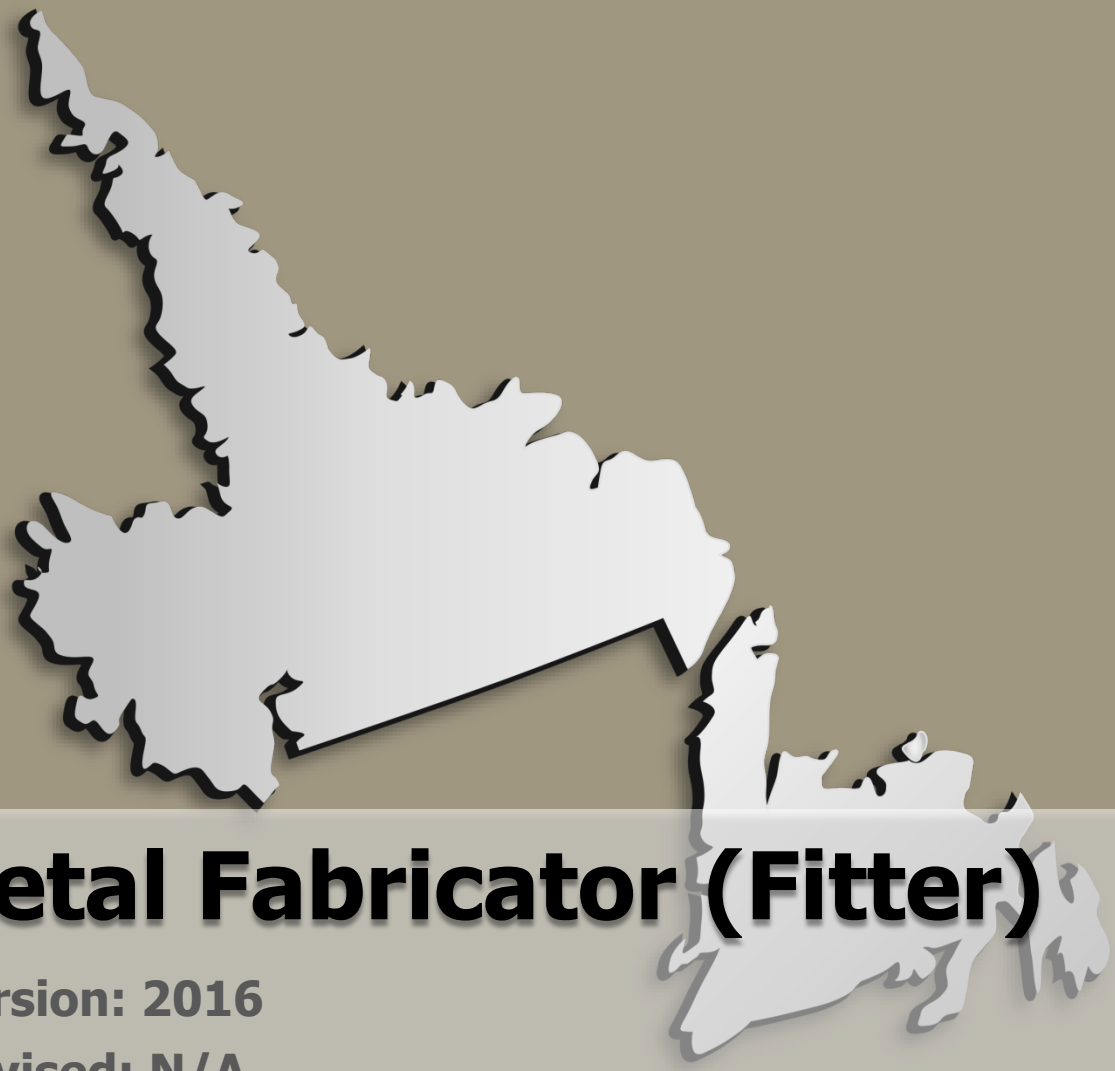
Atlantic Workforce Partnership

Curriculum Standard



Metal Fabricator (Fitter)

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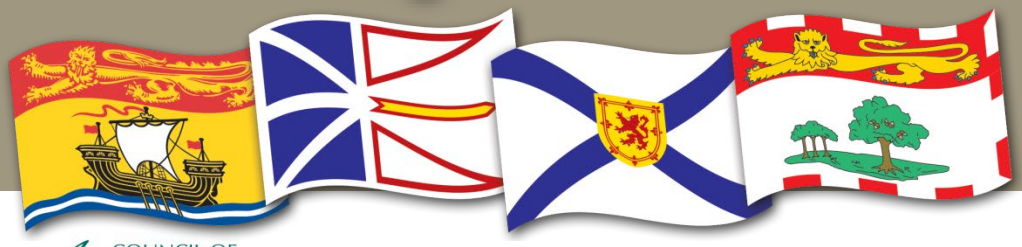
Atlantic Apprenticeship



COUNCIL OF ATLANTIC PREMIERS
CONSEIL DES PREMIERS MINISTRES DE L'ATLANTIQUE

Employment and Social Development Canada
Emploi et Développement social Canada

PLAN OF TRAINING

Atlantic Apprenticeship Curriculum Standard

Metal Fabricator (Fitter)

APRIL 2016

Newfoundland Labrador

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: June 23, 2016

Atlantic Apprenticeship Curriculum Standard

Metal Fabricator (Fitter)

Preface

This Atlantic Apprenticeship Curriculum Standard is intended to assist instructional staff in the design and delivery of technical, in-class training in support of the Metal Fabricator (Fitter) program.

This document contains all the technical training elements required to complete the Metal Fabricator (Fitter) apprenticeship program and has been developed based on the 2011 National Occupational Analysis and the 2011 Interprovincial Program Guide (IPG). The NOA and IPG can be found on the Red Seal website (www.red-seal.ca).

Implementation of this AACS for Apprenticeship training is outlined in the following table.

Level	Implementation Effective
Level 1	2016-2017
Level 2	2017-2018
Level 3	2018-2019

** *The above implementation schedule identifies the training season where implementation is required to be complete in all Atlantic jurisdictions. Please* ***confirm*** *with Apprenticeship Staff in your jurisdiction for more specific implementation dates for your jurisdiction prior to commencing training.*

Granting of credit or permission to challenge level examinations for pre-employment or pre-apprenticeship training for the Metal Fabricator (Fitter) trade will be based on the content outlined in this standard. Training providers must contact their provincial apprenticeship authority for more information on the process and requirements for determining eligibility for credit towards an apprenticeship program. Programs which have been deemed acceptable by the jurisdictional apprenticeship authority will be identified in transfer credit matrix developed through the Atlantic Apprenticeship Harmonization Project.

Acknowledgements

The development of the Atlantic Apprenticeship Curriculum Standard (AACS) is an initiative of the Atlantic Apprenticeship Council's Atlantic Apprenticeship Harmonization Project (AAHP) through the Atlantic Workforce Partnership and Employment and Social Development Canada.

The Atlantic Apprenticeship Council wishes to acknowledge the contributions of the following industry and instructional representatives on the Atlantic Trade Advisory Committee (ATAC) who participated in the development of this document in May 2015.

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

Table of Contents

User Guide

Atlantic Apprenticeship Curriculum Standards (AACS) are developed based on National Occupational Analyses (NOA), Interprovincial Program Guides (IPG) (if available) and extensive industry consultation. This document represents the minimum content to be delivered as part of the harmonized Atlantic program for the Metal Fabricator (Fitter) trade.

The AACS's are deliberately constructed for ease of use and flexibility of structure in order to adapt to all delivery requirements. They detail units of training, unit outcomes and objectives. They do not impose a delivery model or teaching format.

Jurisdictions and/or training providers will select and develop delivery materials and techniques that accommodate a variety of learning styles and delivery patterns. The AACS does not dictate study materials, textbooks or learning activities to be used in delivery.

The document includes a Level Structure to facilitate mobility for apprentices moving from one jurisdiction to another.

Structure

The content of the AACS is divided into units. Unit codes are used as a means of identification and are not intended to convey the order of delivery. It is at the discretion of the training provider to deliver the content in the required logical sequence of delivery within the level. Jurisdictions are free to deliver units one at a time or concurrently within a level, provided all outcomes are met.

The Learning Outcomes describe what the apprentice should know or be able to do at the end of training. Wording of the Learning Outcomes, "Demonstrate knowledge of…" acknowledges the broad spectrum of ways in which knowledge can be assessed (i.e. practical projects, multiple choice testing, presentations, etc.) by instructional staff within the training.

Summative evaluation will be through a multiple-choice Level Examination administered through the jurisdictional Apprenticeship Authority.

The 2011 National Occupational Analysis References (NOA) to AACS Comparison chart outlines the relation between each NOA sub-task and the AACS units. NOA References have also been detailed in each unit to highlight the direct link between the unit and relevant sub-tasks in the NOA.

In the Level Structure section, the document identifies suggested hours in order to provide an indication of the time it should take to cover the material in the unit and is intended as a guide only. Adjustments to the suggested hours for each unit may be required to account for rate of apprentice learning, statutory holidays, storm days, registration and examinations. These suggested hours detailed for each unit will represent both theory and practical training (if relevant) and for consistency will be based on a standard of 30 hours per week of training. The actual length of time required to deliver an outcome successfully will depend upon the learning activities and teaching methods used.

There are two types of objectives found in the AACS document: theoretical and practical.

The theoretical objectives represent the material that is to be covered during the technical training in order to convey the required knowledge to the apprentice.

The practical objectives represent the tasks or skills that have been deemed by the Atlantic Trade Advisory Committee as critical for the apprentices to receive exposure to while attending technical training. For example, exposure could be done through instructor demonstration or individual or group performance of the skill or task. Training providers are encouraged to use practical demonstration and opportunities for hands-on learning whenever possible. Practical objectives are not intended to replace the on-the-job training component of the apprentice's program or to mirror or replace the logbook skills that are to be taught and evaluated in the workplace.

Detailed content for each objective has not been developed. Where detail is required for clarity, content has been provided.

Glossary of Terms

These definitions are intended as a guide to how language is used in the document.

