	GTAW 1 - Set-up and Deposit a Weld
		WD2840	GTAW 2 - Fillet Weld All Positions, Mild Steel
		WD2542	GTAW 3 - Alloy and Non-Ferrous Metals
		WD1815	Fillet and Groove Weld, Medium Carbon Steel using FCAW, GMAW, GTAW, MCAW and SMAW
		WD3010	GTAW 4 - Fillet (3F, 4F) and Groove Weld All Positions, Mild Steel Plate
		WD3030	GTAW 5 - Pipe and Tubing, All Positions, Mild Steel

NOA 2009 Tasks		2013 POT	
<b>Task 16 - Welds using submerged arc welding process (SAW).</b>			
16.01	Selects SAW equipment and consumables.	WD2561	SAW (Submerged Arc Welding)
16.02	Sets up SAW equipment.		
16.03	Sets operating parameters for SAW.		
16.04	Operates SAW equipment.		
<b>Task 17 - Welds using other processes.</b>			
17.01	Uses stud welding process (SW).	WD2411	Stud Welding and Resistance Spot Welding
17.02	Uses resistance welding (RW) processes (Spot (RSW) and Seam (RSEW)).		
17.03	Operates automated welding equipment.		

### C. Program Structure

For each and every course, a formal assessment is required for which 70% is the pass mark. A mark of 70% must be attained in both the theory examination and the practical project assignment, where applicable as documented on an official transcript.

The order of course delivery within each block can be determined by the educational agency, as long as pre-requisite conditions are satisfied.

Upon completion of an entry level program, individuals may be required to complete other certifications (employer or job site specific) in order to gain employment.

<b>Block I</b>				
<b>Course No.</b>	<b>IPG No.</b>	<b>Course Name</b>	<b>Hours</b>	<b>Pre-Requisite(s)</b>
TS1510		OH&S	6	None
TS1520	-	WHMIS	6	None
TS1530	-	Standard First Aid	14	None
WD1390	WDF-005	Safety	6	None
WD1190	WDF-010	Tools and Equipment	60	TS1520, TS1530, WD1390
WD1701	WDF-015	Stationary Machinery	12	WD1190
WD1602	WLD-115	Oxy-fuel Cutting, Heating, Gouging and Welding	60	TS1520, TS1530, WD1390
WD1610	WDF-040	SMAW (Shielded Metal Arc Welding) 1-Set-up, Strike and Maintain an Arc	30	WD1190, WD1602
WD1620	WDF-045	SMAW (Shielded Metal Arc Welding) 2-Fillet Weld, All Positions	60	WD1610

<b>Block I</b>				
<b>Course No.</b>	<b>IPG No.</b>	<b>Course Name</b>	<b>Hours</b>	<b>Pre-Requisite(s)</b>
WD1631	WDF-050	GMAW (Gas Metal Arc Welding) 1-Set-up and Maintain an Arc	18	WD1190, WD1602
WD1821	WLD-100	GMAW (Gas Metal Arc Welding) 2-Fillet Weld All Positions, Mild Steel	18	WD1631
WD1741	WDF-055	FCAW (Flux Core Arc Welding) 1-Set-Up and Deposit a Weld	18	WD1190, WD1602
WD1360	WDF-060	MCAW (Metal Core Arc Welding) 1-Set-up and Deposit a Weld	18	WD1190, WD1602
WD1641	WLD-225	GTAW (Gas Tungsten Arc Welding) 1-Set-up and Deposit a Weld	18	WD1190, WD1602
WD1651	WLD-245	Plasma Arc Cutting and Gouging	12	WD1190
WD1661	WDF-075	Blue Print Reading 1 (Basic)	30	None
WD1670	WDF-075	Blue Print Reading 2 (Welding Symbols)	30	WD1661
WD1682	WDF-090	Metallurgy	18	None
WD1691	WLD-200	Quality Control	15	None
WD1721	WLD-300	Jigs and Fixtures	12	WD1610 or WD1631 or WD1641 or WD1741 or WD1360
WD1801	WLD-205	SMAW (Shielded Metal Arc Welding) 3-Groove Weld 1G, 2G, 1GF, 2GF, 3GF and 4GF	120	WD1620

<b>Block I</b>				
<b>Course No.</b>	<b>IPG No.</b>	<b>Course Name</b>	<b>Hours</b>	<b>Pre-Requisite(s)</b>
WD1815	WLD-210 WLD-220 WLD-340	Fillet and Groove Weld, Medium and High Carbon Steel using FCAW, GMAW, GTAW, MCAW and SMAW	6	WD1610 or WD1631 or WD1641 or WD1741 or WD1360
WD1832	WLD-215	GMAW (Gas Metal Arc Welding) 3-Groove Weld, All Positions, Mild Steel	30	WD1821
WD1871	WLD-365	Build Up of Metal Parts	12	WD1610 or WD1631 or WD1641 or WD1741 or WD1360
WD1892	WLD-105	FCAW (Flux Core Arc Welding) 2-Fillet and Groove Weld Plate, All Positions	80	WD1741
WD1900	WLD-240	Air Carbon Arc Cutting and Gouging	15	WD1610
WD1430	WDF-020 WDF-025	Hoisting, Lifting, Rigging and Access Equipment	30	WD1390
WD1790	WDF-080	Work Planning	6	All Block I Technical Courses
OT1150		Workplace Exposure	80	None
*AM1100	-	Math Essentials	30	None
AM1320	-	Welding Math Fundamentals	30	AM1100
CM2160	-	Communication Essentials	45	None
SD1760	-	Workplace Essentials	45	None
MC1060	-	Computer Essentials	15	None

<b>Block I</b>				
<b>Course No.</b>	<b>IPG No.</b>	<b>Course Name</b>	<b>Hours</b>	<b>Pre-Requisite(s)</b>
AP1101	-	Introduction to Apprenticeship	15	None
<b>Total Hours</b>			<b>1020</b>	

**\*A student who can meet the mathematics requirement through an ACUPLACER® test may be exempted from AM1100 - Math Essentials. Please check with your training institution.**

<b>Required Work Experience</b>
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<b>Block II</b>				
<b>Course No.</b>	<b>IPG No.</b>	<b>Course Name</b>	<b>Hours</b>	<b>Pre-Requisite(s)</b>
WD2840	WLD-230	GTAW (Gas Tungsten Arc Welding) 2-Fillet Weld All Positions, Mild Steel	24	WD1641
WD2910	WDF-085	Layout and Template Development Fundamentals	30	None
WD2142	WLD-210	SMAW (Shielded Metal Arc Welding) 4-Groove Welds Mild Steel Plate, 3G, 4G and 6G	30	WD1801
WD2411	WLD-355 WLD-360	Stud Welding and Resistance Spot Welding	6	WD1390
WD2501	WLD-325	SMAW (Shielded Metal Arc Welding) 5-Alloy Steels	6	None
WD2521	WLD-310	GMAW (Gas Metal Arc Welding) 4-Pipe and Tubing, All Positions, Mild Steel	30	WD1832
WD2740	WLD-110	MCAW (Metal Core Arc Welding) 2-Fillet and Groove Weld Plate, Flat and Horizontal, Mild Steel	30	WD1360
WD2531	WLD-330 WLD-335	GMAW (Gas Metal Arc Welding) 5-Aluminium and Stainless Steel	18	WD1832
WD2542	WLD-345	GTAW (Gas Tungsten Arc Welding) 3-Alloy and Non-Ferrous Metals	30	WD2840
WD2552	WLD-315	FCAW (Flux Core Arc Welding) 3-Pipe and Tubing, All Positions, Mild Steel	30	WD1892

<b>Block II</b>				
<b>Course No.</b>	<b>IPG No.</b>	<b>Course Name</b>	<b>Hours</b>	<b>Pre-Requisite(s)</b>
WD2561	WLD-350	SAW (Submerged Arc Welding)	6	WD1610 or WD1631 or WD1641 or WD1741 or WD1360
<b>Total Hours</b>			<b>240</b>	

Required Work Experience
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<b>Block III</b>				
<b>Course No.</b>	<b>IPG No.</b>	<b>Course Name</b>	<b>Hours</b>	<b>Pre-Requisite(s)</b>
WD3010	WLD-235	GTAW (Gas Tungsten Arc Welding) 4-Fillet (3F, 4F) and Groove Weld All Positions, Mild Steel Plate	30	WD2840
WD3020	WDF-070	Shop Drawings and Structural Components for Fabrication	30	WD1670
WD3030	WLD-320	GTAW (Gas Tungsten Arc Welding) 5-Pipe and Tubing, All Positions, Mild Steel	75	WD3010
WD3040	WLD-305	SMAW (Shielded Metal Arc Welding) 6-Pipe, All Positions, Mild Steel	105	WD2142
<b>Total Hours</b>			<b>240</b>	

<b>Total Course Credit Hours</b>	<b>1500</b>
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## BLOCK I

### TS1510 Occupational Health and Safety

#### **Learning Outcomes:**

- Demonstrate knowledge of interpreting the Occupational Health and Safety Act, laws and regulations.
- Demonstrate knowledge of understanding the designated responsibilities within the laws and regulations such as the right to refuse dangerous work; and the importance of reporting accidents.
- Demonstrate knowledge of how to prevent accidents and illnesses.
- Demonstrate knowledge of how to improve health and safety conditions in the workplace.

**Duration:** 6 Hours

**Pre-Requisite(s):** None

#### **Objectives and Content:**

1. Interpret the Occupational Health and Safety Act laws and regulations.
  - i. explain the scope of the act
    - application of the act
    - Federal/Provincial jurisdictions
    - Canada Labour Code
    - rules and regulations
    - private home application
    - conformity of the Crown by the Act
2. Explain responsibilities under the Act and Regulations.
  - i. duties of employer, owner, contractors, sub-contractors, employees, and suppliers

3. Explain the purpose of joint health and safety committees.
  - i. formation of committee
  - ii. functions of committee
  - iii. legislated rights
  - iv. health and safety representation
  - v. reporting endangerment to health
  - vi. appropriate remedial action
  - vii. investigation of endangerment
  - viii. committee recommendation
  - ix. employer's responsibility in taking remedial action
  
4. Examine right to refuse dangerous work.
  - i. reasonable grounds for refusal
  - ii. reporting endangerment to health
  - iii. appropriate remedial action
  - iv. investigation of endangerment
  - v. committee recommendation
  - vi. employer's responsibility to take appropriate remedial action
  - vii. action taken when employee does not have reasonable grounds for refusing dangerous work
  - viii. employee's rights
  - ix. assigning another employee to perform duties
  - x. temporary reassignment of employee to perform other duties
  - xi. collective agreement influences
  - xii. wages and benefits
  
5. State examples of work situations where one might refuse work.
  
6. Describe discriminatory action.
  - i. definition
  - ii. filing a complaint procedure
  - iii. allocated period of time a complaint can be filed with the Commission
  - iv. duties of an arbitrator under the Labour Relations Act
  - v. order in writing inclusion
  - vi. report to commission Allocated period of time to request Arbitrator to deal with the matter of the request
  - vii. notice of application
  - viii. failure to comply with the terms of an order
  - ix. order filed in the court

7. Explain duties of commission officers.
  - i. powers and duties of officers
  - ii. procedure for examinations and inspections
  - iii. orders given by officers orally or in writing
  - iv. specifications of an order given by an officer to owner of the place of employment, employer, contractor, sub-contractor, employee, or supplier
  - v. service of an order
  - vi. prohibition of persons towards an officer in the exercise of his/her power or duties
  - vii. rescinding of an order
  - viii. posting a copy of the order
  - ix. illegal removal of an order
  
8. Interpret appeals of others.
  - i. allocated period of time for appeal of an order
  - ii. person who may appeal order
  - iii. action taken by Commission when person involved does not comply with the order
  - iv. enforcement of the order
  - v. notice of application
  - vi. rules of court
  
9. Explain the process for reporting of accidents.
  - i. application of act
  - ii. report procedure
  - iii. reporting notification of injury
  - iv. reporting accidental explosion or exposure
  - v. posting of act and regulations

**Practical Requirements:**

1. Conduct an interview with someone in your occupation on two or more aspects of the act and report results.
  
2. Conduct a safety inspection of shop area.

## TS1520 Workplace Hazardous Materials Information System (WHMIS)

### Learning Outcomes:

- Demonstrate knowledge of interpreting and applying the Workplace Hazardous Materials Information System (WHMIS) Regulation under the Occupational Health and Safety Act.

