



Metal Fabricator (Fitter)

2015

Based on the Atlantic Apprenticeship Curriculum Standard
(pg. 11 for Level Structure)



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 2012 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	2015-16
Level 2	2017-18
Level 3	2018-19

*** The above implementation schedule was current at time of printing. Please **confirm** with Apprenticeship Staff 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 Atlantic Apprenticeship Curriculum Standard (AACS) is an initiative under the Atlantic Apprenticeship Harmonization Project (AAHP) through the Atlantic Workforce Partnership and Employment and Social Development Canada.

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Table of Contents

Preface.....	2
Acknowledgements.....	3
User Guide	5
Glossary of Terms	7
Essential Skills Profiles.....	8
Profile Chart.....	9
Recommended Atlantic Level Structure.....	11
2012 NOA Sub-Task to AACS Unit Comparison	13
Program Content	
Level 1.....	18
Level 2.....	63
Level 3.....	99
Feedback and Revisions.....	121

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 at the end of a level will be through a multiple-choice Level Examination administered through the jurisdictional Apprenticeship Authority.

User Guide *(continued)*

The 2012 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 mandatory 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.

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.

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.
PROCEDURE	A prescribed series of steps taken to accomplish an end.
PURPOSE	The reason for which something exists or is done, made or used.
TECHNIQUE	Within a procedure, the manner in which technical skills are applied.

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		

Recommended Atlantic Level Structure

Level 1 - 9 Weeks

Unit Code	Unit Title	Sugg Hrs*	Pg #	Practical Objectives*
MENT-1801	Workplace Mentoring I (NS Specific)	Through out	19	
WDF-005	Safety	8	20	
WDF-010	Tools and Equipment	4	22	
WDF-015	Stationary Machinery	4	24	
WDF-020	Hoisting, Lifting & Rigging	12	26	
WDF-025	Access Equipment	3	28	
WDF-030	Communication and Trade Documentation	3	30	
WDF-630	Metallurgy I	6	31	
WDF-035	Intro to Welding Processes	14	32	
WDF-040	Shielded Metal Arc Welding I - Set up, Strike & Maintain an Arc	6	35	Strike and maintain an arc.
WDF-045	Shielded Metal Arc Welding II - Fillet Weld, All Positions	18	37	Perform fillet welds on low carbon steel in all positions.
WDF-050	Gas Metal Arc Welding I - Set up & Maintain an Arc	18	39	1. Establish and maintain an arc. 2. Assemble and disassemble GMAW equipment.
WDF-600	Gas Metal Arc Welding II - Fillet Weld, All Positions	18	41	Perform fillet welds on low carbon steel plate in all positions.
WDF-055	Flux Core Arc Welding I - Set up and Deposit a Weld	6	43	Establish and maintain an arc.
WDF-060	Metal Core Arc Welding I - Set up & Deposit a Weld	6	45	Establish and maintain an arc.
WDF-635	Groove Welding I - Shielded Metal Arc Welding, Flat and Horizontal	18	47	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	12	49	Perform groove welds on low carbon steel plate in flat and horizontal positions.
WDF-605	Oxy-fuel	24	51	1. Set up, operate & shut down oxy-fuel equip. 2. Perform oxy-fuel cutting operations.
WDF-610	Electric Arc Cutting & Gouging	12	53	Perform air-carbon arc gouging.
WDF-615	Plasma Arc Cutting & Gouging	6	55	Perform plasma arc cutting and gouging operations.
WDF-075	Drawings	30	57	Interpret basic shop drawings.
WDF-070	Fabrication Fundamentals	18	59	
WDF-085	Introduction to Layout and Pattern Development	15	61	Develop simple templates
WDF-065	Weld Faults	9	62	

Level 2 - 8 Weeks

Unit Code	Unit Title	Sugg Hrs*	Pg #	Practical Objectives*
WDF-620	Quality Assurance/Control I	9	64	
MTF-200	Drawings II	60	66	Sketch a drawing including req'd fab details.
MTF-205	Layout -Simple Compon. & Templates	60	67	Develop simple templates.
MTF-210	Fabrication - Simple Components	24	69	Fabricate simple components.
MTF-215	Fit & Assemble - Simple Components	12	71	Fit and assemble simple components.
MTF-700	Plasma Arc Cutting II Review	3	73	Perform plasma arc cutting operations.
MTF-220	Bending Equipment	6	75	Bend material using bending equipment.
MTF-225	Heat Forming	3	77	Perform heat forming operations.
MTF-230	Plate Rolling Equipment	6	79	Perform plate rolling operations.
MTF-235	Shape Rolling Equipment	3	81	Perform shape rolling operations.
MTF-240	Press Brake Equipment	6	83	Bend materials using press brakes.
WDF-645	Metallurgy II	12	85	
MTF-705	Shielded Metal Arc Welding III - Tack Weld, All Positions.	3	87	Perform tack welds.
MTF-710	Gas Metal Arc Welding III - Tack Weld, All Positions	3	89	Perform tack welds using GMAW equipment.
MTF-715	Flux Core Arc Welding II - Tack Weld, All Positions	3	91	Perform tack welds in all positions.
MTF-720	Metal Core Arc Welding II - Tack Weld, Flat and Horizontal Positions	3	93	Perform tack welds in the flat and horizontal position using the MCAW process.
MTF-730	Gas Tungsten Arc Welding I - Set up & Maintain an Arc	6	95	Establish and maintain an arc.
MTF-735	Gas Tungsten Arc Welding II Tack Weld, All Positions	18	97	Perform tack welds using the GTAW process.