ADJUST	To put in good working order; regulate; bring to a proper state or position.
APPLICATION	The use to which something is put and/or the circumstance in which an individual would use it.
CHARACTERISTIC	A feature that helps to identify, tell apart or describe recognizably; a distinguishing mark or trait.
COMPONENT	A part that can be separated from or attached to a system; a segment or unit.
DEFINE	To state the meaning of (a word, phrase, etc.).
DESCRIBE	To give a verbal account of; tell about in detail.
EXPLAIN	To make plain or clear; illustrate; rationalize.
IDENTIFY	To point out or name objectives or types.
INTERPRET	To translate information from observation, charts, tables, graphs and written material.
MAINTAIN	To keep in a condition of good repair or efficiency.
METHOD	A means or manner of doing something that has procedures attached to it.
OPERATE	How an object works; to control or direct the functioning of.
PROCEDURE	A prescribed series of steps taken to accomplish an end.
PURPOSE	The reason for which something exists or is done, made or used.

Glossary of Terms (*continued*)

TECHNIQUE	Within a procedure, the manner in which technical skills are applied.
TEST	v. To subject to a procedure that ascertains effectiveness, value, proper function or other quality. n. A way of examining something to determine its characteristics or properties, or to determine whether or not it is working correctly.

Essential Skills Profiles

Through extensive research, the Government of Canada and other national and international agencies have identified and validated key essential skills for the workplace. These skills are used in nearly every job and at different levels of complexity. They provide the foundation for learning all other skills and enable people to evolve with their jobs and adapt to workplace change.

Essential Skills Profiles describe how workers in various occupations use each of the key essential skills. They include:

- a brief description of the occupation;
- examples of tasks that illustrate how each essential skill is applied; and,
- complexity ratings that indicate the level of difficulty of the example tasks.

Essential Skills profiles can be found on the Employment and Social Development Canada (ESDC) website at www.esdc.gc.ca/eng/jobs/les/profiles/index.shtml

The development and improvement of these Essential Skills is inherent throughout the apprenticeship training program as apprentices work towards achieving journeyperson status.

Profile Chart

COMMON OCCUPATIONAL SKILLS			
WDF-005 Safety	**WDF-010** Tools and Equipment	**WDF-020** Hoisting, Lifting and Rigging	**WDF-025** Access Equipment
WDF-030 Communication and Trade Documentation	**WDF-075** Drawings	**MTF-200** Drawings II	**MTF-300** Drawings III
WDF-620 Quality Assurance/Control I	**WDF-625** Quality Assurance Control II	**WDF-630** Metallurgy I	**WDF-645** Metallurgy II
WDF-650 Metallurgy III	**WDF-065** Weld Faults	**MTF-725** Communication and Work Planning	**MTF-740** Program Review
FABRICATION OF COMPONENTS			
WDF-015 Stationary Machinery	**WDF-605** Oxy-fuel	**WDF-610** Electric Arc Cutting and Gouging	**WDF-615** Plasma Arc Cutting and Gouging
MTF-700 Plasma Arc Cutting and Gouging (Review)	**WDF-070** Fabrication Fundamentals	**WDF-085** Introduction of Layout and Pattern Development	**MTF-205** Layout - Simple Components and Templates
MTF-310 Layout - Complex Components and Templates	**MTF-210** Fabrication - Simple Components	**MTF-315** Fabrication Complex Components	**MTF-220** Bending Equipment
MTF-225 Heat Forming	**MTF-230** Plate Rolling Equipment	**MTF-235** Shape Rolling Equipment	**MTF-240** Press Brake Equipment
MTF-305 Automated Shape Cutting Machines			
ASSEMBLY OF COMPONENTS			
WDF-035 Introduction to Welding Processes	**WDF-040** SMAW I - Set up, Strike and Maintain an Arc	**WDF-045** SMAW II - Fillet Weld, All Positions	**MTF-705** SMAW III - Tack Weld, All Positions
WDF-050 GMAW I - Set up and Maintain an Arc	**WDF-600** GMAW II - Fillet Weld, All Positions	**MTF-710** GMAW III - Tack Weld, All Positions	**WDF-055** FCAW I - Set up and Deposit a Weld

Profile Chart *(continued)*

ASSEMBLY OF COMPONENTS (Continued)			
MTF-715 FCAW II - Tack Weld, All Positions	**WDF-060** MCAW I - Set up and Deposit a Weld	**MTF-720** MCAW II - Tack Weld, Flat and Horizontal Positions	**WDF-635** Groove Welding I - SMAW, Flat and Horizontal
WDF-640 Groove Welding II - GMAW, Flat and Horizontal	**MTF-730** GTAW I - Set up and Maintain an Arc	**MTF-735** GTAW II - Tack Weld, All Positions	**MTF-215** Fit and Assemble - Simple Components
MTF-320 Fit and Assemble - Complex Assemblies	**MTF-330** Finish Preparation		

Level Structure

Level 1 – 9 Weeks

Unit Code	Unit Title	Suggested Hours	Page Number
WDF-005	Safety	8	20
WDF-010	Tools and Equipment	4	22
WDF-015	Stationary Machinery	4	24
WDF-020	Hoisting, Lifting and Rigging	12	26
WDF-025	Access Equipment	3	28
WDF-030	Communication and Trade Documentation	3	30
WDF-630	Metallurgy I	6	32
WDF-035	Introduction to Welding Processes	14	33
WDF-040	Shielded Metal Arc Welding I - Set up, Strike and Maintain an Arc	6	36
WDF-045	Shielded Metal Arc Welding II - Fillet Weld, All Positions	18	38
WDF-050	Gas Metal Arc Welding I - Set up and Maintain an Arc	18	40
WDF-600	Gas Metal Arc Welding II - Fillet Weld, All Positions	18	42
WDF-055	Flux Core Arc Welding I - Set up and Deposit a Weld	6	44
WDF-060	Metal Core Arc Welding I - Set up and Deposit a Weld	6	46
WDF-635	Groove Welding I - Shielded Metal Arc Welding, Flat and Horizontal	18	48
WDF-640	Groove Welding II - Gas Metal Arc Welding, Flat and Horizontal	12	50
WDF-605	Oxy-fuel	24	52
WDF-610	Electric Arc Cutting and Gouging	12	55
WDF-615	Plasma Arc Cutting and Gouging	6	57
WDF-075	Drawings	30	59
WDF-070	Fabrication Fundamentals	18	61
WDF-085	Introduction to Layout and Pattern Development	15	63
WDF-065	Weld Faults	9	64

Level Structure (continued)

Level 2 - 8 Weeks

Unit Code	Unit Title	Suggested Hours	Page Number
WDF-620	Quality Assurance/Control I	9	66
MTF-200	Drawings II	60	68
MTF-205	Layout - Simple Components and Templates	60	69
MTF-210	Fabrication - Simple Components	24	71
MTF-215	Fit and Assemble - Simple Components	12	73
MTF-700	Plasma Arc Cutting II (Review)	3	75
MTF-220	Bending Equipment	6	77
MTF-225	Heat Forming	3	79
MTF-230	Plate Rolling Equipment	6	81
MTF-235	Shape Rolling Equipment	3	83
MTF-240	Press Brake Equipment	6	85
WDF-645	Metallurgy II	12	87
MTF-705	Shielded Metal Arc Welding III - Tack Weld, All Positions.	3	89
MTF-710	Gas Metal Arc Welding III - Tack Weld, All Positions	3	91
MTF-715	Flux Core Arc Welding II - Tack Weld, All Positions	3	93
MTF-720	Metal Core Arc Welding II - Tack Weld, Flat and Horizontal Positions	3	95
MTF-730	Gas Tungsten Arc Welding I - Set up and Maintain an Arc	6	97
MTF-735	Gas Tungsten Arc Welding II - Tack Weld, All Positions	18	99

Level 3 - 6 Weeks

Unit Code	Unit Title	Suggested Hours	Page Number
MTF-300	Drawings III	30	102
MTF-305	Automated Shape Cutting Machines	3	103
MTF-725	Communication and Work Planning	12	104
MTF-310	Layout - Complex Components and Templates	30	106
MTF-315	Fabrication - Complex Components	24	108
MTF-320	Fit and Assemble - Complex Assemblies	24	110
WDF-625	Quality Assurance/Control II	9	112
MTF-330	Finish Preparation	6	114
WDF-650	Metallurgy III	12	117
MTF-740	Program Review	30	119

2011 NOA Sub-task to AACS Unit Comparison

NOA Sub-task		AACS Unit	
Task 1 - Performs safety-related functions.			
1.01	Maintains safe work environment.	WDF-005	Safety
1.02	Uses personal protective equipment (PPE) and safety equipment.	WDF-005	Safety
Task 2 - Maintains and uses tools and equipment.			
2.01	Maintains hand, power, layout and measuring tools and equipment.	WDF-010	Tools and Equipment
2.02	Maintains stationary machinery.	WDF-015	Stationary Machinery
2.03	Maintains cutting and welding equipment.	WDF-035	Introduction to Welding Processes
		WDF-040	SMAW I - Set up, Strike and Maintain an Arc
		WDF-050	GMAW I - Set up and Maintain an Arc
		WDF-055	FCAW I - Set up and Maintain an Arc
		WDF-060	MCAW I - Set up and Maintain an Arc
		MTF-730	GTAW I - Set up and Maintain an Arc
		WDF-605	Oxy-fuel
		WDF-615	Plasma Arc Cutting and Gouging
2.04	Uses access equipment.	WDF-025	Access Equipment
Task 3 - Organizes work.			
3.01	Interprets plans, drawings and specifications.	WDF-075	Drawings
		MTF-200	Drawings II
		MTF-300	Drawings III
3.02	Communicates with others.	WDF-030	Communication and Trade Documentation
3.03	Organizes project tasks.	MTF-725	Communication and Work Planning
Task 4 - Performs quality assurance throughout fabrication and assembly process.			
4.01	Performs visual inspections.	WDF-620	Quality Assurance/Control I
4.02	Verifies measurements, welds and layout.	WDF-625	Quality Assurance/Control II
4.03	Tracks materials and parts for traceability.	WDF-625	Quality Assurance/Control II
Task 5 - Handles materials.			
5.01	Organizes material.	WDF-070	Fabrication Fundamentals
5.02	Determines weights.	WDF-020	Hoisting, Lifting and Rigging
5.03	Applies rigging practices.	WDF-020	Hoisting, Lifting and Rigging
5.04	Operates material handling equipment.	WDF-020	Hoisting, Lifting and Rigging