**Duration:** 6 Hours

**Pre-Requisite(s):** None

### Objectives and Content:

1. Define WHMIS safety.
  - i. rational and key elements
  - ii. history and development of WHMIS
  - iii. WHMIS legislation
  - iv. WHMIS implementation program
  - v. definitions of legal and technical terms
  
2. Examine hazard identification and ingredient disclosure.
  - i. prohibited, restricted and controlled products
  - ii. classification and the application of WHMIS information requirements
  - iii. responsibilities for classification
    - the supplier
    - the employer
    - the worker - Classification: rules and criteria
    - information on classification
    - classes, divisions and subdivision in WHMIS
    - general rules for classification
    - class A - compressed gases
    - class B - flammable and combustible materials
    - class C - oxidizing material
    - class D - poisonous and infectious material
    - class E - corrosive material
    - class F - dangerously reactive material

- iv. products excluded from the application of WHMIS legislation
    - consumer products
    - explosives
    - cosmetics, drugs, foods and devices
    - pest control products
    - radioactive prescribed substances
    - wood or products made of wood
    - manufactured articles
    - tobacco or products of tobacco
    - hazardous wastes
    - products handled or transported pursuant to the Transportation of Dangerous Goods (TDG) Act
  - v. comparison of classification systems - WHMIS and TDG
  - vi. general comparison of classification categories
  - vii. detailed comparison of classified criteria
3. Explain labeling and other forms of warning.
- i. definition of a WHMIS label
    - supplier label
    - workplace label
    - other means of identification
  - ii. responsibility for labels
    - supplier responsibility
    - employer responsibility
    - worker responsibility
  - iii. introduce label content, design and location
    - supplier labels
    - workplace labels
    - other means of identification
4. Introduce material safety data sheets (MSDS).
- i. definition of a material safety data sheet
  - ii. purpose of the data sheet
  - iii. responsibility for the production and availability of data sheets
    - supplier responsibility
    - employer responsibility
    - workers responsibility

**Practical Requirements:**

1. Locate WHMIS label and interpret the information displayed.
2. Locate a MSDS sheet for a product used in the workplace and determine what personal protective equipment and other precautions are required when handling this product.



TS1530      Standard First Aid

Learning Outcomes:

- Demonstrate knowledge of recognizing situations requiring emergency action.
- Demonstrate knowledge of making appropriate decisions concerning first aid.

**Duration:**              14 Hours

**Pre-Requisite(s):**    None

**Practical Requirements:**

1.      Complete a **St. John Ambulance or Canadian Red Cross** Standard First Aid Certificate course.

## WD1390 Safety

### Learning Outcomes:

- Demonstrate knowledge of safety equipment, their applications, maintenance and procedures for use.
- Demonstrate knowledge of safe work practices.
- Demonstrate knowledge of regulatory requirements pertaining to safety.

**Duration:** 6 Hours

**Pre-Requisite(s):** None

### Objectives and Content:

1. Identify types of personal protective equipment (PPE) and clothing and describe their applications and limitations.
  - i. respiratory protection
  - ii. hearing protection
  - iii. eye protection
  - iv. fall protection
  - v. head protection
  - vi. foot protection
  - vii. hand protection
2. Describe the procedures used to care for and maintain PPE.
3. Identify hazards and describe safe work practices.
  - i. personal
  - ii. workplace
    - job hazard assessment procedures
    - lockout/tag out
    - confined space awareness
    - trenches and excavations
    - explosion and fire (hot work)
    - heights (fall protection and fall arrest)
    - ventilation/fumes
  - iii. environmental contamination (awareness of)

**Practical Requirements:**

None.

## WD1190 Tools and Equipment

### Learning Outcomes:

- Demonstrate knowledge of tools and equipment, their applications, maintenance and procedures for use.

**Duration:** 60 Hours

**Pre-Requisite(s):** TS1520, TS1530, WD1390

### Objectives and Content:

1. Interpret regulations pertaining to tools and equipment.
2. Identify types of hand tools and describe their applications and procedures for use.
3. Describe the procedures used to inspect, maintain and store hand tools.
4. Identify types of power tools and describe their applications and procedures for use.
  - i. electric
  - ii. hydraulic
  - iii. pneumatic
5. Identify power tool attachments and consumables and describe their applications and procedures for use.
6. Describe the procedures used to inspect, maintain and store power tools.
7. Identify types of layout and measuring tools and equipment and describe their applications and procedures for use.
8. Describe the procedures used to inspect, maintain and store layout and measuring tools and equipment.

**Practical Requirements:**

1. Layout lines on flat bar.
2. Layout drill gauge.
3. Use tools to cut outlines laid out on flat bar and cut out drill gauge.
4. Layout and fabricate drilling and threading exercise as per assigned project.
5. Layout and fabricate circle cutting attachment.
6. Install grinding wheels on stationary grinder.
7. Grind metals with stationary grinders.
8. Demonstrate use of wheel dresser.
9. Grind metals with a portable grinder.

## WD1701 Stationary Machinery

### Learning Outcomes:

- Demonstrate knowledge of stationary machinery, their applications, maintenance and procedures for use.

**Duration:** 12 Hours

**Pre-Requisite(s):** WD1190

### Objectives and Content:

1. Define terminology associated with stationary machinery.
  - i. capacity
  - ii. rake angle
  - iii. blade clearance
  - iv. back gauge calibration
  - v. lateral guide squaring
  - vi. punching
  - vii. shearing
  - viii. notching
  - ix. coping
  - x. bending
2. Identify hazards and describe safe work practices pertaining to stationary machinery.
3. Identify types of stationary machinery and describe their characteristics and applications.
  - i. presses
  - ii. drill presses
  - iii. stationary grinders
  - iv. shears
  - v. saws
  - vi. press brakes
  - vii. ironworkers
  - viii. plate rollers

4. Describe the procedures used to set-up and operate stationary machinery.
5. Describe the procedures used to inspect and maintain stationary machinery.

**Practical Requirements:**

1. Set-up and operate stationary for:
  - i. punching
  - ii. notching
  - iii. shearing

## WD1602 Oxy-fuel Cutting, Heating Gouging and Welding

### Learning Outcomes:

- Demonstrate knowledge of oxy-fuel equipment and accessories.
- Demonstrate knowledge of the procedures used to cut with oxy-fuel equipment.
- Demonstrate knowledge of the procedures used to gouge with oxy-fuel equipment.
- Demonstrate knowledge of the procedures used to weld with oxy-fuel equipment.
- Demonstrate knowledge of the procedures used to braze with oxy-fuel equipment.

**Duration:** 60 Hours

**Pre-Requisite(s):** TS1520, TS1530, WD1390

### Objectives and Content:

1. Define terminology associated with oxy-fuel cutting, gouging and welding.
2. Identify hazards and describe safe work practices pertaining to oxy-fuel cutting, gouging and welding.
  - i. personal
  - ii. shop/facility
  - iii. fire and explosion
  - iv. equipment
  - v. ventilation/fumes
  - vi. storage, handling and transportation
3. Identify and interpret codes and regulations pertaining to oxy-fuel cutting, gouging and welding equipment and operations.
4. Identify oxy-fuel equipment and accessories and describe their applications and limitations.
  - i. cutting
  - ii. gouging
  - iii. welding



- iv. brazing/braze-welding
  - v. heating
5. Identify types of flames and describe their application and the procedures for flame adjustment.
    - i. oxidizing
    - ii. carburizing
    - iii. neutral
  6. Describe the procedures used to set-up, adjust and shut down oxy-fuel equipment.
    - i. manufacturers' recommendations
  7. Describe the procedures used to inspect and maintain oxy-fuel equipment.
  8. Describe the procedures used to cut materials using oxy-fuel equipment.
    - i. free hand
    - ii. guided
      - straight edge
      - pattern
    - iii. automated/semi-automated
  9. Identify common cutting faults and describe the procedures to prevent and correct them.
  10. Describe the procedures used to gouge using oxy-fuel equipment.
  11. Describe the procedures used to weld using oxy-fuel equipment.
  12. Describe the procedures used to braze/braze-weld using oxy-fuel equipment.

**Practical Requirements:**

1. Cutting.
  - i. straight cutting
  - ii. bevel cutting

2. Gouging.
  - i. gouge groove in flat plate
  
3. Fusion Welding.
  - i. closed corner
  - ii. horizontal lap joint
  - iii. square butt joint
  
4. Bronze Welding.
  - i. horizontal lap joint
  - ii. square butt joint
  
5. Silver Brazing.
  - i. copper/steel tee joint
  - ii. copper tee and tubing
  - iii. copper to copper (silfos)

## WD1610 SMAW (Shielded Metal Arc Welding) 1-Set-up, Strike and Maintain an Arc

### Learning Outcomes:

- Demonstrate knowledge of shielded metal arc welding (SMAW) welding equipment, consumables and accessories.
- Demonstrate knowledge of the procedures used to set - up, adjust, operate, inspect and maintain SMAW welding equipment.
- Demonstrate knowledge of the procedures used to deposit a weld bead using SMAW welding equipment.
- Demonstrate knowledge of the procedures used to perform visual weld inspections.

**Duration:** 30 Hours

**Pre-Requisite(s):** WD1190, WD1602

### Objectives and Content:

1. Describe the purpose, applications and advantages of SMAW.
2. Define terminology associated with SMAW welding.
  - i. mild steel and low alloy steel electrodes
  - ii. AC (Alternating Current)
  - iii. DC (Direct Current) (polarity)
  - iv. arc Blow
  - v. duty cycle
  - vi. rated amperage
  - vii. general precautions
  - viii. electrodes
  - ix. equipment and accessories
    - personal protective equipment
    - ground clamps
    - terminal lugs
    - electrode holders

3. Identify hazards and describe safe work practices pertaining to SMAW welding.
  - i. personal
  - ii. shop/facility
  - iii. fire and explosion
  - iv. equipment
  - v. ventilation/fumes
  - vi. storage/handling
4. Identify codes and standards pertaining to SMAW welding.
  - i. Canadian Standards Association (CSA)
  - ii. American Society of Mechanical Engineers (ASME)
  - iii. American Welding Society (AWS)
5. Identify SMAW welding equipment, consumables and accessories and describe their applications.
6. Describe the procedures used to set- up and adjust SMAW welding equipment.
7. Describe the procedures used to strike and maintain an arc using SMAW welding equipment.
8. Describe the procedures and techniques used to deposit a weld bead using SMAW welding equipment
  - i. arc length
  - ii. travel speed
  - iii. work and travel angles
  - iv. visual inspection
9. Describe the procedures used to inspect and maintain SMAW welding equipment.

### **Practical Requirements.**

1. Set-up welding equipment check the various external components.
2. Tack weld with (6011) 4311 and (7018) 4918 electrodes.
3. Deposit stringer and weave beads with (6011) 4311 and (7018) 4918 electrodes.

4. Perform padding with 4311 and 4918 electrodes.
5. Perform a visual weld inspection.

## WD1620 SMAW (Shielded Metal Arc Welding) 2-Fillet Weld, All Positions

### Learning Outcomes:

- Demonstrate knowledge of the procedures used to prepare base metals and joints for shielded metal arc welding (SMAW) fillet welds.
- Demonstrate knowledge of the procedures used to perform fillet welds on low carbon steel in all positions using the SMAW process.
- Demonstrate knowledge of the procedures used to perform visual weld inspections.

**Duration:** 60 Hours

**Pre-Requisite(s):** WD1610

### Objectives and Content:

1. Define terminology associated with SMAW fillet welds.
  - i. tee
  - ii. lap
  - iii. corner
  - iv. composite
  - v. single-pass
  - vi. multi-pass
  - vii. plug
  - viii. slot
2. Identify the considerations when selecting consumables and determining equipment set-up for performing SMAW fillet welds in all positions.
  - i. specification requirements
  - ii. base metal
    - composition
    - thickness
  - iii. power source
  - iv. welding position
  - v. joint type and design

3. Identify the requirements and describe the procedures to store consumables used for SMAW fillet welds on low carbon steel.
4. Describe the procedures used to prepare base metals and joints for SMAW fillet welds.
5. Describe the procedures used to fillet weld on mild steel in all positions.
  - i. identify position
    - limitations
  - ii. identify material
  - iii. determine thickness of material
  - iv. determine fillet size
  - v. select electrode
  - vi. select current
6. Describe the procedures used to prevent and correct weld faults.

**Practical Requirements:**

1. Perform fillet welds in all positions on low carbon steel.
  - i. tee joint
  - ii. lap joint
2. Perform a visual weld inspection.

## WD1631 GMAW (Gas Metal Arc Welding) 1-Set-up and Maintain an Arc

### Learning Outcomes:

- Demonstrate knowledge of gas metal arc welding (GMAW) welding equipment, consumables and accessories.
- Demonstrate knowledge of the procedures used to set-up, adjust, operate, inspect and maintain GMAW welding equipment.
- Demonstrate knowledge of the procedures used to deposit a weld bead using GMAW welding equipment.
- Demonstrate knowledge the procedures used to perform visual weld inspections.