NOA Sub-task		AACS Unit	
Task 6 - Performs layout.			
6.01	Performs pattern development.	WDF-085	Introduction to Layout and Pattern Development
		MTF-205	Layout - Simple Components and Templates
		MTF-210	Fabrication - Simple Components
		MTF-310	Layout - Complex Components and Templates
		MTF-315	Fabrication - Complex Components
6.02	Calculates material allowances for various processes.	MTF-205	Layout - Simple Components and Templates
		MTF-210	Fabrication - Simple Components
		MTF-310	Layout - Complex Components and Templates
		MTF-315	Fabrication - Complex Components
6.03	Determines dimensions.	MTF-205	Layout - Simple Components and Templates
		MTF-210	Fabrication - Simple Components
		MTF-310	Layout - Complex Components and Templates
		MTF-315	Fabrication - Complex Components
6.04	Transfers dimensions.	MTF-205	Layout - Simple Components and Templates
		MTF-210	Fabrication - Simple Components
		MTF-310	Layout - Complex Components and Templates
		MTF-315	Fabrication - Complex Components
6.05	Makes templates.	WDF-085	Introduction to Layout and Pattern Development
		MTF-205	Layout - Simple Components and Templates
		MTF-210	Fabrication - Simple Components
		MTF-310	Layout - Complex Components and Templates
		MTF-315	Fabrication - Complex Components
Task 7 - Cuts materials.			
7.01	Cuts materials using manual plasma cutting equipment.	WDF-615	Plasma Arc Cutting and Gouging
		MTF-210	Fabrication - Simple Components
		MTF-315	Fabrication - Complex Components
7.02	Cuts material using manual oxy-fuel cutting equipment.	WDF-605	Oxy-fuel

NOA Sub-task		AACS Unit	
		MTF-210	Fabrication - Simple Components
		MTF-315	Fabrication - Complex Components
7.03	Cuts material using shears.	WDF-015	Stationary Machinery
		MTF-210	Fabrication - Simple Components
		MTF-315	Fabrication - Complex Components
7.04	Cuts material using saws.	WDF-015	Stationary Machinery
		MTF-210	Fabrication - Simple Components
		MTF-315	Fabrication - Complex Components
7.05	Cuts material using ironworkers.	WDF-015	Stationary Machinery
		MTF-210	Fabrication - Simple Components
		MTF-315	Fabrication - Complex Components
7.06	Cuts material using computer numerical controlled (CNC) equipment.	MTF-305	Automated Shape Cutting Machines
		MTF-210	Fabrication - Simple Components
		MTF-315	Fabrication - Complex Components
7.07	Drills holes.	WDF-015	Stationary Machinery
		MTF-210	Fabrication - Simple Components
		MTF-315	Fabrication - Complex Components
7.08	Cuts threads.	MTF-210	Fabrication - Simple Components
		MTF-315	Fabrication - Complex Components
7.09	Prepares joints.	MTF-210	Fabrication - Simple Components
		MTF-315	Fabrication - Complex Components
Task 8 - Forms materials.			
8.01	Forms material using plate rollers.	MTF-210	Fabrication - Simple Components
		MTF-230	Plate Rolling Equipment
		MTF-315	Fabrication - Complex Components
8.02	Forms material using shape rollers.	MTF-210	Fabrication - Simple Components
		MTF-235	Shape Rolling Equipment
		MTF-315	Fabrication - Complex Components
8.03	Forms material using conventional and computer numerical controlled (CNC) press brakes.	MTF-210	Fabrication - Simple Components
		MTF-240	Press Brake Equipment
		MTF-315	Fabrication - Complex Components
8.04	Forms materials using benders.	MTF-210	Fabrication - Simple Components
		MTF-220	Bending Equipment
		MTF-315	Fabrication - Complex Components
8.05	Applies heat for forming.	MTF-210	Fabrication - Simple Components
		MTF-225	Heat Forming
		MTF-315	Fabrication - Complex Components
Task 9 - Fits and fastens sub-components and components.			

NOA Sub-task		AACS Unit	
9.01	Assembles jigs.	MTF-215	Fit and Assemble - Simple Components
		MTF-320	Fit and Assemble - Complex Assemblies
9.02	Determines proper sequence for assembly.	MTF-215	Fit and Assemble - Simple Components
		MTF-320	Fit and Assemble - Complex Assemblies
9.03	Assembles sub-components and components.	MTF-215	Fit and Assemble - Simple Components
		MTF-320	Fit and Assemble - Complex Assemblies
9.04	Sets fabricated component in place.	MTF-215	Fit and Assemble - Simple Components
		MTF-320	Fit and Assemble - Complex Assemblies
9.05	Fastens components on-site.	MTF-215	Fit and Assemble - Simple Components
		MTF-320	Fit and Assemble - Complex Assemblies
Task 10 - Performs welding activities.			
10.01	Applies heat prior to tack welding.	WDF-045	SMAW II - Fillet Weld, All Positions
		WDF-600	GMAW II - Fillet Weld, All Positions
		WDF-635	Groove Welding I - SMAW, Flat and Horizontal
		WDF-640	Groove Welding II - GMAW, Flat and Horizontal
		MTF-705	SMAW III - Tack Weld, All Positions
		MTF-710	GMAW III - Tack Weld, All Positions
		MTF-715	FCAW II - Tack Weld, All Positions
		MTF-720	MCAW II - Tack Weld, All Positions
10.02	Performs tack welding.	WDF-045	SMAW II - Fillet Weld, All Positions
		WDF-600	GMAW II - Fillet Weld, All Positions
		WDF-635	Groove Welding I - SMAW, Flat and Horizontal
		WDF-640	Groove Welding II - GMAW, Flat and Horizontal
		MTF-705	SMAW III - Tack Weld, All Positions
		MTF-710	GMAW III - Tack Weld, All Positions
		MTF-715	FCAW II - Tack Weld, All Positions
		MTF-720	MCAW II - Tack Weld, All Positions
10.03	Minimizes welding distortions.	WDF-045	SMAW II - Fillet Weld, All Positions

NOA Sub-task		AACS Unit	
		WDF-600	GMAW II - Fillet Weld, All Positions
		WDF-635	Groove Welding I - SMAW, Flat and Horizontal
		WDF-640	Groove Welding II - GMAW, Flat and Horizontal
		MTF-705	SMAW III - Tack Weld, All Positions
		MTF-710	GMAW III - Tack Weld, All Positions
		MTF-715	FCAW II - Tack Weld, All Positions
		MTF-720	MCAW II - Tack Weld, All Positions
10.04	Applies welding processes.	WDF-040	SMAW I - Set up, Strike and Maintain an Arc
		WDF-045	SMAW II - Fillet Weld, All Positions
		WDF-050	GMAW I - Set up and Maintain an Arc
		WDF-600	GMAW II - Fillet Weld, All Positions
		WDF-055	FCAW I - Set up and Maintain an Arc
		WDF-060	MCAW I - Set up and Maintain an Arc
		WDF-635	Groove Welding I - SMAW, Flat and Horizontal
		WDF-640	Groove Welding II - GMAW, Flat and Horizontal
		MTF-705	SMAW III - Tack Weld, All Positions
		MTF-710	GMAW III - Tack Weld, All Positions
		MTF-715	FCAW II - Tack Weld, All Positions
		MTF-720	MCAW II - Tack Weld, All Positions
		MTF-730	GTAW I - Set up and Maintain an Arc
10.05	Corrects welding distortions.	WDF-045	SMAW II - Fillet Weld, All Positions
		WDF-600	GMAW II - Fillet Weld, All Positions
		WDF-635	Groove Welding I - SMAW, Flat and Horizontal
		WDF-640	Groove Welding II - GMAW, Flat and Horizontal
		WDF-065	Weld Faults
		MTF-705	SMAW III - Tack Weld, All Positions
		MTF-710	GMAW III - Tack Weld, All Positions
		MTF-715	FCAW II - Tack Weld, All Positions
		MTF-720	MCAW II - Tack Weld, All Positions
Task 11 - Completes project.			
11.01	Determine finishing process.	MTF-330	Finish Preparation
11.02	Prepares material for finishing.	MTF-330	Finish Preparation

Level 1

WDF-005 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.

2011 National Occupational Analysis Reference:

1.01 Maintains safe work environment.
1.02 Uses personal protective equipment (PPE) and safety equipment.

Suggested Hours:

8 Hours

Objectives and Content:

Theoretical Objectives

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)

4. Identify and describe workplace safety and health regulations.
   i) federal
      - Workplace Hazardous Material Information System (WHMIS)
   ii) provincial/territorial
      - occupational health and safety
   iii) municipal
   iv) work site specific (awareness of)

Practical Objectives

N/A

WDF-010 Tools and Equipment

Learning Outcomes:

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

2011 National Occupational Analysis Reference:

2.01 Maintains hand, power, layout and measuring tools and equipment.

Suggested Hours:

4 Hours

Objectives and Content:

Theoretical Objectives

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 Objectives

N/A

WDF-015 Stationary Machinery

Learning Outcomes:

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

2011 National Occupational Analysis Reference:

2.02 Maintains stationary machinery.
7.03 Cuts materials using shears.
7.04 Cuts materials using saws.
7.05 Cuts materials using ironworkers.
7.07 Drills holes.

Suggested Hours:

4 Hours

Objectives and Content:

Theoretical Objectives

1. Define terminology associated with stationary machinery.

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

4. Describe the procedures used to set up and operate stationary machinery.

5. Describe the procedures used to inspect and maintain stationary machinery.

Practical Objectives

N/A

WDF-020 Hoisting, Lifting and Rigging

Learning Outcomes:

- Demonstrate knowledge of hoisting, lifting and rigging 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.

2011 National Occupational Analysis Reference:

5.02 Determines weight.
5.03 Applies rigging practices.
5.04 Operates material handling equipment.

Suggested Hours:

12 Hours

Objectives and Content:

Theoretical Objectives

1. Define terminology associated with hoisting, lifting and rigging.

2. Identify hazards and describe safe work practices pertaining to hoisting, lifting and rigging.

3. Identify regulations pertaining to hoisting, lifting and rigging.

4. Identify types of rigging equipment and accessories and describe their limitations, applications and procedures for use.

5. 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

6. Describe the procedures used to inspect, maintain and store hoisting, lifting and rigging equipment.

7. Describe the procedures used to rig material/equipment for lifting.

8. Describe the procedures to attach and use tag lines.

9. Describe the procedures used to ensure the work area is safe for lifting.
   i) supervision of lift
   ii) securing work area
   iii) communication

10. 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

11. 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

12. Describe the procedures used to perform a lift.
   i) pre-lift checks
   ii) lifting load
   iii) placement of load
   iv) post-lift inspection

Practical Objectives

N/A

WDF-025 Access Equipment

Learning Outcomes:

- Demonstrate knowledge of access equipment, their applications, limitations and procedures for use.

2011 National Occupational Analysis Reference:

2.04 Uses access equipment.

Suggested Hours:

3 Hours

Objectives and Content:

Theoretical Objectives

1. Define terminology associated with access equipment.

2. Identify hazards and describe safe work practices pertaining to access equipment.

3. Identify regulations pertaining to 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. Describe the procedures used to erect and dismantle access equipment.

7. Describe the procedures used to inspect and maintain access equipment.

Practical Objectives

N/A

WDF-030 Communication and Trade Documentation

Learning Outcomes:

- Demonstrate knowledge of effective communication practices.
- Demonstrate knowledge of trade related documentation and its use.

2011 National Occupational Analysis Reference:

3.02 Communicates with others.

Suggested Hours:

3 Hours

Objectives and Content:

Theoretical Objectives

1. Describe effective verbal and non-verbal communication.

2. Identify types of communication devices and describe their applications.

3. Identify types of trade related documentation and describe their applications and procedures for use.
   - i) manufacturers' specifications
   - ii) safety/hazard assessment forms
   - iii) mill certificates
   - iv) heat numbers
   - v) customer specifications
   - vi) codes and standards
   - vii) manuals/catalogues
   - viii) work orders
   - ix) requisitions/purchase orders
   - x) permits
   - xi) procedure sheets

Practical Objectives

N/A

WDF-630 Metallurgy I

Learning Outcomes:

- Demonstrate knowledge of the properties of steel.
- Demonstrate knowledge of steel and procedures for processing it.

2011 National Occupational Analysis Reference:

N/A

Suggested Hours:

6 Hours

Objectives and Content:

Theoretical Objectives

1. Describe the properties of steel.
   i) mechanical
   ii) physical

2. Identify the types of steel and describe their characteristics and applications.

3. Describe the production process for steel.

4. Describe the procedures used to process steel.

Practical Objectives

N/A

WDF-035 Introduction to Welding Processes

Learning Outcomes:

- Demonstrate knowledge of welding processes and their applications.
- Demonstrate knowledge of welding equipment and accessories.

2011 National Occupational Analysis Reference:

2.03 Maintains cutting and welding equipment.

Suggested Hours:

14 Hours

Objectives and Content:

Theoretical Objectives

1. Define terminology associated with welding.

2. Interpret information pertaining to welding found on drawings.
   i) symbols
   ii) abbreviations

3. Identify hazards and describe safe work practices pertaining to welding.
   i) personal
   ii) shop/facility
   iii) fire and explosion
   iv) equipment
   v) ventilation/fumes
   vi) storage, handling and transportation

4. Identify codes and standards pertaining to welding.
   i) Canadian Standards Association (CSA)
   ii) American Society of Mechanical Engineers (ASME)
   iii) American Welding Society (AWS)

5. Identify welding processes and describe their characteristics and applications.

i) shielded metal arc welding (SMAW)
ii) gas metal arc welding (GMAW)
iii) metal core arc welding (MCAW)
iv) flux core arc welding (FCAW)
v) gas tungsten arc welding (GTAW)
vi) stud welding
vii) resistance welding (RW)
viii) submerged arc welding (SAW)

6. Identify types of power sources for welding equipment and describe their applications and limitations.
   i) AC transformer
   ii) AC/DC rectifier
   iii) DC generator
   iv) engine driven
      - alternators
      - generators
   v) inverters

7. Identify the types of beads and describe their characteristics and applications.
   i) stringer
   ii) weave

8. Identify types of welds and describe their characteristics and applications.
   i) fillet
   ii) groove
   iii) surfacing
   iv) plug or slot

9. Identify welding positions and describe their applications.
   i) flat (1F or 1G)
   ii) horizontal (2F or 2 G)
   iii) vertical (3F or 3G)
   iv) overhead (4F or 4G)
   v) pipe fixed – horizontal (5F or 5G)
   vi) pipe fixed – 45 degree plane (6F or 6G)

10. Identify welding test positions and describe their characteristics and restrictions.

Practical Objectives

N/A

WDF-040 Shielded Metal Arc Welding I – 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.

2011 National Occupational Analysis Reference:

2.03 Maintains cutting and welding equipment.
10.04 Applies welding processes.

Suggested Hours:

6 Hours

Objectives and Content:

Theoretical Objectives

1. Define terminology associated with SMAW welding.

2. 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

3. 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)

4. Identify SMAW welding equipment, consumables and accessories and describe their applications.

5. Describe the procedures used to set up and adjust SMAW welding equipment.

6. Describe the procedures used to strike and maintain an arc using SMAW welding equipment.

7. 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

8. Describe the procedures used to inspect, maintain and troubleshoot SMAW welding equipment.

Practical Objectives

1. Strike and maintain an arc.

WDF-045 Shielded Metal Arc Welding II – 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.

2011 National Occupational Analysis Reference:

10.01 Applies heat prior to tack welding.
10.02 Performs tack welding.
10.03 Minimizes welding distortions.
10.04 Applies welding processes.
10.05 Correct welding distortions.

Suggested Hours:

18 Hours

Objectives and Content:

Theoretical Objectives

1. Define terminology associated with SMAW fillet welds.

2. Interpret information pertaining to SMAW fillet welds found on drawings and specifications.

3. 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

4. Identify the requirements and describe the procedures to store consumables used for SMAW fillet welds on low carbon steel.

5. Describe the procedures used to prepare base metals and joints for SMAW fillet welds.

6. Describe the procedures used to perform fillet welds on low carbon steel in all positions using the SMAW process.

7. Describe the procedures used to perform visual quality inspection of welds.

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

Practical Objectives

1. Perform fillet welds on low carbon steel in all positions.

WDF-050 Gas Metal Arc Welding I – 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.

2011 National Occupational Analysis Reference:

2.03 Maintains cutting and welding equipment.
10.04 Applies welding processes.

Suggested Hours:

18 Hours

Objectives and Content:

Theoretical Objectives

1. Define terminology associated with GMAW welding.

2. Identify hazards and describe safe work practices pertaining to GMAW welding.
   i) personal
   ii) shop/facility
   iii) fire and explosion
   iv) equipment
   v) ventilation/fumes
   vi) storage, handling and transportation

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.

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

9. Describe the procedures used to inspect, maintain and troubleshoot GMAW welding equipment.

Practical Objectives

1. Establish and maintain an arc.

2. Assemble and disassemble GMAW equipment.

WDF-600 Gas Metal Arc Welding II – Fillet Weld, All Positions

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 low carbon steel plate in all positions using the GMAW process.

2011 National Occupational Analysis Reference:

10.01 Applies heat prior to tack welding.
10.02 Performs tack welding.
10.03 Minimizes welding distortions.
10.04 Applies welding processes.
10.05 Correct welding distortions.

Suggested Hours:

18 Hours

Objectives and Content:

Theoretical Objectives

1. Define terminology associated with GMAW fillet welds.

2. Interpret information pertaining to GMAW fillet welds found on drawings and specifications.

3. Identify the considerations when selecting consumables and determining equipment set-up for performing GMAW fillet welds on low carbon 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

4. Identify the requirements and describe the procedures to store consumables used for GMAW fillet welds on low carbon steel plate.

5. Describe the procedures used to prepare base metals and joints for GMAW fillet welds.

6. Describe the procedures used to perform fillet welds on low carbon steel plate in all positions using the GMAW process.

7. Describe the procedures used to perform visual quality inspection of welds.

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

Practical Objectives

1. Perform fillet welds on low carbon steel plate in all positions.

WDF-055 Flux Core Arc Welding I – 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.

2011 National Occupational Analysis Reference:

2.03 Maintains cutting and welding equipment.
10.04 Applies welding processes.

Suggested Hours:

6 Hours

Objectives and Content:

Theoretical Objectives

1. Define terminology associated with FCAW welding.

2. Identify hazards and describe safe work practices pertaining to FCAW welding.
   i) personal
   ii) shop/facility
   iii) fire and explosion
   iv) equipment
   v) ventilation/fumes
   vi) storage, handling and transportation

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 weld bead using FCAW welding equipment.
   i) electrode extension
   ii) travel speed
   iii) work and travel angles
   iv) flow rates

7. Describe the procedures used to inspect, maintain and troubleshoot FCAW welding equipment.

Practical Objectives

1. Establish and maintain an arc.

WDF-060 Metal Core Arc Welding I – 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.

2011 National Occupational Analysis Reference:

2.03 Maintains cutting and welding equipment.
10.04 Applies welding processes.

Suggested Hours:

6 Hours

Objectives and Content:

Theoretical Objectives

1. Define terminology associated with MCAW welding.

2. Identify hazards and describe safe work practices pertaining to MCAW welding.
   i) personal
   ii) shop/facility
   iii) fire and explosion
   iv) equipment
   v) ventilation/fumes
   vi) storage, handling and transportation

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 weld bead using MCAW welding equipment.
   i) electrode extension
   ii) travel speed
   iii) work and travel angles
   iv) flow rates

7. Describe the procedures used to inspect, maintain and troubleshoot MCAW welding equipment.

Practical Objectives

1. Establish and maintain an arc.

WDF-635 Groove Welding I - Shielded Metal Arc Welding, Flat and Horizontal

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 flat and horizontal positions using the SMAW process.

2011 National Occupational Analysis Reference:

10.01 Applies heat prior to tack welding.
10.02 Performs tack welding.
10.03 Minimizes welding distortions.
10.04 Applies welding processes.
10.05 Correct welding distortions.

Suggested Hours:

18 Hours

Objectives and Content:

Theoretical Objectives

1. Define terminology associated with SMAW groove welds.

2. Interpret information pertaining to SMAW groove welds found on drawings and specifications.

3. Identify the considerations when selecting consumables and determining equipment set-up for performing SMAW groove welds on low carbon steel plate.
   i) specification requirements
   ii) base metal
      - composition
      - thickness
   iii) power source
   iv) welding position

v) joint type and design

4. Identify the requirements and describe the procedures to store consumables used for SMAW groove welds on low carbon steel plate.

5. Describe the procedures used to prepare base metals and joints for SMAW groove welds.

6. Describe the procedures used to perform groove welds on low carbon steel plate in flat and horizontal positions using SMAW process.