**Duration:** 18 Hours

**Pre-Requisite(s):** WD1190, WD1602

### Objectives and Content:

1. Describe the purpose, applications and advantages of GMAW.
2. Define terminology associated with GMAW welding.
  - i. general precautions
  - ii. equipment and accessories
    - shielding gas and regulators
    - electrode wire
    - gun
    - feeder
    - power source
    - nozzle
    - cable connections
    - cables
    - pulsed arc machines
  - iii. metal transfers
  - iv. polarity
  - v. arc voltage
  - vi. slope and adjustment



- vii. inductance
  - viii. travel speed
  - ix. wire feed speed
  - x. penetration
  - xi. travel and work angles
  - xii. manipulation
  - xiii. guide tubes
  - xiv. contact tips
  - xv. liners
3. Identify codes and standards pertaining to GMAW welding.
- i. Canadian Standards Association (CSA)
  - ii. American Society of Mechanical Engineers (ASME)
  - iii. American Welding Society (AWS)
4. Identify GMAW welding equipment, consumables and accessories and describe their applications.
5. Describe the procedures used to assemble and disassemble GMAW welding equipment.
6. Describe the procedures used to establish and maintain an arc using GMAW welding equipment.
- i. starting and stopping the weld
    - finishing end of the joint
  - ii. filler metal
  - iii. adjustment
  - iv. shielding gases (pre and post weld)
  - v. drive rolls
  - vi. gun
  - vii. stick-out
  - viii. speed
7. Identify the modes of transfer relating to GMAW welding and describe their characteristics and applications.
- i. short circuiting
  - ii. globular
  - iii. spray
  - iv. pulse

8. Describe the procedures and techniques used to deposit a weld bead using GMAW welding equipment.
  - i. electrode extension
  - ii. travel speed
  - iii. work and travel angles
  - iv. flow rates
  - v. stringer
  - vi. weave
  - vii. stick-out
  - viii. travel speed
  - ix. work and travel angles
  - x. visual inspection
  
9. Describe the procedures used to inspect, maintain and troubleshoot GMAW welding equipment.

**Practical Requirements:**

1. Set-up GMAW equipment.
2. Change electrode wire guide.
3. Adjust and check flow meter.
4. Deposit fillet welds on mild steel, various thickness.
5. Perform a visual weld inspection.

## WD1821 GMAW (Gas Metal Arc Welding) 2-Fillet Weld All Positions, Mild Steel

### Learning Outcomes:

- Demonstrate knowledge of the procedures used to prepare base metals and joints for gas metal arc welding (GMAW) fillet welds.
- Demonstrate knowledge of the procedures used to perform fillet welds on mild steel plate in all positions using the GMAW process.
- Demonstrate knowledge of the procedures used to perform visual weld inspections.

**Duration:** 18 Hours

**Pre-Requisites:** WD1631

### Objectives and Content:

1. Define terminology associated with GMAW fillet welds.
  - i. conventional and pulse
  - ii. identification of position
  - iii. modes of transfer
    - short circuiting
    - globular
    - spray
    - pulse spray
  - iv. shielded gas selection
  - v. filler metals
  - vi. troubleshooting
  - vii. work and travel angles
  - viii. gun manipulation
2. Identify the considerations when selecting consumables and determining equipment set-up for performing GMAW fillet welds on mild steel in all positions.
  - i. specification requirements

- ii. base metal
    - composition
    - thickness
  - iii. shielding gas selection
  - iv. power source
  - v. welding position
  - vi. joint type and design
3. Identify the requirements and describe the procedures to store consumables used for GMAW fillet welds on mild steel plate.
  4. Describe the procedures used to prepare base metals and joints for GMAW fillet welds.
  5. Describe the procedures used to perform fillet welds on mild steel plate in all positions using the GMAW process.
  6. Describe the procedures used to prevent and correct weld faults.

**Practical Requirements:**

1. Perform fillet welds on mild steel plate.
  - i. flat
  - ii. vertical down
  - iii. overhead
2. Perform a visual weld inspection.

## WD1741 FCAW (Flux Core Arc Welding) 1- Set-up and Deposit a Weld

### Learning Outcomes:

- Demonstrate knowledge of flux core arc welding (FCAW) welding equipment, consumables and accessories.
- Demonstrate knowledge of the procedures used to set- up, adjust, operate, inspect and maintain FCAW welding equipment.
- Demonstrate knowledge of the procedures used to deposit a weld bead using FCAW welding equipment.
- Demonstrate knowledge of the procedures used to perform visual weld inspections.

**Duration:** 18 Hours

**Pre-Requisite(s):** WD1190, WD1602

### Objectives and Content:

1. Describe the purpose, applications and advantages of FCAW.
2. Define terminology associated with FCAW welding.
  - i. general precautions
  - ii. equipment and accessories
    - shielding gas and regulators
    - electrode wire
      - flux cored
      - metal cored
    - gun
    - feeder
    - power source
    - nozzle
    - cable connections
    - cables
  - iii. metal transfers
  - iv. polarity
  - v. arc voltage
  - vi. slope and adjustment
  - vii. inductance

- viii. travel speed
  - ix. wire feed speed
  - x. penetration
  - xi. travel and work angles
  - xii. manipulation
  - xiii. guide tubes
  - xiv. contact tips
  - xv. liners
3. Identify codes and standards pertaining to FCAW welding.
    - i. Canadian Standards Association (CSA)
    - ii. American Society of Mechanical Engineers (ASME)
    - iii. American Welding Society (AWS)
  4. Identify FCAW welding equipment, consumables and accessories and describe their applications.
  5. Describe the procedures used to assemble and disassemble FCAW welding equipment.
  6. Describe the procedures and techniques used to deposit a satisfactory weld.
    - i. starting and stopping the weld
    - ii. filler metal
    - iii. adjustment
    - iv. shielded gases (pre and post weld)
    - v. drive rolls
    - vi. gun
    - vii. stick-out
    - viii. speed
  7. Describe the procedures used to inspect, maintain and troubleshoot FCAW welding equipment.

**Practical Requirements:**

1. Set-up FCAW equipment, establish and maintain an arc.
2. Perform a visual weld inspection.

## WD1360 MCAW (Metal Core Arc Welding) 1- Set-up and Deposit a Weld

### Learning Outcomes:

- Demonstrate knowledge of metal core arc welding (MCAW) welding equipment, consumables and accessories.
- Demonstrate knowledge of the procedures used to set-up, adjust, operate, inspect and maintain MCAW welding equipment.
- Demonstrate knowledge of the procedures used to deposit a weld bead using MCAW welding equipment.
- Demonstrate knowledge of the procedures used to perform visual weld inspections.

**Duration:** 18 Hours

**Pre-Requisite(s):** WD1190, WD1602

1. Describe the purpose, applications and advantages of MCAW.
2. Define terminology associated with MCAW welding.
  - i. general precautions
  - ii. equipment and accessories
    - shielding gas and regulators
    - electrode wire
      - flux cored
      - metal cored
    - gun
    - feeder
    - power source
    - nozzle
    - cable connections
    - cables
  - iii. metal transfers
  - iv. polarity
  - v. arc voltage
  - vi. slope and adjustment
  - vii. inductance
  - viii. travel speed

- ix. wire feed speed
  - x. penetration
  - xi. travel and work angles
  - xii. manipulation
  - xiii. guide tubes
  - xiv. contact tips
  - xv. liners
3. Identify codes and standards pertaining to MCAW welding.
    - i. Canadian Standards Association (CSA)
    - ii. American Society of Mechanical Engineers (ASME)
    - iii. American Welding Society (AWS)
  4. Identify MCAW welding equipment, consumables and accessories and describe their applications.
  5. Describe the procedures used to assemble and disassemble MCAW welding equipment.
  6. Describe the procedures and techniques used to deposit a satisfactory weld.
    - i. starting and stopping the weld
    - ii. filler metal
    - iii. adjustment
    - iv. shielded gases (pre and post weld)
    - v. drive rolls
    - vi. gun
    - vii. stick-out
    - viii. speed
  7. Describe the procedures used to inspect, maintain and troubleshoot MCAW welding equipment.

**Practical Requirements:**

1. Set-up MCAW equipment, establish and maintain an arc.
2. Perform a visual weld inspection.



## WD1641 GTAW (Gas Tungsten Arc Welding) 1-Set-up and Deposit a Weld

### Learning Outcomes:

- Demonstrate knowledge of gas tungsten arc welding (GTAW) equipment, consumables and accessories.
- Demonstrate knowledge of the procedures used to set-up, adjust, operate, inspect and maintain GTAW welding equipment.
- Demonstrate knowledge of the procedures used to deposit a weld bead using GTAW equipment.
- Demonstrate knowledge of the procedures used to perform visual weld inspections.

**Duration:** 18 Hours

**Pre-Requisite(s):** WD1190, WD1602

### Objectives and Content:

1. Describe the purpose, applications and advantages of GTAW.
2. Define terminology associated with GTAW welding.
  - i. equipment and accessories
    - power sources
    - air-cooled torches
    - water-cooled torches
    - flow meters
  - ii. tungsten electrodes
  - iii. current requirement
  - iv. shielding gases
  - v. travel and work angles
  - vi. filler rods
  - vii. collet
  - viii. collet body
  - ix. cup
  - x. high frequency

3. Identify GTAW welding equipment, consumables and accessories and describe their applications.
4. Describe the procedures used to assemble and disassemble GTAW welding equipment.
5. Describe the procedures used to establish and maintain an arc using GTAW welding equipment.
6. Describe the procedures and techniques used to deposit a weld bead using GTAW welding equipment.
  - i. with filler metal
  - ii. without filler metal
7. Describe the procedures used to inspect, maintain and troubleshoot GTAW welding equipment

**Practical Requirements:**

1. Set-up GTAW equipment.
2. Run beads on mild steel plate.
3. Shut-down equipment.
4. Perform a visual weld inspection.

## WD1651 Plasma Arc Cutting and Gouging

### Learning Outcomes:

- Demonstrate knowledge of plasma arc equipment and accessories.
- Demonstrate knowledge of the procedures used to cut with plasma arc equipment.
- Demonstrate knowledge of the procedures used to gouge with plasma arc equipment.

**Duration:** 12 Hours

**Pre-Requisite(s):** WD1190

### Objectives and Content:

1. Define terminology associated with plasma arc cutting and gouging.
2. Describe the plasma arc process.
  - i. general precautions
  - ii. equipment and accessories
    - types of torches
    - electrodes and tips
  - iii. types of arcs
  - iv. gases
  - v. power source
  - vi. procedures to set-up equipment and check its operation
3. Describe the procedures used to set-up, adjust and shut down plasma arc equipment.
4. Describe the procedures used to inspect and maintain plasma arc equipment.
5. Describe the procedures used to cut using plasma arc equipment.
6. Describe the procedures used to gouge using plasma arc equipment.

**Practical Requirements:**

1. Perform plasma arc cutting and gouging operations.

## WD1661 Blueprint Reading 1 (Basic)

### Learning Outcomes:

- Demonstrate a basic knowledge of blueprints and their purpose.
- Demonstrate knowledge of interpreting and extracting information from drawings.

**Duration:** 30 Hours

**Pre-Requisite(s):** None

### Objectives and Content:

1. Identify the types of orthographic, oblique and isometric drawings and their purposes.
2. Identify the various types of lines used on blueprints and describe their applications.
  - i. centre
  - ii. hidden
  - iii. dimension
  - iv. extension
  - v. object
  - vi. break
  - vii. long
  - viii. short
3. Identify views and describe their purpose.
  - i. front
  - ii. right side
  - iii. left side
  - iv. top (plan)
  - v. bottom
  - vi. back
  - vii. section
  - viii. detailed

4. Identify notes and specifications and describe their purpose.
  - i. parts of objects
  - ii. title block
  - iii. revisions
  - iv. drawing numbers
  
5. Identify sectioning practices and describe their purpose.
  - i. enlarged
  - ii. isometric
  - iii. auxiliary
  - iv. rotation
  - v. developed view
  - vi. detail
  
6. Identify and interpret common abbreviations and symbols.
  - i. supplementary symbols
  - ii. outdated and preferred symbols
  - iii. references
  - iv. location of symbols on drawings

**Practical Requirement(s):**

None.

## WD1670 Blueprint Reading 2 (Welding Symbols)

### Learning Outcomes:

- Demonstrate knowledge of the procedures used to interpret welding abbreviations and symbols.
- Demonstrate knowledge of interpreting and extracting information from drawings.

**Duration:** 30 Hours

**Pre-Requisite(s):** WD1661

### Objectives and Content:

1. Identify common welding symbols and abbreviations and describe their applications.
  - i. back gouging
  - ii. melt through
  - iii. finishing
  - iv. processes
2. Identify and interpret the symbols for fillet welds.
  - i. pitch
  - ii. dimension
  - iii. shape
  - iv. finishing
3. Identify and interpret the symbols for groove welds.
  - i. preparation
    - depth
    - angle
  - ii. root spacing
4. Identify and interpret the symbols for melt-through welds.
  - i. root spacing

- ii. preparation angle
  - iii. backing
  - iv. fusible inserts
5. Identify and interpret the symbols for plug welds.
- i. dimensions
  - ii. bevel angle
  - iii. filler thickness
  - iv. number
  - v. pitch
  - vi. shape
6. Identify and interpret weld finishing symbols.
- i. grinding
  - ii. machining
  - iii. chipping
  - iv. hammering
  - v. rolling
  - vi. unspecified
7. Identify and interpret pipe welding symbols.