7. Describe the procedures used to perform visual quality inspection of welds.

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

Practical Objectives

1. Perform groove welds on low carbon steel plate in flat and horizontal positions.

WDF-640 Groove Welding II - Gas Metal Arc Welding, Flat and Horizontal

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 low carbon steel plate in flat and horizontal positions using the GMAW process.

2011 National Occupational Analysis Reference:

10.01 Applies heat prior to tack welding.
10.02 Performs tack welding.
10.03 Minimizes welding distortions.
10.04 Applies welding processes.
10.05 Correct welding distortions.

Suggested Hours:

12 Hours

Objectives and Content:

Theoretical Objectives

1. Define terminology associated with GMAW groove welds.

2. Interpret information pertaining to GMAW groove welds found on drawings and specifications.

3. Identify the considerations when selecting consumables and determining equipment set-up for performing GMAW groove welds on low carbon steel plate.
   i) specification requirements
   ii) base metal
      - composition
      - thickness
   iii) power source

iv) welding position
v) joint type and design

4. Identify the requirements and describe the procedures to store consumables used for GMAW groove welds on low carbon steel plate.

5. Describe the procedures used to prepare base metals and joints for GMAW groove welds.

6. Describe the procedures used to perform groove welds on low carbon steel plate in all positions using GMAW process.

7. Describe the procedures used to perform visual quality inspection of welds.

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

Practical Objectives

1. Perform groove welds on low carbon steel plate in flat and horizontal positions.

WDF-605 Oxy-fuel

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.

2011 National Occupational Analysis Reference:

2.03 Maintains cutting and welding equipment.
7.02 Cuts material using manual oxy-fuel cutting equipment.

Suggested Hours:

24 Hours

Objectives and Content:

Theoretical Objectives

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 Objectives

1. Set up, operate and shut down oxy-fuel equipment.

2. Perform oxy-fuel cutting operations.

WDF-610 Electric Arc Cutting and Gouging

Learning Outcomes:

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

2011 National Occupational Analysis Reference:

N/A

Suggested Hours:

12 Hours

Objectives and Content:

Theoretical Objectives

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 electric arc cutting and gouging processes and their applications.
   i) air-carbon arc
   ii) metal arc
   iii) oxy-arc

4. Identify electric arc cutting and gouging equipment and accessories and describe their applications.

5. Describe the procedures used to set up, adjust and shut down electric arc cutting and gouging equipment.

6. Describe the procedures used to inspect and maintain electric arc cutting and gouging equipment.

7. Describe the procedures used to cut using electric arc cutting equipment.

8. Describe the procedures used to gouge using electric arc gouging equipment.

Practical Objectives

1. Perform air-carbon arc gouging.

WDF-615 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.

2011 National Occupational Analysis Reference:

2.03 Maintains cutting and welding equipment.
7.01 Cuts material using plasma cutting equipment.

Suggested Hours:

6 Hours

Objectives and Content:

Theoretical Objectives

1. Define terminology associated with plasma arc cutting and gouging.

2. Identify hazards and describe safe work practices pertaining to plasma arc cutting and gouging.
   i) personal
   ii) shop/facility
   iii) fire and explosion
   iv) equipment
   v) ventilation/fumes

3. Describe the plasma arc cutting and gouging process and its applications.

4. Identify plasma arc equipment and accessories and describe their applications.
   i) cutting
   ii) gouging

5. Describe the procedures used to set up, adjust and shut down plasma arc equipment.

6. Describe the procedures used to inspect and maintain plasma arc equipment.

7. Describe the procedures used to cut using plasma arc equipment.

8. Describe the procedures used to gouge using plasma arc equipment.

Practical Objectives

1. Perform plasma arc cutting and gouging operations.

WDF-075 Drawings

Learning Outcomes:

- Demonstrate knowledge of drawings and their applications.
- Demonstrate knowledge of interpreting and extracting information from drawings.

2011 National Occupational Analysis Reference:

3.01 Interprets plans, drawings and specifications.

Suggested Hours:

30 Hours

Objectives and Content:

Theoretical Objectives

1. Define terminology associated with drawings and sketches.

2. Describe metric and imperial systems of measurement and the procedures used to perform conversions.

3. Identify the types of drawings and describe their applications.
   - i) architectural
   - ii) engineering
   - iii) erection
   - iv) assembly
   - v) shop (detail)

4. Identify drawing projections and views and describe their applications.
   - i) projections
     - orthographic (1st and 3rd angle)
     - oblique
     - isometric
   - ii) views
     - plan

- section
- detail
- elevation

5. Describe the use of scales.

6. Interpret information on drawings.
   i) welding symbols
   ii) lines
   iii) legend
   iv) other symbols and abbreviations
   v) notes and specifications
   vi) schedules
   vii) scales

7. Describe basic sketching techniques.

8. Describe dimensioning systems, their purpose and applications.
   i) datum/baseline
   ii) elevation
   iii) conventional
   iv) running
   v) aligned
   vi) unidirectional
   vii) group

9. Describe the procedures used for the care, handling and storage of drawings.

Practical Objectives

1. Interpret basic shop drawings.

WDF-070 Fabrication Fundamentals

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.

2011 National Occupational Analysis Reference:

5.01 Organizes material.

Suggested Hours:

18 Hours

Objectives and Content:

Theoretical Objectives

1. Define terminology associated with structural components.

2. Identify hazards and describe safe work practices pertaining to structural components.

3. Interpret codes, regulations and standards pertaining to structural components.
   i) industry standards
   ii) codes of practice
   iii) government regulations

4. Interpret information pertaining to structural components found on drawings and specifications.

5. Identify types of structures and describe their characteristics.

6. Identify structural steel shapes and describe their designations, characteristics and applications.
   i) sheet

ii) plate
iii) pipe
iv) flat
v) bar
vi) angle
vii) channel
viii) beams
ix) hollow structural sections

7. Identify types of joints and describe their characteristics and applications.
   i) corner
   ii) tee
   iii) lap
   iv) edge
   v) butt

8. Describe the procedures used to prepare joints on structural steel shapes.

9. Describe the procedures used to fabricate using various structural steel shapes.

Practical Objectives

N/A

WDF-085 Introduction to Layout and Pattern Development

Learning Outcomes:

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

2011 National Occupational Analysis Reference:

6.01 Performs pattern development.
6.05 Makes templates.

Suggested Hours:

15 Hours

Objectives and Content:

Theoretical Objectives

1. Define terminology associated with layout and pattern development.

2. Identify tools and equipment relating to layout and pattern development and describe their applications and procedures for use.

3. Explain the purpose of pattern and template development.

4. Identify materials used in pattern and template development and describe their characteristics and applications.

5. Identify the geometric operations used in performing layout and describe their applications.

Practical Objectives

1. Develop simple templates.

WDF-065 Weld Faults

Learning Outcomes:

- Demonstrate knowledge of weld faults, their characteristics and effect on welds.

2011 National Occupational Analysis Reference:

10.05 Corrects welding distortions.

Suggested Hours:

9 Hours

Objectives and Content:

Theoretical Objectives

1. Define terminology associated with weld faults.

2. Interpret standards and documentation relating to welds and weld faults.

3. Identify tools and equipment used to identify weld faults and describe their applications and procedures for use.

4. Identify the classifications of weld faults and describe their characteristics.
   i) dimensional defects
   ii) structural discontinuities
   iii) defective properties (weld metal and base metal)

5. Identify the causes of weld faults and describe their effect on welds.

Practical Objectives

N/A

LEVEL 2

WDF-620 Quality Assurance/Control I

Learning Outcomes:

- Demonstrate knowledge of quality control measures used to verify compliance with design and code specifications.

2011 National Occupational Analysis Reference:

4.01 Performs visual inspections.
4.02 Verifies measurements, welds and layout.

Suggested Hours:

9 Hours

Objectives and Content:

Theoretical Objectives

1. Explain quality assurance, its purpose and applications.

2. Define terminology associated with quality control.

3. Interpret codes and standards pertaining to quality control.

4. Interpret information pertaining to quality control found on drawings and specifications.

5. Identify tools and equipment relating to quality control and describe their applications and procedures for use.

6. Explain quality control, its purpose and applications.

7. Explain the methods used to identify and verify materials.
   i) codes, standards and specifications
   ii) mill certificates
   iii) colour coding of materials

Practical Objectives

N/A

MTF-200 Drawings II

Learning Outcomes:

- Demonstrate knowledge of interpreting and extracting information from structural steel, tanks and pressure vessel shop drawings**.**

2011 National Occupational Analysis Reference:

2.03 Maintains cutting and welding equipment.

Suggested Hours:

60 Hours

Objectives and Content:

Theoretical Objectives

1. Define terminology associated with structural steel, tanks and pressure vessel shop drawings**.**

2. Identify symbols and abbreviations found on structural steel tanks and pressure vessel shop drawings**.**

3. Interpret information found on structural steel shop drawings.

4. Interpret information found on tank shop drawings.

5. Interpret information found on pressure vessel shop drawings.

Practical Objectives

1. Sketch a drawing including required details for fabrication.

MTF-205 Layout – Simple Components and Templates

Learning Outcomes:

- Demonstrate knowledge of the procedures used to lay out simple components and templates.

2011 National Occupational Analysis Reference:

6.01 Performs pattern development.
6.02 Calculates material allowances for various processes.
6.03 Determines dimensions.
6.04 Transfers dimensions.
6.05 Makes templates.

Suggested Hours:

60 Hours

Objectives and Content:

Theoretical Objectives

1. Define terminology associated with layout of simple components and templates.

2. Interpret information pertaining to layout of simple components and templates found on drawings and specifications.

3. Describe the procedures used to determine and transfer dimensions from drawings.

4. Identify calculations relating to layout of simple components and templates and describe the procedures used to perform them.
   i) materials
   ii) angles
   iii) tolerances and allowances

5. Identify tools and equipment relating to layout of simple components and templates and describe their applications and procedures for use.

6. Identify the considerations when performing layout of simple components and templates.
   i) material selection
   ii) layout method
   iii) fabrication requirements
   iv) assembly requirements
   v) tolerances
   vi) quantities

7. Identify the methods of template development and describe their characteristics and applications.
   i) parallel line development
   ii) radial line development
   iii) triangulation

8. Describe the procedures used to perform layout of simple components and templates from drawings.

Practical Objectives

1. Develop simple templates.

MTF-210 Fabrication – Simple Components

Learning Outcomes:

- Demonstrate knowledge of the procedures used to fabricate simple components.

2011 National Occupational Analysis Reference:

6.01 Performs pattern development.
6.02 Calculates material allowances for various processes.
6.03 Determines dimensions.
6.04 Transfers dimensions.
6.05 Makes templates.
7.01 Cuts material using manual plasma arc cutting equipment.
7.02 Cuts material using manual oxy-fuel cutting equipment.
7.03 Cuts material using shears.
7.04 Cuts material using saws.
7.05 Cuts material using ironworkers.
7.06 Cuts material using computer numerical controlled (CNC) equipment.
7.07 Drills holes.
7.08 Cuts threads.
7.09 Prepares joints.
8.01 Forms material using plate rollers.
8.02 Forms material using shape rollers.
8.03 Forms materials using conventional and computer numerical controlled (CNC) press brakes.
8.04 Forms materials using benders.
8.05 Applies heat for forming.

Suggested Hours:

24 Hours

Objectives and Content:

Theoretical Objectives

1. Define terminology associated with simple component fabrication.

2. Identify hazards and describe safe work practices pertaining to simple component fabrication.
   i) personal
   ii) shop/facility
   iii) equipment

3. Interpret codes and standards pertaining to simple component fabrication.

4. Interpret information pertaining to simple component fabrication found on drawings and specifications.

5. Identify types of simple components and describe their characteristics and applications.

6. Identify types of materials used in simple component fabrication.
   i) structural members
   ii) plate
   iii) piping

7. Describe simple jigs and fixtures, their purpose and applications.

8. Describe the procedures used to fabricate simple jigs and fixtures.

9. Describe the procedures used to fabricate simple components in the shop.
   i) layout
   ii) cut material
   iii) drill, cut or punch holes
   iv) cut threads
   v) form material
   vi) prepare joints

Practical Objectives

1. Fabricate simple components.

MTF-215 Fit and Assemble – Simple Components

Learning Outcomes:

- Demonstrate knowledge of the procedures used to fit and assemble simple components.

2011 National Occupational Analysis Reference:

9.01 Assembles jigs.
9.02 Determines proper sequence for assembly.
9.03 Assembles sub-components and components.
9.04 Sets fabricated component in place.
9.05 Fastens components on-site.

Suggested Hours:

12 Hours

Objectives and Content:

Theoretical Objectives

1. Define terminology associated with fit and assembly of simple components.

2. Identify hazards and describe safe work practices pertaining to fit and assembly of simple components.
   i) personal
   ii) shop/facility
   iii) equipment

3. Interpret codes and standards pertaining to fit and assembly of simple components.

4. Interpret information pertaining to fit and assembly of simple components found on drawings and specifications.

5. Identify fastening methods for simple component assembly and describe their characteristics and applications.
   i) mechanical fasteners

ii) tack welding
iii) welding

6. Identify tools, equipment and accessories used for simple component assembly and describe their applications and procedures for use.

7. Describe the procedures used to lay out and fit simple components for assembly.
   i) shop
   ii) field

8. Describe the procedures used to assemble and fasten simple components.
   i) shop
   ii) field

Practical Objectives

1. Fit and assemble simple components.

MTF-700 Plasma Arc Cutting II (Review)

Learning Outcomes:

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

2011 National Occupational Analysis Reference:

2.03 Maintains cutting and welding equipment.
7.01 Cuts material using plasma cutting equipment.

Suggested Hours:

3 Hours

Objectives and Content:

Theoretical Objectives

1. Define terminology associated with plasma arc cutting.

2. Identify hazards and describe safe work practices pertaining to plasma arc cutting.
   i) personal
   ii) shop/facility
   iii) fire and explosion
   iv) equipment
   v) ventilation/fumes

3. Describe the plasma arc cutting process and its applications.

4. Identify plasma arc equipment and accessories and describe their applications.

5. Describe the procedures used to set up, adjust and shut down plasma arc equipment.

6. Describe the procedures used to inspect and maintain plasma arc equipment.

7. Describe the procedures used to cut using plasma arc equipment.

Practical Objectives

1. Perform plasma arc cutting operations.

MTF-220 Bending Equipment

Learning Outcomes:

- Demonstrate knowledge of bending equipment and attachments, their applications and procedures for use.
- Demonstrate knowledge of the procedures used to perform bending operations.

2011 National Occupational Analysis Reference:

8.04 Forms materials using benders.

Suggested Hours:

6 Hours

Objectives and Content:

Theoretical Objectives

1. Define terminology associated with bending equipment and operations.

2. Explain the effects associated with bending of materials.
   i) mechanical
   ii) dimensional

3. Identify hazards and describe safe work practices pertaining to bending equipment and operations.
   i) personal
   ii) shop/facility
   iii) equipment

4. Interpret documentation pertaining to bending operations.
   i) equipment manufacturers' specifications

5. Interpret information pertaining to bending materials found on drawings and specifications.

6. Identify tools and equipment relating to bending operations and describe their applications and procedures for use.

7. Identify types of bending equipment and describe their characteristics, limitations and applications.

8. Identify bending equipment attachments and describe their characteristics and applications.

9. Describe the procedures used to set up and adjust bending equipment.

10. Identify the considerations and describe the procedures used to lay out materials for bending.
    i) cut length calculations
    ii) bend radius minimums
    iii) minimum radius calculated considering ductility
    iv) material selection

11. Identify bending methods and describe their associated procedures.
    i) draw bending
    ii) compression bending
    iii) press bending

12. Describe the procedures used to inspect and maintain bending equipment.

Practical Objectives

1. Bend material using bending equipment.

MTF-225 Heat Forming

Learning Outcomes:

- Demonstrate knowledge of the procedures used to perform heat forming operations.

2011 National Occupational Analysis Reference:

8.05 Applies heat for forming.

Suggested Hours:

3 Hours

Objectives and Content:

Theoretical Objectives

1. Define terminology associated with heat forming operations.

2. Explain the effects associated with heat forming on materials.
   i) mechanical
   ii) dimensional

3. Identify hazards and describe safe work practices pertaining to heat forming operations.
   i) personal
   ii) shop/facility
   iii) fire and explosion
   iv) equipment
   v) ventilation/fumes
   vi) storage, handling and transportation

4. Interpret information pertaining to heat forming operations found on drawings and specifications.

5. Identify tools and equipment relating to heat forming operations and describe their applications and procedures for use.

6. Identify the considerations and describe the procedures used to lay out materials for heat forming operations.

7. Describe the procedures used to heat form materials.

Practical Objectives

1. Perform heat forming operations.

MTF-230 Plate Rolling Equipment

Learning Outcomes:

- Demonstrate knowledge of plate rolling equipment and attachments, their applications and procedures for use.
- Demonstrate knowledge of the procedures used to perform plate rolling operations.

2011 National Occupational Analysis Reference:

8.01 Forms materials using plate rollers.

Suggested Hours:

6 Hours

Objectives and Content:

Theoretical Objectives

1. Define terminology associated with plate rolling equipment and operations.

2. Explain the effects associated with plate rolling.
   i) mechanical
   ii) dimensional

3. Identify hazards and describe safe work practices pertaining to plate rolling equipment and operations.
   i) personal
   ii) shop/facility
   iii) equipment

4. Interpret documentation pertaining to plate rolling equipment and operations.
   i) plate specifications
   ii) equipment manufacturers' specifications

5. Interpret information pertaining to plate rolling found on drawings and specifications.

6. Identify tools and equipment relating to plate rolling operations and describe their applications and procedures for use.

7. Identify types of plate rolling equipment and describe their characteristics and applications.

8. Describe the procedures used to set up and adjust plate rolling equipment.

9. Identify the considerations and describe the procedures used to lay out materials for plate rolling.

10. Describe the procedures used to operate plate rolling equipment.
    i) cylinder
    ii) cone

11. Describe the use of sweep templates.

12. Describe the procedures used to inspect and maintain plate rolling equipment.

Practical Objectives

1. Perform plate rolling operations.

MTF-235 Shape Rolling Equipment

Learning Outcomes:

- Demonstrate knowledge of shape rolling equipment and attachments, their applications and procedures for use.
- Demonstrate knowledge of the procedures used to perform shape rolling operations.

2011 National Occupational Analysis Reference:

8.02 Forms materials using shape rollers.

Suggested Hours:

3 Hours

Objectives and Content:

Theoretical Objectives

1. Define terminology associated with shape rolling equipment and operations.

2. Explain the effects associated with shape rolling.
   i) mechanical
   ii) dimensional

3. Identify hazards and describe safe work practices pertaining to shape rolling equipment and operations.
   i) personal
   ii) shop/facility
   iii) equipment

4. Interpret documentation pertaining to shape rolling equipment and operations.
   i) material specifications
   ii) equipment manufacturers' specifications

5. Interpret information pertaining to shape rolling found on drawings and specifications.

6. Identify tools and equipment relating to shape rolling operations and describe their applications and procedures for use.

7. Identify types of shape rolling equipment and attachments and describe their characteristics and applications.

8. Describe the procedures used to set up and adjust shape rolling equipment.

9. Identify the considerations and describe the procedures used to lay out structural shapes.

10. Describe the procedures used to operate shape rolling equipment.

11. Describe the use of sweep templates.

12. Describe the procedures used to inspect and maintain shape rolling equipment.

Practical Objectives

1. Perform shape rolling operations.

MTF-240 Press Brake Equipment

Learning Outcomes:

- Demonstrate knowledge of press brake equipment and attachments, their applications and procedures for use.
- Demonstrate knowledge of the procedures used to perform press brake operations.

2011 National Occupational Analysis Reference:

8.03 Forms materials using conventional and computer numerical controlled (CNC) press brakes.

Suggested Hours:

6 Hours

Objectives and Content:

Theoretical Objectives

1. Define terminology associated with press brake equipment and operations.

2. Explain the effects associated with braking.
   i) mechanical
   ii) dimensional

3. Identify hazards and describe safe work practices pertaining to press brake equipment and operations.
   i) personal
   ii) shop/facility
   iii) equipment

4. Interpret documentation pertaining to press brake operations.
   i) equipment manufacturers' specifications
   ii) bending charts

5. Interpret information pertaining to bending materials found on drawings and specifications.

6. Identify tools and equipment relating to press brake operations and describe their applications and procedures for use.