**Practical Requirements:**

None.



## WD1682 Metallurgy

### Learning Outcomes:

- Demonstrate knowledge of metals and their characteristics.
- Demonstrate knowledge of metallurgical principles.
- Demonstrate knowledge of expansion and contraction.

**Duration:** 18 Hours

**Pre-Requisite(s):** None

### Objectives and Content:

1. Define terminology associated with metallurgy.
  - i. ferrous
  - ii. low carbon
  - iii. medium carbon
  - iv. high carbon
  - v. alloy steel
  - vi. non-ferrous
  - vii. low alloy steel
  - viii. heat treated steel
  - ix. stainless steel
  - x. duplex stainless steel
  - xi. spark test
  - xii. tensile strength
  - xiii. elasticity
  - xiv. ductility
  - xv. hardness
  - xvi. compressive strength
  - xvii. fatigue strength
  - xviii. impact strength
  - xix. thermal conductivity
  - xx. thermal expansion
  - xxi. brittleness

- xxii. forging process
  - xxiii. casting process
  - xxiv. peening
2. Describe classification numbering systems for metals.
- i. Society of Automotive Engineers (SAE)
  - ii. American Iron and Steel Institute (ANSI)
  - iii. American Society of Testing and Materials (ASTM)
  - iv. Canadian Standards Association (CSA)
3. Identify the processes used in the heat treatment of metals.
- i. stress relieving
  - ii. quenching
  - iii. hardening
  - iv. tempering
  - v. annealing
  - vi. normalizing
4. Describe the effects of hot and cold working of metals.
- i. stress
  - ii. contraction
  - iii. expansion
  - iv. distortion
  - v. work hardening

**Practical Requirements:**

None.

## WD1691 Quality Control

### Learning Outcomes:

- Demonstrate knowledge of quality control measures used to verify compliance with design and code specifications.
- Demonstrate knowledge of inspection and testing methods and their applications.

**Duration:** 15 Hours

**Pre-Requisite(s):** None

### Objectives and Content:

1. Define terminology associated with quality control.
  - i. mill certificates
  - ii. data sheets
  - iii. paint thickness
  - iv. non-destructive
    - visual
    - radiography
    - magnetic particle
    - ultrasonic
    - dye penetrant test
    - leak test
    - pneumatic test (air and soap, inert gas)
    - hydrostatic test (water pressure)
2. Interpret codes and standards pertaining to quality control.
3. Interpret information pertaining to quality control found on drawings and specifications.
4. Identify tools and equipment relating to quality control and describe their applications and procedures for use.
5. Explain quality control, its purpose and applications.

6. Explain the methods used to identify and verify materials.
  - i. codes, standards and specifications
  - ii. mill certificates
  - iii. colour coding of materials
  
7. Identify methods of inspection and testing and describe their characteristics, limitations and applications.
  - i. destructive
  - ii. non-destructive
  
8. Describe the procedures used to verify compliance with design and code specifications.
  - i. perform visual inspections
  - ii. verify measurements
  - iii. perform post welding checks
  - iv. mark materials and parts
  - v. verify layout
  
9. Describe the procedures used to document quality control measures.

**Practical Requirements:**

None.

## WD1721 Jigs and Fixtures

### **Learning Outcomes:**

- Demonstrate knowledge of basic jigs and fixtures and their applications.

**Duration:** 12 Hours

**Pre-Requisite(s):** WD1610 or WD1631 or WD1641 or WD1741 or WD1360

### **Objectives and Content:**

1. Define terminology associated with jigs and fixtures.
2. Explain the purpose, applications and limitations of basic jigs and fixtures.
3. Identify types of basic jigs and fixtures and describe their characteristics and applications.
4. Describe the procedures used to fabricate basic jigs and fixtures.

### **Practical Requirements:**

1. Fabricate a jig or fixture.

**WD1801    SWAW (Shielded Metal Arc Welding) 3 - Groove Weld 1G, 2G, 1GF, 2GF, 3GF and 4GF**

**Learning Outcomes:**

- Demonstrate knowledge of the procedures used to prepare base metals and joints for shielded metal arc welding (SMAW) groove welds.
- Demonstrate knowledge of the procedures used to perform groove welds on low carbon steel plate in all positions using the SMAW process.
- Demonstrate knowledge of the procedures used to perform visual weld inspections.

**Duration:**                    120 Hours

**Pre-Requisite(s):**    WD1620

**Objectives and Content:**

1.    Define terminology associated with SMAW groove welds.
  - i.    butt joint
  - ii.   root landing/face
  - iii.  root opening
  - iv.   bevel landing
  - v.    root penetration
  - vi.   1-G
  - vii.  2-G
  - viii. 1GF
  - ix.   2GF
  - x.    3GF
  - xi.   4GF
  - xii.  F3
  - xiii. F4
  
2.    Describe the procedures used to perform groove welds in the 1G, 2G, 1GF, 2GF, 3GF, and 4GF positions.
  - i.    joint design
  - ii.   inspection and testing

- iii. electrode angles
  - iv. electrode manipulation
  - v. amperage adjustment
  - vi. identify position and limitations
  - vii. identify material
  - viii. determine thickness of material
  - ix. select electrode
  - x. select current
  - xi. penetration
3. Describe the procedures used to prepare base metals and joints for SMAW groove welds.
  4. Describe the procedures used to perform groove welds on low carbon steel plate in all positions using SMAW process.
  5. Describe the procedures used to test welds and prevent and correct weld faults.

**Practical Requirements:**

1. Weld groove butt joints on 3/8" mild steel plate in 1G, 2G, 1GF, 2GF, 3GF, and 4GF positions using F3 and F4 electrodes.
2. Perform weld tests.
3. Perform a visual weld inspection.

## WD1815 Fillet and Groove Weld, Medium and High Carbon Steel using FCAW, GMAW, GTAW, MCAW and SMAW

### Learning Outcomes:

- Demonstrate knowledge of the procedures used to prepare medium and high carbon steel plate and joints for FCAW, GMAW, GTAW, MCAW and SMAW fillet and groove welds.
- Demonstrate knowledge of the procedures used to perform fillet and groove welds on medium and high carbon steel plate in all positions using the FCAW, GMAW, GTAW, MCAW and SMAW processes.

**Duration:** 6 Hours

**Pre-Requisite(s):** WD1610 or WD1631 or WD1641 or WD1741 or WD1360

### Objectives and Content:

1. Define terminology associated with FCAW, GMAW, GTAW, MCAW and SMAW fillet and groove welds on medium and high carbon steel plate.
2. Identify the considerations when selecting consumables and determining equipment set-up for performing FCAW, GMAW, GTAW, MCAW and SMAW fillet and groove welds on medium and high carbon steel plate.
  - i. specification requirements
  - ii. base metals
    - composition
    - thickness
  - iii. power source
  - iv. welding position
  - v. joint type and design
3. Identify the requirements and describe the procedures to store consumables used for FCAW, GMAW, GTAW, MCAW and SMAW fillet and groove welds on medium and high carbon steel plate.



4. Describe the procedures used to prepare medium and high carbon steel plate and joints for FCAW, GMAW, GTAW, MCAW and SMAW fillet and groove welds.
5. Describe the procedures used to perform fillet and groove welds on medium and high carbon steel plate using FCAW, GMAW, GTAW, MCAW and SMAW processes.
  - i. temperature measuring devices
  - ii. pre-heating
  - iii. interpass temperature
  - iv. post-heating
  - v. stress relieving
6. Describe the procedures used to prevent and correct weld faults.

**Practical Requirements:**

None.

## WD1832 GMAW (Gas Metal Arc Welding) 3-Groove Weld, All Positions, Mild Steel

### Learning Outcomes:

- Demonstrate knowledge of the procedures used to prepare base metals and joints for gas metal arc welding (GMAW) groove welds.
- Demonstrate knowledge of the procedures used to perform groove welds on mild steel plate in all positions using the GMAW process.
- Demonstrate knowledge of the procedures used to perform visual weld inspections.

**Duration:** 30 Hours

**Pre-Requisite(s):** WD1821

### Objectives and Content:

1. Define terminology associated with GMAW groove welds.
2. Identify the considerations when selecting consumables and determining equipment set-up for performing GMAW fillet and groove welds on mild steel plate.
  - i. specification requirements
  - ii. base metals
    - composition
    - thickness
  - iii. power source
  - iv. welding position
  - v. joint type and design
3. Identify the requirements and describe the procedures to store consumables used for GMAW groove welds on mild steel plate.
4. Describe the procedures used to prepare base metal and joints for GMAW groove welds.

5. Describe the procedures used to perform groove welds on mild steel plate in all positions using GMAW process.
6. Describe the procedures used to prevent and correct weld faults.
7. Perform groove welds on mild steel plate in all positions.

**Practical Requirements:**

1. Perform groove welds in flat, horizontal, and vertical down positions on mild steel plate using the GMAW process.
2. Perform a visual weld inspection.

## WD1871 Build Up of Metal Parts

### Learning Outcomes:

- Demonstrate knowledge of the procedures used to build up metal parts.
- Demonstrate knowledge of the procedures used to surface base metals.

**Duration:** 12 Hours

**Pre-Requisite(s):** WD1610 or WD1631 or WD1641 or WD1741 or WD1360

### Objectives and Content:

1. Define terminology associated with build-up and surfacing of metal parts.
  - i. hard surfacing
  - ii. sequence
  - iii. surfacing materials
  - iv. types of wear
    - abrasion
    - impact
    - corrosion
2. Explain the purpose and applications of building up and surfacing of metal parts.
3. Identify the processes used to build up and surface metal parts.
  - i. shielded metal arc welding (SMAW)
  - ii. gas metal arc welding (GMAW)
  - iii. flux core arc welding (FCAW)
  - iv. metal core arc welding (MCAW)
  - v. gas tungsten arc welding (GTAW)
  - vi. submerged arc welding (SAW)
  - vii. oxy fuel gas welding (OFW)
4. Identify types of wear requiring hard surfacing.
  - i. abrasion
  - ii. impact
  - iii. corrosion

- iv. erosion
- 5. Describe the procedures used to build up and surface metal parts using welding processes.
  - i. identify base metal
  - ii. identify effects of heating and cooling
  - iii. identify effects of dilution
  - iv. select process
  - v. select filler material
  - vi. determine sequence

**Practical Requirements:**

- 1. Build up a component with any process.

## WD1892 FCAW (Flux Core Arc Welding) 2-Fillet and Groove Weld Plate, All Positions

### Learning Outcomes:

- Demonstrate knowledge of the procedures used to prepare plate for flux core arc welding (FCAW).
- Demonstrate knowledge of the procedures used to perform welds on plate in all positions using the FCAW process.
- Demonstrate knowledge of the procedures used to perform visual weld inspections.

**Duration:** 80 Hours

**Pre-Requisite(s):** WD1741

### Objectives and Content:

1. Define terminology associated with FCAW fillet and groove welds.
  - i. stringer
  - ii. weave
  - iii. stick-out
  - iv. travel speed
  - v. work and travel angles
  - vi. visual inspection
  
2. Identify the considerations when selecting consumables and determining equipment set-up for performing FCAW fillet and groove welds on plate.
  - i. specification requirements
  - ii. base metals
    - composition
    - thickness
  - iii. power source
  - iv. welding position
  - v. joint type and design

3. Identify the requirements and describe the procedures to store consumables for FCAW welding of plate.
4. Describe the procedures used to prepare plate for FCAW fillet and groove welds.
5. Describe the procedures used to perform fillet and groove welds on plate using the FCAW process.
  - i. temperature measuring devices
  - ii. pre-heating
  - iii. inter-pass temperature
  - iv. post-heating
  - v. stress relieving
6. Describe the procedures used to prevent and correct weld faults.

**Practical Requirements:**

1. Perform FCAW welds.
  - i. 1GF
  - ii. 2GF
  - iii. 3GF
  - iv. 4 GF
2. Perform a visual weld inspection.

## WD1900 Air Carbon Arc Cutting and Gouging

### Learning Outcomes:

- Demonstrate knowledge of the procedures used to remove a weld from a joint using the air carbon arc (CAC-A) process.
- Demonstrate knowledge of the procedures used to prepare joints using the air carbon arc (CAC-A) process.