7. Identify types of press brakes and describe their characteristics and applications.
   i) hydraulic
   ii) mechanical
   iii) computerized numerical controlled (CNC)

8. Identify press brake attachments and describe their characteristics and applications.

9. Describe the procedures used to set up and adjust press brakes.

10. Identify the considerations and describe the procedures used to lay out materials for bending on a press brake.

11. Describe the procedures used to operate press brakes.

12. Describe the procedures used to inspect and maintain press brakes.

Practical Objectives

1. Bend materials using press brakes.

WDF-645 Metallurgy II

Learning Outcomes:

- Demonstrate knowledge of metals and their characteristics.

2011 National Occupational Analysis Reference:

N/A

Suggested Hours:

12 Hours

Objectives and Content:

Theoretical Objectives

1. Define terminology associated with metallurgy.

2. Identify types of metals and describe their characteristics and applications.
   i) plain carbon steel
   ii) low alloy steel
   iii) heat treated steel
   iv) stainless steel
   v) duplex stainless steel
   vi) non-ferrous

3. 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)

4. Describe the effects of hot and cold working of metals.
   i) stress
   ii) contraction
   iii) expansion
   iv) distortion

v) work hardening

5. Describe the procedures used to prevent or correct problems that occur when working with metals.

Practical Objectives

N/A

MTF-705 Shielded Metal Arc Welding III – Tack Weld, All Positions

Learning Outcomes:

- Demonstrate knowledge of the procedures used to prepare base metals and joints for shielded metal arc welding (SMAW) tack welds.
- Demonstrate knowledge of the procedures used to perform tack welds in all positions using the SMAW process.

2011 National Occupational Analysis Reference:

10.01 Applies heat prior to tack welding.
10.02 Performs tack welding.
10.03 Minimizes welding distortions.
10.04 Applies welding processes.
10.05 Correct welding distortions.

Suggested Hours:

3 Hours

Objectives and Content:

Theoretical Objectives

1. Define terminology associated with SMAW tack welds.

2. Interpret information pertaining to SMAW tack welds found on drawings and specifications.

3. Identify the considerations when selecting consumables and determining equipment set-up for performing SMAW tack welds in all positions.
   i) specification requirements
   ii) base metal
      - composition
      - thickness
   iii) power source
   iv) welding position

v) joint type and design

4. Identify the requirements and describe the procedures to store consumables used for SMAW tack welds.

5. Describe the procedures used to prepare base metals and joints for SMAW tack welds.

6. Describe the procedures used to perform tack welds in all positions using the SMAW process.

7. Describe the procedures used to perform visual quality inspection of tack welds.

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

Practical Objectives

1. Perform tack welds.

MTF-710 Gas Metal Arc Welding III – Tack Weld, All Positions

Learning Outcomes:

- Demonstrate knowledge of the procedures used to prepare base metals and joints for gas metal arc welding (GMAW) tack welds.
- Demonstrate knowledge of the procedures used to perform tack welds in all positions using the GMAW process.

2011 National Occupational Analysis Reference:

10.01 Applies heat prior to tack welding.
10.02 Performs tack welding.
10.03 Minimizes welding distortions.
10.04 Applies welding processes.
10.05 Correct welding distortions.

Suggested Hours:

3 Hours

Objectives and Content:

Theoretical Objectives

1. Define terminology associated with GMAW tack welds.

2. Interpret information pertaining to GMAW tack welds found on drawings and specifications.

3. Identify the considerations when selecting consumables and determining equipment set-up for performing GMAW tack welds 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

4. Identify the requirements and describe the procedures to store consumables used for GMAW tack welds.

5. Describe the procedures used to prepare base metal and joints for GMAW tack welds.

6. Describe the procedures used to perform tack welds in all positions using the GMAW process.

7. Describe the procedures used to perform visual quality inspection of welds.

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

Practical Objectives

1. Perform tack welds using GMAW equipment.

MTF-715 Flux Core Arc Welding II – Tack Weld, All Positions

Learning Outcomes:

- Demonstrate knowledge of the procedures used to prepare base metals and joints for flux core arc welding (FCAW) tack welds.
- Demonstrate knowledge of the procedures used to perform tack welds in all positions using the FCAW process.

2011 National Occupational Analysis Reference:

10.01 Applies heat prior to tack welding.
10.02 Performs tack welding.
10.03 Minimizes welding distortions.
10.04 Applies welding processes.
10.05 Correct welding distortions.

Suggested Hours:

3 Hours

Objectives and Content:

Theoretical Objectives

1. Define terminology associated with tack welding in all positions using the FCAW process.

2. Interpret information pertaining to FCAW tack welds found on drawings and specifications.

3. Identify the considerations when selecting consumables and determining equipment set-up for performing FCAW tack welds 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

4. Identify the requirements and describe the procedures to store consumables used for FCAW.

5. Describe the procedures used to prepare base metals and joints for FCAW tack welds.

6. Describe the procedures used to perform tack welds in all positions using the FCAW process.

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

Practical Objectives

1. Perform tack welds in all positions.

MTF-720 Metal Core Arc Welding II – Tack Weld, Flat and Horizontal Positions

Learning Outcomes:

- Demonstrate knowledge of the procedures used to prepare base metals and joints for metal core arc welding (MCAW) tack welds.
- Demonstrate knowledge of the procedures used to perform tack welds in the flat and horizontal positions using the MCAW process.

2011 National Occupational Analysis Reference:

10.01 Applies heat prior to tack welding.
10.02 Performs tack welding.
10.03 Minimizes welding distortions.
10.04 Applies welding processes.
10.05 Correct welding distortions.

Suggested Hours:

3 Hours

Objectives and Content:

Theoretical Objectives

1. Define terminology associated with MCAW tack welds.

2. Interpret information pertaining to MCAW tack welds found on drawings and specifications.

3. Identify the considerations when selecting consumables and determining equipment set-up for performing MCAW tack welds in the flat and horizontal position.
   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 the requirements and describe the procedures to store consumables used for MCAW.

5. Describe the procedures used to prepare base metals and joints for MCAW tack welds.

6. Describe the procedures used to perform tack welds in the flat and horizontal position using the MCAW process.

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

Practical Objectives

1. Perform tack welds in the flat and horizontal position using the MCAW process.

MTF-730 Gas Tungsten Arc Welding I – Set up and Maintain an Arc

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.

2011 National Occupational Analysis Reference:

2.03 Maintains cutting and welding equipment.
10.04 Applies welding processes.

Suggested Hours:

6 Hours

Objectives and Content:

Theoretical Objectives

1. Define terminology associated with GTAW welding.

2. Identify hazards and describe safe work practices pertaining to GTAW welding.
   i) personal
   ii) shop/facility
   iii) fire and explosion
   iv) equipment
   v) ventilation/fumes
   vi) storage, handling and transportation

3. Identify codes and standards pertaining to GTAW welding.
   i) Canadian Standards Association (CSA)
   ii) American Society of Mechanical Engineers (ASME)
   iii) American Welding Society (AWS)

4. Identify GTAW welding equipment, consumables and accessories and describe their applications.

5. Describe the procedures used to assemble and disassemble GTAW welding equipment.

6. Describe the procedures used to establish and maintain an arc using GTAW welding equipment.

7. Describe the procedures and techniques used to deposit a weld bead using GTAW welding equipment.
   i) with filler metal
   ii) without filler metal

8. Describe the procedures used to inspect, maintain and troubleshoot GTAW welding equipment.

Practical Objectives

1. Establish and maintain an arc.

MTF-735 Gas Tungsten Arc Welding II – Tack Weld, All Positions

Learning Outcomes:

- Demonstrate knowledge of the procedures used to prepare base metals and joints for gas tungsten arc welding (GTAW) tack welds.
- Demonstrate knowledge of the procedures used to perform tack welds in all positions using the GTAW process.

2011 National Occupational Analysis Reference:

10.01 Applies heat prior to tack welding.
10.02 Performs tack welding.
10.03 Minimizes welding distortions.
10.04 Applies welding processes.
10.05 Correct welding distortions.

Suggested Hours:

18 Hours

Objectives and Content:

Theoretical Objectives

1. Define terminology associated with GTAW tack welds.

2. Interpret information pertaining to GTAW tack welds found on drawings and specifications.

3. Identify the considerations when selecting consumables and determining equipment set-up for performing GTAW tack welds 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

4. Identify the requirements and describe the procedures to store consumables used for GTAW.

5. Describe the procedures used to prepare base metals and joints for GTAW tack welds.

6. Describe the procedures used to perform tack welds in all positions using the GTAW process.

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

Practical Objectives

1. Perform tack welds using the GTAW process.

LEVEL 3

MTF-300 Drawings III

Learning Outcomes:

- Demonstrate knowledge of interpreting and extracting information from advanced structural steel, tank and pressure vessel shop drawings**.**
- Demonstrate knowledge of interpreting and extracting information from structural steel and tank erection drawings.
- Demonstrate knowledge of interpreting and extracting information from basic piping drawings.

2011 National Occupational Analysis Reference:

3.01 Interprets plans, drawings and specifications.

Suggested Hours:

30 Hours

Objectives and Content:

Theoretical Objectives

1. Define terminology associated with advanced shop and erection drawings.

2. Identify symbols and abbreviations found on advanced shop and erection drawings.

3. Interpret information found on advanced structural steel shop and erection drawings.

4. Interpret information found on advanced tank shop and erection drawings.

5. Interpret information found on advanced pressure vessel shop drawings.

6. Interpret information found on basic piping drawings.

Practical Objectives

1. Develop a pressure vessel drawing.

MTF-305 Automated Shape Cutting Machines

Learning Outcomes:

- Demonstrate knowledge of automated shape cutting machines and their applications.

2011 National Occupational Analysis Reference:

7.06 Cuts material using computer numerical controlled (CNC) equipment.

Suggested Hours:

3 Hours

Objectives and Content:

Theoretical Objectives

1. Define terminology associated with automated shape cutting machines.

2. Identify hazards and describe safe work practices pertaining to automated shape cutting machines.

3. Identify types of automated shape cutting machines and describe their characteristics and applications.
   - i) optical tracer
     - oxy-fuel
     - plasma
   - ii) computerized numerical control (CNC)
     - plasma
     - laser
     - water jet
     - oxy-fuel

Practical Objectives

N/A

MTF-725 Communication and Work Planning

Learning Outcomes:

- Demonstrate knowledge of the procedures used to plan and organize work tasks.
- Demonstrate knowledge of the procedures used to communicate professionally to convey information.

2011 National Occupational Analysis Reference:

3.03 Organizes project tasks.

Suggested Hours:

12 Hours

Objectives and Content:

Theoretical Objectives

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.