**Duration:** 15 Hours

**Pre-Requisite(s):** WD1610

### Objectives and Content:

1. Define terminology associated with electric arc cutting and gouging.
2. Identify hazards and describe safe work practices pertaining to electric arc cutting and gouging.
  - i. personal
  - ii. shop/facility
  - iii. fire and explosion
  - iv. equipment
  - v. ventilation/fumes
  - vi. storage, handling and transportation
  - vii. noise
3. Describe the purposes and applications of air carbon arc cutting and gouging.
4. Describe the procedures used to remove a weld from a joint using the CAC-A (Air Carbon Arc) process.
  - i. types of carbon electrodes
  - ii. air pressure
  - iii. electrode angles
  - iv. polarity
  - v. constant current power source



5. Describe groove preparation using the CAC-A process.
  - i. U-joint
  - ii. J-joint
  - iii. single-vee
  - iv. single-bevel joints
  
6. Describe the procedures used to back gouge a welded joint.

**Practical Requirements:**

1. Set-up equipment for gouging, select the correct air pressure, carbon electrode and polarity.
  
2. Back gouge to sound metal a single vee groove butt joint.

## WD1430 Hoisting, Lifting, Rigging and Access Equipment

### Learning Outcomes:

- Demonstrate knowledge of hoisting, lifting, rigging and access equipment, their applications, limitations and procedures for use.
- Demonstrate knowledge of the procedures used to perform hoisting and lifting operations.
- Demonstrate knowledge of calculations required prior to hoisting and lifting operations.

**Duration:** 30 Hours

**Pre-Requisite(s):** WD1390

### Objectives and Content:

1. Define terminology associated with hoisting, lifting, rigging and access equipment.
2. Identify hazards and describe safe work practices pertaining to hoisting, lifting rigging and access equipment.
3. Identify regulations pertaining to hoisting, lifting rigging and access equipment.
4. Identify types of access equipment and describe their characteristics and applications.
  - i. scaffolding
  - ii. ladders
  - iii. man lifts
  - iv. elevated work platforms
5. Identify types of fall protection and fall arrest equipment and describe their applications and procedures for use.
6. Identify types of rigging equipment and accessories and describe their limitations, applications and procedures for use.

7. Identify types of hoisting and lifting equipment and accessories and describe their applications and procedures for use.
  - i. jacks
  - ii. hoists
  - iii. cranes
    - overhead travelling cranes (OTC)
    - gantry
8. Describe the procedures used to inspect, maintain and store hoisting, lifting, rigging and access equipment.
9. Describe the procedures used to rig material/equipment for lifting.
10. Describe the procedures to attach and use tag lines.
11. Describe the procedures used to ensure the work area is safe for lifting.
  - i. supervision of lift
  - ii. securing work area
  - iii. communication
12. Identify and describe the procedures used to communicate during hoisting, lifting and rigging operations.
  - i. hand signals
  - ii. electronic communications
  - iii. audible and visual warnings
13. Identify the factors to consider when selecting rigging equipment.
  - i. load characteristics
  - ii. sling angle
  - iii. environment
    - chemical hazards
    - grounding requirements
    - weather conditions
  - iv. working load limit
14. Describe the procedures used to perform a lift.
  - i. pre-lift checks
  - ii. lifting load

- iii. placement of load
- iv. post-lift inspection

**Practical Requirements:**

None.

## WD1790 Work Planning

### **Learning Outcomes:**

- Demonstrate knowledge of the procedures used to plan and organize work tasks.

**Duration:** 6 Hours

**Pre-Requisite(s):** All Block I Technical Courses

### **Objectives and Content:**

1. Identify sources of information relevant to work task planning.
  - i. supervisor
  - ii. documentation
  - iii. drawings
  - iv. related professionals
  - v. suppliers
  - vi. clients
2. Identify the considerations when planning work tasks.
  - i. scheduling
  - ii. sequence
  - iii. material selection and handling
  - iv. equipment selection
3. Describe the procedures used to organize, move and store tools, equipment, materials and supplies.

### **Practical Requirements:**

None.

OT1150 Workplace Exposure

**Learning Outcomes:**

- Demonstrate knowledge of theory and practical applications of trade skills, safe work practices, appropriate workplace behaviour, and time management through exposure to the trade in an authentic work environment.

**NOTE:** The pre-apprentice must be supervised at the workplace. Supervision staff must be appropriately qualified to undertake that role – preferably a certified Journeyperson for the trade.

**Duration:** 80 Hours

**Pre-Requisite(s):** None

## AP1101 Introduction to Apprenticeship

### Learning Outcomes:

- Demonstrate knowledge of how to become a registered apprentice.
- Demonstrate knowledge of the steps to complete an apprenticeship program.
- Demonstrate knowledge of various stakeholders in the apprenticeship process.
- Demonstrate knowledge of the Red Seal Program.

**Duration:** 15 Hours

**Pre-Requisite(s):** None

### Objectives and Content:

1. Define the following terms:
  - i. apprenticeship
  - ii. apprentice vs. registered apprentice
  - iii. Journeyperson vs. Certified Journeyperson
  - iv. Certificate of Apprenticeship
  - v. Certificate of Qualification
  - vi. Recognition of Prior Learning
  - vii. dual certification
  
2. Explain the apprenticeship system in Newfoundland and Labrador and the roles and responsibilities of those involved.
  - i. registered apprentice
  - ii. training institution
  - iii. employer
  - iv. Journeyperson
  - v. Department of Advanced Education and Skills
    - Industrial Training Section
    - Standards and Curriculum Section
  - vi. Provincial Trade Advisory Committees
  - vii. Provincial Apprenticeship and Certification Board

3. Identify the Conditions Governing Apprenticeship.
4. Describe the training and educational requirements.
  - i. pre-employment (entry level) training
  - ii. block release
  - iii. on-the-job
5. Explain the steps in the registered apprenticeship process.
  - i. criteria for eligibility
    - entrance requirements as per Conditions of Apprenticeship
    - employment
  - ii. registration process
    - application requirements
  - iii. Memorandum of Understanding
    - probation period
    - cancellation
  - iv. Record of Occupational Progress (Logbook)
    - signing off skills
    - recording hours
    - updating PDO on progress
  - v. class calls
    - schedule
    - EI Eligibility
    - Direct Entry
    - advanced level
  - vi. Block Exams
  - vii. progression
    - schedule
    - wage rates
  - viii. cancellation of apprenticeship
  - ix. Practical Examinations
  - x. Provincial and Interprovincial examinations
  - xi. certification
    - Certification of Apprenticeship
    - Certification of Qualification
    - Provincial certification
    - Interprovincial Red Seal endorsement



6. Explain the Interprovincial Standards Red Seal Program.
  - i. designated Red Seal trade
  - ii. the National Occupational Analysis (NOA)
  - iii. Interprovincial (IP) Red Seal Endorsement Examination
  - iv. relationship of NOA to IP Examination
  - v. qualification recognition and mobility
7. Identify the current financial incentives available to apprentices.
8. Explain the NL apprenticeship and trades certification division's out-of- province apprenticeship policy.

**Practical Requirements:**

1. Use the Provincial Apprenticeship and Trades Certification web site at [www.gov.nl.ca/app](http://www.gov.nl.ca/app) to:
  - i. locate, download, and complete the Application for Apprenticeship and Memorandum of Understanding (MOU)
  - ii. locate, download, and complete the Out of Province registration forms
    - Application for Apprenticeship (out of province)
    - Letter of Understanding (LOU)
    - Acceptance of Conditions Letter
  - iii. locate, download, and complete the Work Experience Credits form
  - iv. identify the locations of all Industrial Training offices
  - v. locate and review the following learning resources relevant to the trade:
    - Study Guide
    - Exam Preparation Guide
    - Plan of Training
2. Use a logbook for this trade to:
  - i. identify the hours for the trade (in-school and on-the-job)
  - ii. identify the number of blocks
  - iii. identify the courses in each block
  - iv. identify the workplace skills to be completed and verified

3. Use the Red Seal Web site, <http://www.red-seal.ca> to retrieve the National Occupational Analyses (NOA) for this trade.
  - i. identify the following components of the NOA:
    - Trends
    - Scope
    - Key Competencies
    - Blocks
    - Tasks
    - Subtasks
    - Pie Charts
    - Table of Specifications

## AM1100 Math Essentials

Note: It is recommended that AM1100 be delivered in the first semester of the Entry Level training program.

### Learning Outcomes:

- Demonstrate knowledge of the numeracy skills required to begin the 2<sup>nd</sup> level math course.
- Demonstrate knowledge of mathematics as a critical element of the trade environment.
- Demonstrate knowledge of mathematical principles in trade problem solving situations.
- Demonstrate the ability to solve simple mathematical word problems.

**Duration:** 30 Hours

**Pre-Requisite(s):** None

### Objectives and Content:

*Wherever possible, the instructor should use trade specific examples to reinforce the course objectives*

1. Use multiplication tables from memory.
2. Perform whole number operations.
  - i. read, write, count, round off, add, subtract, multiply and divide whole numbers
3. Apply the order of operations in math problems.
4. Perform fraction and mixed number operations.
  - i. read, write, add, subtract, multiply and divide fractions

5. Perform decimal operations.
  - i. read, write, round off, add, subtract, multiply and divide decimals
6. Perform percent/decimal/fraction conversion and comparison.
  - i. convert between fractions, decimals and percents
7. Perform percentage operations.
  - i. read and write percentages
  - ii. calculate base, rates and percentages
8. Perform ratio and proportion operations.
  - i. use a ratio comparing two quantities with the same units
  - ii. use a proportion comparing two ratios
9. Use the imperial measurement system in math problems.
  - i. identify units of measurement for:
    - length
    - mass
    - area
    - volume
    - capacity
10. Use the metric measurement system in math problems.
  - i. identify units of measurement for:
    - length
    - mass
    - area
    - volume
    - capacity

**Practical Requirements:**

1. To emphasize or further develop specific knowledge objectives, students will be asked to complete practical demonstrations which confirm proper application of mathematical theory to job skills.

## AM1320 Welding Math Fundamentals

### Learning Outcomes:

- Demonstrate knowledge of mathematical concepts in the performance of trade practices.
- Demonstrate knowledge of mathematics as a critical element of the trade environment.
- Demonstrate knowledge of solving mathematical word problems.
- Demonstrate knowledge of mathematical principles for the purposes of problem solving, job and materials estimation, measurement, calculation, system conversion, diagram interpretation and scale conversions, formulae calculations, and geometric applications.

**Duration:** 30 Hours

**Pre-Requisite(s):** AM1100

### Objectives and Content:

*The instructor is required to use trade specific examples to reinforce the course objectives.*

1. Employ percent/decimal/fraction conversion and comparison in trade specific situations.
2. Apply ratios and proportions to trade specific problems.
3. Use the Imperial Measurement system in trade specific applications.
4. Use the Metric Measurement system in trade specific applications.
5. Complete Imperial/Metric conversions in trade specific situations.
  - i. convert between imperial and metric measurements
  - ii. convert to another unit within the same measurement system

6. Manipulate formulas using cross multiplication, dividing throughout, elimination, and substitution to solve trade specific problems, such as:
  - i. right angle triangles
  - ii. area
  - iii. volume
  - iv. perimeter
  
7. Perform calculations involving geometry that are relevant to the trade, such as:
  - i. angle calculations
  - ii. circle calculations
  
8. Use practical math skills to complete administrative trade tasks.
  - i. material estimation
  - ii. material costing
  - iii. time & labour estimates
  - iv. taxes & surcharges
  - v. markup & projecting revenue

**Practical Requirements:**

1. To emphasize or further develop specific knowledge objectives, students will be asked to complete practical demonstrations which confirm proper application of mathematical theory to job skills.

Note:

This course has been designated as NON-TRANSFERABLE to other trades programs, and NOT ELIGIBLE FOR PRIOR LEARNING ASSESSMENT. Students completing training in this trade program are required to complete this math course.

## CM2160 Communication Essentials

### Learning Outcomes:

- Demonstrate knowledge of the importance of well-developed writing skills in the workplace and in career development.
- Demonstrate knowledge of the purpose of various types of workplace correspondence.
- Demonstrate knowledge of the principles of effective workplace writing.
- Demonstrate knowledge of standard formats for letters and memos.
- Demonstrate knowledge of principles related to writing effective letters and memos.
- Demonstrate the ability to prepare and deliver an oral presentation.
- Demonstrate knowledge of the importance of effective interpersonal skills in the workplace.

**Duration:** 45 Hours

**Pre-Requisite(s):** None

### Objectives and Content:

*Wherever possible, the instructor is expected to use trade specific examples to reinforce the course objectives.*

1. Identify the principles for writing clear, concise, complete sentences and paragraphs which adhere to the conventions of grammar, punctuation, and mechanics.
2. Identify the principles of effective workplace writing.
  - i. describe the value of well-developed writing skills to career success
  - ii. discuss the importance of tone, and language or word choice in workplace communication, regardless of the circumstances
  - iii. demonstrate an awareness of cultural differences when preparing workplace correspondence
  - iv. describe the writing process as it applies to workplace communication
    - planning
    - writing

- editing/revising
  - v. identify the parts of a business letter and memo, and when each should be used in the workplace
  - vi. identify the standard formats for business letters and memos
  - vii. identify guidelines for writing sample letters and memos which convey:
    - acknowledgment
    - routine request
    - routine response
    - complaint
    - refusal
    - persuasive request
    - letters of appeal
- 3. Identify types of informal workplace documents.
  - i. identify types & purposes of reports
    - incident
    - process
    - progress
  - ii. identify common trade specific forms
  - iii. describe primary and secondary methods used to gather information
  - iv. discuss the importance of accuracy and completeness in reports and forms
- 4. Identify the elements of presentations used in the workplace.
  - i. identify presentation types
    - impromptu
    - informative
    - demonstration
    - persuasive
  - ii. identify the components of an effective presentation
    - eye contact
    - body language
    - vocal qualities
    - audience analysis
    - multimedia tools
    - keeping on topic



5. Demonstrate an understanding of interpersonal communications in the workplace.
  - i. identify listening techniques
  - ii. demonstrate an understanding of group dynamics
  - iii. describe the importance of contributing information and expertise in the workplace
  - iv. describe the importance of respectful and open communication in the workplace
  - v. identify methods to accept and provide feedback in a constructive and considerate manner
  - vi. explain the role of conflict in a group to reach solutions
  
6. Identify acceptable workplace uses of communication technologies.
  - i. cell / Smart Phone etiquette
  - ii. voice mail
  - iii. e-mail
  - iv. teleconferencing / videoconferencing for meetings and interviews
  - v. social networking
  - vi. other emerging technologies

**Practical Requirements:**

1. Write well-developed, coherent, unified paragraphs.
2. Write sample letters and memos.
3. Write one short informal report.
4. Complete a selection of at least 3 trade-related forms.
5. Deliver an effective oral presentation.

## SD1760 Workplace Essentials

Note: It is recommended that SD1760 be delivered in the second half of the Entry Level training program.

### Learning Outcomes:

- Demonstrate knowledge of workplace essentials in the areas of meetings, unions, workers compensation, workers' rights, and human rights.
- Demonstrate knowledge of good customer service practices.
- Demonstrate knowledge of effective job search techniques.

**Duration:** 45 Hours

**Pre-Requisite(s):** None

### Objectives and Content:

*Wherever possible, the instructor is expected to use trade specific examples to reinforce the course objectives.*

1. Identify common practices related to workplace meetings.
  - i. identify and discuss meeting format and preparation required for a meeting
  - ii. explain the purpose of an agenda
  - iii. explain the expected roles, responsibilities, and etiquette of meeting participants
  
2. Define unions and identify their role in the workplace.
  - i. identify the purpose of unions
  - ii. identify a common union structure
  - iii. identify the function of unions in this trade

3. Demonstrate an understanding of the Worker's Compensation process.
  - i. describe the aims, objectives, regulations and benefits of the Workplace Health, Safety and Compensation Commission
  - ii. explain the role of the Workers Advisor
  - iii. explain the internal review process
  
4. Demonstrate an understanding of workers' rights.
  - i. define labour standards
  - ii. identify regulations, including:
    - hours of work & overtime
    - termination of employment
    - minimum wages & allowable deductions
    - statutory holidays, vacation time, and vacation pay
  
5. Demonstrate an understanding of Human Rights issues.
  - i. examine the Human Rights Code and explain the role of the Human Rights Commission
  - ii. define harassment in various forms and identify strategies for prevention
    - direct
    - systemic
    - adverse effect
  - iii. identify gender and stereotyping issues in the workplace
  - iv. define basic concepts and terms related to workplace diversity including age, race, culture, religion, socio-economic status, and sexual orientation
  
6. Demonstrate an understanding of quality customer service.
  - i. explain why quality service is important
  - ii. identify barriers to quality customer service
  - iii. identify customer needs & common methods for meeting them
  - iv. identify and discuss the characteristics & importance of a positive attitude
  - v. identify the importance of demonstrating good communication skills including body language, listening, questioning, and when using electronic communication devices
  - vi. identify techniques for interacting with challenging customers to address complaints and resolve conflict

7. Demonstrate an understanding of effective job search techniques.
  - i. identify and explain employment trends, opportunities, and sources of employment
  - ii. identify and discuss essential skills for the trades as outlined by Human Resources and Skills Development Canada
  - iii. review job ads and identify the importance of fitting qualifications to job requirements
  - iv. identify the characteristics of effective resumes, the types of resumes, and principles of resume formatting
  - v. identify the characteristics of an effective cover letter
  - vi. identify the components of a portfolio, and discuss the value of establishing and maintaining a personal portfolio
  - vii. identify the common characteristics of the job interview process:
    - pre-interview preparation
    - interview conduct
    - post-interview follow up

**Practical Requirements:**

1. Create a resume.
2. Create a cover letter.
3. Participate in a mock job interview.

## MC1060 Computer Essentials

### Learning Outcomes:

- Demonstrate knowledge of computer systems and their operation.
- Demonstrate knowledge of popular software packages and their applications.
- Demonstrate knowledge of security issues related to computers.
- Demonstrate knowledge of the software used to complete apprenticeship block exams.

**Duration:** 15 Hours

**Pre-Requisite(s):** None

### Objectives and Content:

*Wherever possible, the instructor is expected to use trade specific examples to reinforce the course objectives.*

1. Identify the major external components of a microcomputer system.
  - i. input devices
  - ii. output devices
  - iii. central control unit
  
2. Use operating system software.
  - i. start and quit a program
  - ii. use the help function
  - iii. use the find function
  - iv. maximize and minimize a window
  - v. use the task bar
  - vi. adjust desktop settings such as screen savers, screen resolution, and backgrounds
  - vii. shut down a computer

3. Perform file management commands.
  - i. create folders
  - ii. copy files and folders
  - iii. move files and folders
  - iv. rename files and folders
  - v. delete files and folders
  
4. Use word processing software to create documents.
  - i. enter text
  - ii. indent and tab text
  - iii. change text attributes (bold, underline, font, etc.)
  - iv. change layout format (margins, alignment, line spacing)
  - v. spell check and proofread
  - vi. edit text
  - vii. save document
  - viii. print document
  - ix. close document
  - x. retrieve documents
  
5. Use spreadsheet software to create spreadsheets.
  - i. enter data in cells
  - ii. create formulas to add, subtract, multiply and divide
  - iii. save spreadsheet
  - iv. print spreadsheet
  - v. close spreadsheet
  - vi. retrieve spreadsheet
  
6. Access the Internet.
  - i. access websites using the world wide web(www)
  - ii. identify examples of web browsers
  - iii. use search engines with common searching techniques
  - iv. describe security issues

7. Use electronic mail.
  - i. describe e-mail etiquette
    - grammar and punctuation
    - privacy and legal issues when sharing and forwarding e-mail
    - work appropriate content
    - awareness of employer policies
  - ii. manage e-mail using the inbox, sent, and deleted folders
  - iii. send an e-mail message with attachment(s)
  - iv. print e-mail

**Practical Requirements:**

None.

## BLOCK II

### WD2840 GTAW (Gas Tungsten Arc Welding) 2-Fillet Weld All Positions, Mild Steel

#### Learning Outcomes:

- Demonstrate knowledge of the procedures used to prepare base metals and joints for gas tungsten arc welding (GTAW) fillet welds.
- Demonstrate knowledge of the procedures used to perform fillet welds on mild steel sheet and plate in all positions using the GTAW process.
- Demonstrate knowledge of the procedures used to perform visual weld inspections.

**Duration:** 24 Hours

**Pre-Requisite(s):** WD1641

#### Objectives and Content:

1. Define terminology associated with GTAW fillet welds.
2. Identify the considerations when selecting consumables and determining equipment set-up for performing GTAW fillet welds in all positions.
  - i. preparation
    - current requirements
  - ii. electrode selection
    - type
    - size and preparation
  - iii. cup sizes
  - iv. gas lens (diffusers)
  - v. shielding gas
  - vi. filler metal
  - vii. manipulation
    - filler metal
    - torch



3. Identify the requirements and describe the procedures to store consumables used for GTAW fillet welds on mild steel sheet and plate.
4. Describe the procedures used to prepare base metals and joints for GTAW fillet welds.
5. Describe the procedures used to perform fillet welds on mild steel sheet and plate in all positions using the GTAW process.
6. Describe the procedures used to prevent and correct weld faults.

**Practical Requirements:**

1. Perform fillet welds on mild steel in all positions using the GTAW process.
2. Perform a visual weld inspection.

## WD2910 Layout and Template Development Fundamentals

### Learning Outcomes:

- Demonstrate knowledge of pattern and template development and its purpose.
- Demonstrate knowledge of the procedures used to develop simple templates.

**Duration:** 30 Hours

**Pre-Requisite(s):** None

### Objectives and Content:

1. Describe the purpose and applications of templates.
2. Define terminology associated with layout and template development.
3. Describe methods used to establish line of cut using template.
4. Describe layout tools and procedures.
5. Describe template development using triangular, radial lines, and parallel lines.
6. Describe layout operations as required to develop wrap around templates for use in welded fabrication of joints in pipe and tubing for:
  - i. a single cut elbow
  - ii. a 90° double cut elbow
  - iii. a tee
  - iv. a 30° lateral

### Practical Requirements:

1. Develop templates.
  - i. hole-punching drilling
  - ii. double cut elbow
  - iii. tee

WD2142 SMAW (Shielded Metal Arc Welding) 4 - Groove Welds Mild Steel Plate, 3G, 4G, 6G

**Learning Outcomes:**

- Demonstrate knowledge of the procedures used to groove weld on mild steel plate using the SMAW process with F-3 and F-4 electrodes.
- Demonstrate knowledge of the procedures used to perform weld tests.
- Demonstrate knowledge of the procedures used to perform visual weld inspections.

**Duration:** 30 Hours

**Pre-requisite(s):** WD1801

**Objectives and Content:**

1. Identify and describe the weld position.
  - i. 3-G
  - ii. 4-G
  - iii. 6-G
  
2. Describe the procedures used to perform a groove weld in an open root butt joint on mild steel plate in 3G, 4G, and 6G positions.
  - i. joint design
  - ii. inspection and testing
  - iii. electrode angles
  - iv. electrode manipulation
  - v. amperage adjustment
  - vi. identify position and limitations
  - vii. identify material
  - viii. determine thickness of material
  - ix. select electrode
  - x. select current
  - xi. penetration

3. Describe the procedures used to test welds.
  - i. codes and standards
4. Describe weld faults.

**Practical Requirements:**

1. Weld single vee groove butt joints on 3/8" mild steel plate in 3G, 4G, and 6G positions using F3 and F4 electrodes.
2. Perform weld tests.
3. Perform a visual weld inspection.

## WD2411 Stud Welding and Resistance Spot Welding

### Learning Outcomes:

- Demonstrate knowledge of stud welding and resistance spot welding.

**Duration:** 6 Hours

**Pre-Requisite(s):** WD1390

### Objectives and Content:

1. Define terminology associated with the stud weld and resistance spot weld process.
2. Describe the stud weld process.
  - i. general precautions, hazards and safe work practices
  - ii. principles of operation
    - equipment
    - weld quality
    - variables
      - stud size
      - current
      - time
      - lift
      - plunge
3. Describe the procedures used to stud weld.
4. Describe the resistance spot weld process.
  - i. general precautions
  - ii. principles of operation
    - equipment
    - weld quality
    - types of joints

- variables
    - current
    - time
    - material (type and thickness)
5. Identify RW welding processes and describe their applications.
    - i. spot
    - ii. seam
    - iii. projection
  6. Describe the procedures used to perform resistance spot welding.
  7. Describe the procedures used to prepare base metals for stud welding resistance spot welding.
  8. Describe the procedures used to prevent and correct weld faults.

**Practical Requirements:**

None.

## WD2501 SMAW (Shielded Metal Arc Welding) 5-Alloy Steels

### Learning Outcomes:

- Demonstrate knowledge of the procedures used to weld alloy steels using the SMAW process.
- Demonstrate knowledge of the procedures used to weld stainless steels using the SMAW process.
- Demonstrate knowledge of the procedures used to weld nickel alloy steels using the SMAW process.

**Duration:** 6 Hours

**Pre-Requisite(s):** None

### Objectives and Content:

1. Identify types of alloy steels and alloying elements; and describe their characteristics and applications.
2. Describe the SMAW process for welding alloy steels.
  - i. weldability
    - techniques
    - problems
    - probable causes
  - ii. welding procedures
3. Describe the SMAW process for welding stainless steels.
  - i. identification of materials
  - ii. thermal conductivity
  - iii. expansion
  - iv. weldability
    - techniques
    - problems
    - probable causes
  - v. welding procedures

4. Describe the SMAW process for welding nickel alloy steel.
  - i. identification of materials
    - nickel content
    - alloys
  - ii. weldability
    - techniques
    - problems
    - probable causes
  - iii. welding procedures
5. Describe the procedures used to test welds.
6. Describe weld faults when using alloys.

**Practical Requirements:**

None.



WD2521 GMAW (Gas Metal Arc Welding) 4-Pipe and Tubing, All Positions, Mild Steel

**Learning Outcomes:**

- Demonstrate knowledge of the procedures used to prepare pipe and tubing for gas metal arc welding (GMAW) welds.
- Demonstrate knowledge of the procedures used to weld pipe and tubing in all positions using the GMAW process.
- Demonstrate knowledge of the procedures used to perform visual weld inspections.