4. Describe the procedures used to coordinate work and consult with others.

5. Describe the procedures used to communicate professionally to convey information.

Practical Objectives

N/A

MTF-310 Layout – Complex Components and Templates

Learning Outcomes:

- Demonstrate knowledge of the procedures used to lay out complex components and templates.

2011 National Occupational Analysis Reference:

6.01 Performs pattern development.
6.02 Calculates material allowances for various processes.
6.03 Determines dimensions.
6.04 Transfers dimensions.
6.05 Makes templates.

Suggested Hours:

30 Hours

Objectives and Content:

Theoretical Objectives

1. Define terminology associated with layout of complex components and templates.

2. Interpret information pertaining to layout of complex components and templates found on drawings and specifications.

3. Describe the procedures used to determine and transfer dimensions from drawings.

4. Identify calculations relating to layout of complex components and templates and describe the procedures used to perform them.
   i) materials
   ii) angles
   iii) tolerances and allowances

5. Identify tools and equipment relating to layout of complex components and templates and describe their applications and procedures for use.

6. Identify the considerations when performing layout of complex components and templates.
   i) material selection
   ii) layout method
   iii) fabrication requirements
   iv) assembly requirements
   v) tolerances
   vi) quantities

7. Identify the methods of template development and describe their characteristics and applications.
   i) parallel line development
   ii) radial line development
   iii) triangulation

8. Describe the procedures used to perform layout of complex components and templates from drawings.

Practical Objectives

1. Develop complex templates.

MTF-315 Fabrication – Complex Components

Learning Outcomes:

- Demonstrate knowledge of the procedures used to fabricate complex components.

2011 National Occupational Analysis Reference:

6.01 Performs pattern development.
6.02 Calculates material allowances for various processes.
6.03 Determines dimensions.
6.04 Transfers dimensions.
6.05 Makes templates.
7.01 Cuts material using manual plasma arc cutting equipment.
7.02 Cuts material using manual oxy-fuel cutting equipment.
7.03 Cuts material using shears.
7.04 Cuts material using saws.
7.05 Cuts material using ironworkers.
7.06 Cuts material using computer numerical controlled (CNC) equipment.
7.07 Drills holes.
7.08 Cuts threads.
7.09 Prepares joints.
8.01 Forms material using plate rollers.
8.02 Forms material using shape rollers.
8.03 Forms materials using conventional and computer numerical controlled (CNC) press brakes.
8.04 Forms materials using benders.
8.05 Applies heat for forming.

Suggested Hours:

24 Hours

Objectives and Content:

Theoretical Objectives

1. Define terminology associated with complex component fabrication.

2. Identify hazards and describe safe work practices pertaining to complex component fabrication.
   i) personal
   ii) shop/facility
   iii) equipment

3. Interpret codes and standards pertaining to complex component fabrication.

4. Interpret information pertaining to complex component fabrication found on drawings and specifications.

5. Identify types of complex components and describe their characteristics and applications.

6. Identify types of materials used in complex component fabrication.
   i) structural members
   ii) plate
   iii) piping

7. Describe complex jigs and fixtures, their purpose and applications.

8. Describe the procedures used to fabricate complex jigs and fixtures.

9. Describe the procedures used to fabricate complex components.
   i) layout
   ii) cut material
   iii) drill, cut or punch holes
   iv) cut threads
   v) form material
   vi) prepare joints

Practical Objectives

1. Fabricate complex components.

MTF-320 Fit and Assemble – Complex Assemblies

Learning Outcomes:

- Demonstrate knowledge of the procedures used to fit and assemble complex assemblies.

2011 National Occupational Analysis Reference:

9.01 Assembles jigs.
9.02 Determines proper sequence for assembly.
9.03 Assembles sub-components and components.
9.04 Sets fabricated component in place.
9.05 Fastens components on-site.

Suggested Hours:

24 Hours

Objectives and Content:

Theoretical Objectives

1. Define terminology associated with fit and assembly of complex assemblies.

2. Identify hazards and describe safe work practices pertaining to fit and assembly of complex assemblies.
   i) personal
   ii) shop/facility
   iii) fire and explosion
   iv) equipment
   v) ventilation/fumes
   vi) storage, handling and transportation
   vii) heights
   viii) confined spaces
   ix) excavations
   x) water
   xi) weather conditions

3. Interpret codes and standards pertaining to fit and assembly of complex assemblies.

4. Interpret information pertaining to fit and assembly of complex assemblies found on drawings and specifications.

5. Identify fastening methods for component assembly and describe their characteristics and applications.
   i) mechanical fasteners
   ii) tack welding
   iii) welding

6. Identify tools, equipment and accessories used for complex component assembly and describe their applications and procedures for use.

7. Describe the procedures used to lay out and fit complex components for assembly.
   i) shop
   ii) field

8. Describe the procedures used to assemble and fasten complex components.
   i) shop
   ii) field

Practical Objectives

1. Fit and assemble complex components.

WDF-625 Quality Assurance/Control II

Learning Outcomes:

- Demonstrate knowledge of inspection and testing methods and their applications.

2011 National Occupational Analysis Reference:

4.02 Verifies measurements, welds and layout.
4.03 Tracks material and parts for traceability.

Suggested Hours:

9 Hours

Objectives and Content:

Theoretical Objectives

1. Define terminology associated with quality assurance/control.

2. Interpret codes and standards pertaining to quality control.
   i) Canadian Standards Association (CSA)
   ii) American Society of Mechanical Engineers (ASME)
   iii) American Welding Society (AWS)

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. Identify methods of inspection and testing and describe their characteristics, limitations and applications.
   i) destructive
   ii) non-destructive

6. 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

7. Describe the procedures used to document quality control measures.

Practical Objectives

N/A

MTF-330 Finish Preparation

Learning Outcomes:

- Demonstrate knowledge of the procedures used to prepare products for finish.

2011 National Occupational Analysis Reference:

11.01 Determines finishing process.
11.02 Prepares material for finishing.

Suggested Hours:

6 Hours

Objectives and Content:

Theoretical Objectives

1. Define terminology associated with finish preparation.

2. Identify hazards and describe safe work practices pertaining to finish preparation.
   - i) personal
   - ii) shop/facility
   - iii) fire and explosion
   - iv) equipment
   - v) ventilation/fumes
   - vi) storage, handling and transportation
   - vii) heights
   - viii) confined spaces
   - ix) weather conditions
   - x) chemical hazards

3. Interpret codes and standards pertaining to finish preparation.

4. Interpret information pertaining to finish preparation found on drawings and specifications.

5. Identify tools and equipment relating to finish preparation and describe their applications and procedures for use.

6. Identify methods used to prepare surfaces for finishing and describe their characteristics and applications.
   - i) abrasive blasting
   - ii) chemical cleaning
   - iii) mechanical cleaning
     - chipping
     - sanding
     - grinding
     - wire wheel buffing
   - iv) polishing

7. Describe the procedures used to prepare products for finish.

8. Describe the procedures used to perform final visual inspection for quality finish.
   - i) weld profile
   - ii) surface defects
   - iii) spatter and slag
   - iv) sharp edges
   - v) surface contamination
   - vi) arc strikes

9. Identify types of finishes and describe their characteristics and applications.
   - i) primer and paint
   - ii) galvanize
   - iii) electroplate

10. Describe the procedures used to prepare finished materials for shipping.
    - i) identification
      - tag
      - stamp
      - engrave
      - etch
      - markers
      - colour code
    - ii) protect and secure
      - covering
      - wrapping

- tarping

Practical Objectives

N/A

WDF-650 Metallurgy III

Learning Outcomes:

- Demonstrate knowledge of material testing procedures.

2011 National Occupational Analysis Reference:

N/A

Suggested Hours:

12 Hours

Objectives and Content:

Theoretical Objectives

1. Define terminology associated with metallurgy.

2. Describe the processes used in the heat treatment of metals.
   i) stress relieving
   ii) quenching
   iii) hardening
   iv) tempering
   v) annealing
   vi) normalizing

3. Describe forging and casting processes.

4. Identify the causes of corrosion and describe the methods used to prevent or correct them.
   i) oxidation
   ii) galvanic corrosion
   iii) chemical corrosion

5. Identify common metal testing techniques and describe their associated procedures.
   i) Rockwell hardness

ii) Brinell hardness
iii) tensile
iv) Charpy impact
v) Izod impact

Practical Objectives

N/A

MTF-740 Program Review

Learning Outcomes:

- Demonstrate knowledge of the National Occupational Analysis and its relationship to the Interprovincial Examination.
- Demonstrate knowledge of overall comprehension of the trade in preparation for the Interprovincial Examination.

2011 National Occupational Analysis Reference:

Entire National Occupational Analysis (NOA)

Suggested Hours:

30 Hours

Objectives and Content:

Theoretical Objectives

1. Define terminology associated with an NOA.
   i) blocks
   ii) tasks
   iii) sub-tasks

2. Explain how an NOA is developed and the link it has with the Interprovincial Red Seal Examination.
   i) development
   ii) validation
   iii) block and task weighting
   iv) examination breakdown (pie-chart)

3. Identify Red Seal products and describe their use for preparing for the Interprovincial Red Seal Examination.
   i) Red Seal website
   ii) examination preparation guide
   iii) sample questions
   iv) examination counselling sheets

4. Explain the relationship between the NOA and the AACS and IPG.

5. Review Common Occupational Skills for the Metal Fabricator (Fitter) trade as identified in the NOA.
   i) safety
   ii) tools and equipment
   iii) organization of work
   iv) quality assurance
   v) handle material

6. Review Fabrication of Components for the Metal Fabricator (Fitter) trade as identified in the NOA.
   i) perform layout
   ii) cut material
   iii) form material

7. Review Assembly of Components for the Metal Fabricator (Fitter) trade as identified in the NOA.
   i) fit and fasten components
   ii) perform welding activities
   iii) complete project

Practical Objectives

N/A

Feedback and Revisions

This AACS will be amended periodically; comments or suggestions for improvements should be directed to:

New Brunswick:
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Newfoundland and Labrador:
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Any comments or suggestions received will be reviewed and considered to determine the course of action required. If the changes are deemed to be minor, they will be held for implementation during the next review cycle. If immediate change is deemed appropriate and approved by the Atlantic Trade Advisory Committee, it will result in a revision to this version of the AACS and will be detailed in the following section.

Version Changes

Revision Date	Affected Section	Description of Change