**Duration:** 30 Hours

**Pre-requisite(s):** WD1832

**Objectives and Content:**

1. Identify the considerations when selecting consumables and determining equipment set-up for performing GMAW welds on pipe and tubing in all positions.
  - i. specification requirements
  - ii. base metals
    - composition
    - thickness
  - iii. shielding gas selection
  - iv. power source
  - v. welding position
  - vi. joint type and design
  - vii. backing rings
  - viii. welding pre-fabricated fittings
2. Describe the procedures used to prepare pipe and tubing base metals and joints for GMAW welds.
3. Describe the procedures used to perform welds on pipe and tubing in all positions using GMAW process.

4. Describe the procedures used to prevent and correct weld faults.

**Practical: Requirements:**

1. Perform groove welds on mild steel pipe and tubing in all positions using the GMAW process.
2. Perform a visual weld inspection.

WD2740 MCAW (Metal Core Arc Welding) 2 –Fillet and Groove Weld  
Plate, Flat and Horizontal, Mild Steel

**Learning Outcomes:**

- Demonstrate knowledge of the procedures used to prepare base metals for metal core arc welding (MCAW).
- Demonstrate knowledge of the procedures used to perform welds using the MCAW process.
- Demonstrate knowledge of the procedures used to perform visual weld inspections.

**Duration:** 30 Hours

**Pre-requisite(s):** WD1360

**Objectives and Content:**

1. Define terminology associated with MCAW fillet and groove welds.
2. Interpret information pertaining to MCAW fillet and groove welds found on drawings and specifications.
3. Identify the considerations when selecting consumables and determining equipment set-up for performing MCAW fillet and groove welds.
  - i. specification requirements
  - ii. base metal
    - composition
    - thickness
  - iii. shielding gas selection
  - iv. power source
  - v. welding position
  - vi. joint type and design
4. Identify requirements and describe the procedures to store consumables used for MCAW welding.

5. Describe the procedures used to prepare base metals and joints for MCAW fillet and groove welds.
6. Describe the procedures used to perform fillet and groove welds using the MCAW process.
7. Describe the procedures used to prevent and correct weld faults.

**Practical: Requirements:**

1. Perform MCAW welds.
  - i. 1F
  - ii. 2F
  - iii. 1GF
  - iv. 2GF
2. Perform a visual weld inspection.

## WD2531 GMAW (Gas Metal Arc Welding) 5-Aluminum and Stainless Steel

### Learning Outcomes:

- Demonstrate knowledge of the procedures used to weld aluminum sheet and plate in all positions using the GMAW process.
- Demonstrate knowledge of the procedures used to weld stainless steels in all positions using the GMAW process.
- Demonstrate knowledge of the procedures used to perform visual weld inspections.

**Duration:** 18 Hours

**Pre-Requisite(s):** WD1832

### Objectives and Content:

1. Describe the GMAW process used to weld aluminum and stainless sheet and plate in all positions.
  - i. determine material characteristics
    - identification numbers
    - alloys
    - weldability
  - ii. select filler wire
  - iii. identify parameters
  - iv. identify variables
  - v. identify shielding gases
  - vi. power source
    - push/pull
    - spool gun
  - vi. thermal conductivity
2. Describe the procedures used to fillet and groove weld aluminum sheet and plate.

3. Describe the procedures used to fillet and groove weld stainless steel.
4. Describe weld faults.

**Practical Requirements:**

1. Deposit fillet welds on stainless steel and aluminium plate.
2. Deposit groove welds on aluminium plate.
3. Perform a visual weld inspection.

## WD2542 GTAW (Gas Tungsten Arc Welding) 3-Alloy and Non-Ferrous Metals

### Learning Outcomes:

- Demonstrate knowledge of the procedures used to prepare ferrous and non-ferrous alloys and joints for gas tungsten arc welding (GTAW) welds.
- Demonstrate knowledge of the procedures used to perform welds on ferrous and non-ferrous alloys in all positions using the GTAW process.
- Demonstrate knowledge of the procedures used to perform visual weld inspections.

**Duration:** 30 Hours

**Pre-Requisite(s):** WD2840

### Objectives and Content:

1. Describe the GTAW process used to weld alloy steels.
  - i. identification of materials
    - alloying of elements
  - ii. weldability
    - techniques
    - problems
    - probable causes
  - iii. welding procedures
2. Identify the considerations when selecting consumables and determining equipment set-up for performing GTAW welds on ferrous and non-ferrous alloys in all positions.
  - i. specification requirements
  - ii. base metal
    - composition
    - thickness
  - iii. shielding gas selection
    - trailing gas
  - iv. back purging

- v. power source
  - vi. welding position
  - vii. joint type and design
3. Describe the process used to weld titanium.
    - i. thermal conductivity
      - expansion
    - ii. identification
    - iii. weldability
    - iv. inert shielding gases
      - trailing gas
      - purging
    - v. welding procedures
  4. Describe the procedures used to prepare ferrous and non-ferrous alloys and joints for GTAW welds.
  5. Describe the procedures used to perform welds on ferrous and non-ferrous alloys in all positions using the GTAW process.
  6. Describe the procedures used to prevent and correct weld faults.

**Practical Requirements:**

1. Weld stainless steel using GTAW process.
2. Deposit fillet welds on aluminium plate using a GTAW process.
3. Perform a visual weld inspection.



WD2552 FCAW (Flux Core Arc Welding) 3-Pipe and Tubing, All Positions, Mild Steel

**Learning Outcomes:**

- Demonstrate knowledge of the procedures used to prepare pipe and tubing for flux core arc welding (FCAW) welds.
- Demonstrate knowledge of the procedures used to weld pipe and tubing in all positions using the FCAW process.
- Demonstrate knowledge of the procedures used to perform visual weld inspections.

**Duration:** 30 Hours

**Pre-requisite(s):** WD1892

**Objectives and Content:**

1. Identify the considerations when selecting consumables and determining equipment set-up for performing FCAW welds on pipe and tubing in all positions.
  - i. specification requirements
  - ii. base metals
    - composition
    - thickness
  - iii. shielding gas selection
  - iv. power source
  - v. welding position
  - vi. joint type and design
  - vii. backing rings
  - viii. welding pre-fabricated fittings
2. Describe the procedures used to prepare pipe and tubing base metals and joints for FCAW welds.
3. Describe the procedures used to perform welds on pipe and tubing in all positions using the FCAW process.

4. Identify types of rotating positioners and describe their applications and procedures for use.
5. Describe the procedures used to prevent and correct weld faults.

**Practical: Requirements:**

1. Perform groove welds on mild steel pipe and tubing in all positions using the FCAW process.
2. Perform a visual weld inspection.

## WD2561 SAW (Submerged Arc Welding)

### Learning Outcomes:

- Demonstrate knowledge of the procedures used to prepare base metals for submerged arc welding (SAW).
- Demonstrate knowledge of the procedures used to weld using the SAW process.
- Demonstrate knowledge of the procedures used to perform visual weld inspections.

**Duration:** 6 Hours

**Pre-Requisite(s):** WD1610 or WD1631 or WD1641 or WD1741 or WD1360

### Objectives and Content:

1. Define terminology associated with SAW welding.
2. Identify hazards and describe safe work practices pertaining to SAW welding.
3. Identify SAW welding equipment, consumables and accessories and describe their applications.
4. Describe the procedures used to set-up and adjust SAW welding equipment.
5. Describe the procedures and techniques used to deposit a weld bead using SAW welding equipment.
  - i. arc starting methods
  - ii. electrode extension
  - iii. deposition rates
  - iv. travel speeds
  - v. penetration
6. Identify the considerations when selecting consumables and determining equipment set-up for SAW welding.
  - i. specification requirements

- ii. base metal
    - properties
    - thickness
  - iii. flux types
  - iv. filler metal types
  - v. welding position
  - vi. joint type and design
  - vii. deposition rates
  - viii. travel speeds
  - ix. penetration
  - x. starting methods
  - xi. finishing methods
7. Describe the procedures used to prepare base metals and joints for SAW welding.
8. Describe the procedures used to weld using the SAW process.
9. Describe the procedures used to prevent and correct weld faults.

**Practical Requirements:**

- 1. Weld butt joint, mild steel plate.
- 2. Weld tee joint in horizontal position.
- 3. Perform a visual weld inspection.

### BLOCK III

#### WD3010 GTAW (Gas Tungsten Arc Welding) 4-Fillet (3F, 4F) and Groove Weld All Positions, Mild Steel Plate

##### Learning Outcomes:

- Demonstrate knowledge of the procedures used to fillet (3F, 4F) and groove weld on mild steel plate in all positions using the GTAW process.
- Demonstrate knowledge of the procedures used to perform visual weld inspections.

**Duration:** 30 Hours

**Pre-Requisite(s):** WD2840

##### Objectives and Content:

1. Describe the process used to fillet (3F, 4F) and groove weld in all positions.
  - i. preparation
    - current requirements
    - material
  - ii. electrode selection
    - type
    - size and preparation
  - iii. cup sizes
  - iv. gas lens (diffusers)
  - v. shielding gas
  - vi. filler metal
  - vii. manipulation
    - filler metal
    - torch
2. Describe the procedures used to test welds.
3. Describe weld faults.

**Practical Requirements:**

1. Perform fillet (3F, 4F) and groove welds (all positions), mild steel plate using the GTAW process.
2. Perform a visual weld inspection.

## WD3020 Shop Drawings and Structural Components for Fabrication

### Learning Outcomes:

- Demonstrate knowledge of structural components, their characteristics and applications.
- Demonstrate knowledge of joints, their applications and the procedures used to prepare them for welding operations.
- Demonstrate knowledge of the procedures used to identify structural components from shop drawings.
- Demonstrate knowledge of the procedures used to draw templates for structural parts.
- Demonstrate knowledge of the procedures used to control welding distortion.

**Duration:** 30 Hours

**Pre-Requisite(s):** WD1670

### Objectives and Content:

1. Identify the various types of structural steel shapes and describe the procedures used to determine their dimensions.
  - S-beam (standard)
  - WF-beam (wide flanged beam)
  - angle iron
  - channel
  - I-beam
  - pipe and tubing
  - sheet
  - plate
  - flat bar
  - square stock
2. Identify and interpret methods used to prepare shapes of various structural components found on shop drawings.
  - i. column
  - ii. beam
  - iii. truss

- iv. purlin
  - v. joists
3. Describe the procedures used to work accurately from shop drawings or sketches.
- i. read shop drawings
    - beams
    - columns
    - stairs
    - brace
  - ii. verify dimensions
  - iii. cut parts as per shop drawings
    - notch
    - cut
    - cope
4. Describe the procedures used to draw templates for structural parts.
5. Describe control of shrinkage in weldments.
- i. welding sequence
    - back step
    - staggered intermittent
    - chain intermittent
  - ii. weld size and number of passes
  - iii. balancing of shrinkage and other forces
  - iv. pre-heat and post-heat requirements
  - v. pre-bending/offsetting

**Practical Requirements:**

- 1. Interpret instructions and symbols found on working drawings.



WD3030 GTAW (Gas Tungsten Arc Welding) 5-Pipe and Tubing, All Positions, Mild Steel

**Learning Outcomes:**

- Demonstrate knowledge of the procedures used to prepare pipe and tubing for gas tungsten arc welding (GTAW) welds.
- Demonstrate knowledge of the procedures used to perform welds on pipe and tubing in all positions using the GTAW process.
- Demonstrate knowledge of the procedures used to perform visual weld inspections.

**Duration:** 75 Hours

**Pre-Requisite(s):** WD3010

**Objectives and Content:**

1. Define terminology associated with GTAW welds on pipe and tubing.
  - i. joint type and design
    - joint preparation
    - root face and gap
  - ii. inert selection
    - backing rings
    - consumable insert
  - iii. purging
    - dams
  - iv. gases
    - shielding
    - purging (special applications)
  - v. welding and fabricated fittings
  - vi. tack weld
  - vii. work and travel angles
  - viii. torch manipulation
  - ix. welding variables
  - x. specification requirements

- xi. base metal
    - composition
    - thickness
  - xii. power source
  - xiii. welding position
2. Describe the procedures used to prepare pipe and tubing base metals and joints for GTAW welds.
  3. Describe the procedures used to perform welds on pipe and tubing in all positions using GTAW process.
  4. Describe the procedures used to prevent and correct weld faults.
  5. Identify types of rotating positioners and describe their applications and procedures for use in welding.
  6. Identify orbital welding equipment and describe its components and applications.

**Practical Requirements:**

1. Weld pipe and tubing in all positions using the GTAW process.
2. Perform a visual weld inspection.

WD3040 SMAW (Shielded Metal Arc Welding) 6-Pipe, All Positions,  
Mild Steel

**Learning Outcomes:**

- Demonstrate knowledge of the procedures used to prepare pipe and tubing for shielded metal arc welding (SMAW) welds.
- Demonstrate knowledge of the procedures used to weld pipe and tubing in all positions using the SMAW process.
- Demonstrate knowledge of the procedures used to perform visual weld inspections.

**Duration:** 105 Hours

**Pre-Requisite(s):** WD2142

**Objectives and Content:**

1. Define terminology associated with SMAW welds on pipe and tubing.
  - i. types of pipe and tubing
  - ii. root gap
  - iii. root face
  - iv. tacking
  - v. back-up rings
  - vi. electrode angle
  - vii. specification requirements
  - viii. base metal
    - composition
    - thickness
  - ix. power source
  - x. welding position
  - xi. joint type and design
2. Describe the procedures used to prepare pipe and tubing base metals and joints for SMAW welds.

3. Describe the procedures used to perform welds on pipe and tubing in all positions using the SMAW process.
4. Describe the procedures used to prevent and correct weld faults.
5. Describe tack welding of pipe sections.
6. Describe the procedures used to prepare test coupons.
  - i. cutting and grinding
7. Describe the procedures used to test welds.

**Practical Requirements:**

1. Prepare and weld 6" sch 80 pipe in all positions using F4 electrodes.
2. Perform a visual weld inspection.

## **D. Conditions Governing Apprenticeship Training**

### **1.0 General**

The following general conditions apply to all apprenticeship training programs approved by the Provincial Apprenticeship and Certification Board (PACB) in accordance with the *Apprenticeship Training and Certification Act (1999)*. If an occupation requires additional conditions, these will be noted in the specific Plan of Training for the occupation. In no case should there be a conflict between these conditions and the additional requirements specified in a certain Plan of Training. All references to Memorandum of Understanding will also apply to Letter of Understanding (LOU) agreements.

### **2.0 Entrance Requirements**

#### **2.1 Entry into the occupation as an apprentice requires:**

Indenturing into the occupation by an employer who agrees to provide the appropriate training and work experiences as outlined in the Plan of Training.

#### **2.2 Notwithstanding the above, each candidate must have successfully completed a high school program or equivalent, and in addition may be required to have completed certain academic subjects as specified in a particular Plan of Training. Mature students, at the discretion of the Director of Apprenticeship and Trades Certification, may be registered. A mature student is defined as one who has reached the age of 19 and who can demonstrate the ability and the interest to complete the requirements for certification.**

#### **2.3 At the discretion of the Director of Apprenticeship and Trades Certification, credit toward the apprenticeship program may be awarded to an apprentice for previous work experience and/or training as validated through prior learning assessment.**

#### **2.4 An Application for Apprenticeship form must be duly completed along with a Memorandum of Understanding as applicable to be indentured into an Apprenticeship. The Memorandum of Understanding must contain signatures of**

an authorized employer representative, the apprentice and an official representing the Provincial Apprenticeship and Certification Board to be valid.

- 2.5 A new Memorandum of Understanding must be completed for each change in an employer during the apprenticeship term.

### **3.0 Probationary Period**

The probationary period for each Memorandum of Understanding will be six months or 900 employment credit hours. Within that period the memorandum may be terminated by either party upon giving the other party and the PACB one week notice in writing.

### **4.0 Termination of a Memorandum of Understanding**

After the probationary period referred to in Section 3.0, the Memorandum of Understanding may be terminated by the PACB by mutual consent of the parties involved, or cancelled by the PACB for proper and sufficient cause in the opinion of the PACB, such as that stated in Section 14.

### **5.0 Apprenticeship Progression Schedule, Wage Rates and Advanced Training Criteria**

## Progression Schedule

WELDER - 5400 Hours			
APPRENTICESHIP LEVEL AND WAGES			
Year	Wage Rate At This Level	Requirements for progression to next level of apprenticeship	When requirements are met, the apprentice will progress to...
1 <sup>st</sup>	60 %	<ul style="list-style-type: none"> <li>▪ Completion of Block 1 training</li> <li>▪ Pass Block 1 exam</li> <li>▪ Minimum 1800 hours of combined relevant work experience and training</li> </ul>	2 <sup>nd</sup> Year
2 <sup>nd</sup>	75%	<ul style="list-style-type: none"> <li>▪ Completion of Block 2 training</li> <li>▪ Pass Block 2 exam</li> <li>▪ Minimum 3600 hours of combined relevant work experience and training</li> </ul>	3 <sup>rd</sup> Year
3 <sup>rd</sup>	90%	<ul style="list-style-type: none"> <li>▪ Completion of Block 3 training</li> <li>▪ Minimum 5400 hours of combined relevant work experience and training</li> <li>▪ Sign-off of all workplace skills in apprentice logbook</li> <li>▪ Pass certification exam</li> </ul>	Journeyman Certification
<p>Wage Rates</p> <ul style="list-style-type: none"> <li>▪ Rates are percentages of the prevailing journeyman's wage rate in the place of employment of the apprentice.</li> <li>▪ Rates must not be less than the wage rate established by the Labour Standards Act (1990), as now in force or as hereafter amended, or by other order, as amended from time to time replacing the first mentioned order.</li> <li>▪ Rates must not be less than the wage rate established by any collective agreement which may be in force at the apprentice's workplace.</li> <li>▪ Employers are free to pay wage rates above the minimums specified.</li> </ul> <p>Block Exams</p> <ul style="list-style-type: none"> <li>▪ This program may <b>not</b> currently contain Block Exams, in which case this requirement will be waived until such time as Block Exams are available.</li> </ul>			

WELDER - 5400 Hours		
CLASS CALLS		
Call Level	Requirements for Class Call	Hours awarded for In-School Training
Direct Entry Apprentice: PLA & / or Block 1	<ul style="list-style-type: none"> <li>▪ Minimum of 1000 hours of relevant work experience</li> <li>▪ Prior Learning Assessment (PLA) at designated college (if applicable)</li> </ul>	To be determined by the number of courses completed after each class call
Block 2	<ul style="list-style-type: none"> <li>▪ Minimum of 3000 hours of relevant work experience and training</li> </ul>	240
Block 3	<ul style="list-style-type: none"> <li>▪ Minimum of 5200 hours of relevant work experience and training</li> </ul>	240

Direct Entry Apprentice

- Must complete Block 1 courses through PLA and / or in-school training.
- Block 1 training is to be completed via class calls; up to 16 weeks of training per calendar year.
- Must attend in-school training until Block 1 is complete before attending Blocks 2 or higher

Class Calls at Minimum Hours

- Class calls may not always occur at the minimum hours indicated. Some variation is permitted to allow for the availability of training resources and apprentices.



## **6.0 Tools**

Apprentices shall be required to obtain their own hand tools applicable for the designated occupation of registration or tools as specified by the PACB.

## **7.0 Periodic Examinations and Evaluation**

- 7.1 Every apprentice shall submit to such occupational tests and examinations as the PACB shall direct. If after such occupational tests and examinations the apprentice is found to be making unsatisfactory progress, his/her apprenticeship level and rate of wage shall not be advanced as provided in Section 5 until his/her progress is satisfactory to the Director of Apprenticeship and Trades Certification and his/her date of completion shall be deferred accordingly. Persistent failure to pass required tests shall be a cause for revocation of his/her Memorandum of Understanding.
- 7.2 Upon receipt of reports of accelerated progress of the apprentice, the PACB may shorten the term of apprenticeship and advance the date of completion accordingly.
- 7.3 For each and every course, a formal assessment is required for which 70% is the pass mark. A mark of 70% must be attained in both the theory examination and the practical project assignment, where applicable as documented on an official transcript.
- 7.4 Course credits may be granted through the use of a PACB approved matrix which identifies course equivalencies between designated trades and between current and historical Plans of Training for the same trade.

## **8.0 Granting of Certificates of Apprenticeship**

Upon the successful completion of apprenticeship, the PACB shall issue a Certificate of Apprenticeship.

## **9.0 Hours of Work**

Any hours employed in the performance of duties related to the designated occupation will be credited towards the completion of the term of apprenticeship. Appropriate documentation of these hours must be provided.

## **10.0 Copies of the Registration for Apprenticeship**

The Director of Apprenticeship and Trades Certification shall provide copies of the Registration for Apprenticeship form to all signatories to the document.

## **11.0 Ratio of Apprentices to Journeypersons**

Under normal practice, the ratio of apprentices to journeypersons shall not exceed two apprentices to every one journeyperson employed. Other ratio arrangements would be determined and approved by the PACB.

## **12.0 Relationship to a Collective Bargaining Agreement**

Where applicable in Section 5 of these conditions, Collective Agreements take precedence.

## **13.0 Amendments to a Plan of Apprenticeship Training**

A Plan of Training may be amended at any time by the PACB.

## **14.0 Employment, Re-Employment and Training Requirements**

14.1 The Plan of Training requires apprentices to regularly attend their place of employment.

14.2 The Plan of Training requires apprentices to attend training for that occupation as prescribed by the PACB.

14.3 Failure to comply with Sections 14.1 and/or 14.2 will result in cancellation of the Memorandum of Understanding. Apprentices may have their MOUs reinstated by the PACB but would be subject to a commitment to complete the entire

program as outlined in the General Conditions of Apprenticeship. Permanent cancellation in the said occupation is the result of non-compliance.

- 14.4 Cancellation of the Memorandum of Understanding to challenge journeyperson examinations, if unsuccessful, would require an apprentice to serve a time penalty of two (2) years before reinstatement as an apprentice or qualifying to receive a class call to training as a registered Trade Qualifier. Cancellation must be mutually agreed upon by the employer and the apprentice.
- 14.5 An employer shall ensure that each apprentice is under the direct supervision of an approved journeyperson supervisor who is located at the same worksite as the apprentice, and that the apprentice is able to communicate with the journeyperson with respect to the task, activity or function that is being supervised.
- 14.6 Under the Plan of Training the employer is required to keep each apprentice employed as long as work is available, and if the apprentice is laid off due to lack of work, to give first opportunity to be hired before another is hired.
- 14.7 The employer will permit each apprentice to attend training programs as prescribed by the PACB.
- 14.8 Apprentices who cannot acquire all the workplace skills at their place of employment will have to be evaluated in a simulated work environment at a PACB authorized training institution and have sign-off done by instructors to meet the requirements for certification.

## **15.0 Appeals to Decisions Based on Conditions Governing Apprenticeship Training**

Persons wishing to appeal any decisions based on the above conditions must do so in writing to the Minister of Advanced Education and Skills within 30 days of the decision.

## **E. Requirements for Red Seal Endorsement**

1. Evidence the required work experiences outlined in this Plan of Training have been obtained. This evidence must be in a format clearly outlining the experiences and must be signed by an appropriate person or persons attesting that these experiences have been obtained to the level required.
2. Successful completion of all required courses in the program.
3. A combination of training from an approved training program and suitable work experience totaling 5400 hours.

**Or**

A total 7200 hours of suitable work experience.

4. Completion of a National Red Seal examination, to be set at a place and time determined by the Apprenticeship and Trades Certification Division.

## **F. Roles and Responsibilities of Stakeholders in the Apprenticeship Process**

The apprenticeship process involves a number of stakeholders playing significant roles in the training of apprentices. This section outlines these roles and the responsibilities resulting from them.

### **The Apprentice:**

- completes all required technical training courses as approved by the PACB.
- finds appropriate employment.
- completes all required work experiences in combination with the required hours.
- ensures work experiences are well documented.
- approaches apprenticeship training with an attitude and commitment that fosters the qualities necessary for a successful career as a qualified journeyman.
- obtains the required hand tools as specified by the PACB for each period of training of the apprenticeship program.

### **The Employer:**

- provides high quality work experiences in an environment conducive to learning.
- remunerates apprentices as set out in the Plan of Training or Collective Agreements.
- provides feedback to training institutions, Apprenticeship and Trades Certification Division and apprentices in an effort to establish a process of continuous quality improvement.
- where appropriate, releases apprentices for the purpose of returning to a training institution to complete the necessary technical courses.
- ensures work experiences of the apprentice are documented.
- ensures a certified journeyman is currently on staff in the same trade area as the apprentice and whose certification is recognized by the NL Department of Advanced Education and Skills.

### **The Training Institution:**

- provides a high quality learning environment.
- provides the necessary student support services that will enhance an apprentice's ability to be successful.
- participates with other stakeholders in the continual updating of programs.

### **The Apprenticeship and Trades Certification Division:**

- establishes and maintains program advisory committees under the direction of the PACB.
- promotes apprenticeship training as a viable career option to prospective apprentices and other appropriate persons involved, such as career guidance counsellors, teachers, parents, etc.
- establishes and maintains a protocol with training institutions, employers and other appropriate stakeholders to ensure the quality of apprenticeship training programs.
- ensures all apprentices are appropriately registered and records are maintained as required.
- schedules all necessary technical training periods for apprentices to complete requirements for certification.
- administers block, provincial and interprovincial examinations.

### **The Provincial Apprenticeship and Certification Board:**

- sets policies to ensure the provisions of the *Apprenticeship and Certification Act (1999)* are implemented.
- ensures advisory and examination committees are established and maintained.
- accredits institutions to deliver apprenticeship training programs.
- designates occupations for apprenticeship training and/or certification.