Level 3 – 6 Weeks

Unit Code	Unit Title	Sugg Hrs*	Pg #	Practical Objectives*
MENT-1802	Workplace Mentoring II (NS Specific)	Through out	100	
MTF-300	Drawings III	30	101	Develop a pressure vessel drawing.
MTF-305	Automated Shape Cutting Machines	3	102	
MTF-725	Communication and Work Planning	12	103	
MTF-310	Layout - Complex Components and Templates	30	105	Develop complex templates.
MTF-315	Fabrication - Complex Components	24	107	Fabricate complex templates.
MTF-320	Fit & Assemble Complex Assemblies	24	109	Fit and assemble complex templates.
WDF-625	Quality Assurance/Control II	9	111	
MTF-330	Finish Preparation	6	113	
WDF-650	Metallurgy III	12	116	
MTF-740	Program Review	30	118	

***Suggested Hours:** The time it should take to cover the unit (a guide only).

***Practical Objectives:** The tasks/skills apprentices must be exposed to during technical training. An individual or group performance of the task/skill is recommended; if not possible, an instructor demonstration is acceptable. Training Providers should use practical, hands-on learning whenever possible, whether identified in the curriculum as a practical objective or not.

2012 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
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.		
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		AACCS 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	
7.03	Cuts material using shears.	MTF-210	Fabrication - Simple Components
		MTF-315	Fabrication - Complex Components
		WDF-015	Stationary Machinery
		MTF-210	Fabrication - Simple Components
7.04	Cuts material using saws.	MTF-315	Fabrication - Complex Components
		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

Unit Code	Title	Hours	Page
MENT-1801	Workplace Mentoring I (NS Specific)	Throughout	19
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	31
WDF-035	Introduction to Welding Processes	14	32
WDF-040	Shielded Metal Arc Welding I - Set up, Strike and Maintain an Arc	6	35
WDF-045	Shielded Metal Arc Welding II - Fillet Weld, All Positions	18	37
WDF-050	Gas Metal Arc Welding I - Set up and Maintain an Arc	18	39
WDF-600	Gas Metal Arc Welding II - Fillet Weld, All Positions	18	41
WDF-055	Flux Core Arc Welding I - Set up and Deposit a Weld	6	43
WDF-060	Metal Core Arc Welding I - Set up and Deposit a Weld	6	45
WDF-635	Shielded Metal Arc Welding – Introduction to Groove Welding, Flat & Horizontal	18	47
WDF-640	Gas Metal Arc Welding – Introduction to Groove Welding, Flat & Horizontal	12	49
WDF-605	Oxy-fuel	24	51
WDF-610	Electric Arc Cutting and Gouging	12	53
WDF-615	Plasma Arc Cutting and Gouging	6	55
WDF-075	Drawings	30	57
WDF-070	Fabrication Fundamentals	18	59
WDF-085	Introduction to Layout and Pattern Development	15	61
WDF-065	Weld Faults	9	62

MENT-1801

Workplace Mentoring I

(Nova Scotia Unit of Instruction)

Learning Outcomes:

- Identify and explain strategies for learning workplace skills.
- Demonstrate strategies to assist in learning skills in the workplace.

Objectives and Content:

1. Describe the importance of your own experiences.
2. Identify the partners involved in apprenticeship.
3. Describe the shared responsibilities for workplace learning.
4. Determine your own learning preferences and explain how these relate to learning new skills.
5. Describe the importance of different types of skills in the workplace.
6. Describe the importance of essential skills in the trade.
7. Identify different ways of learning.
8. Identify your learning preferences.
9. Identify different learning needs and strategies to meet learning needs.
10. Identify techniques for effective communication.
11. Identify strategies to assist in learning a skill.

Resource:

- Recommended resource to use in the delivery of this unit:
www.apprenticeship.nsc.ca/mentoring/apprentice.htm

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.

2012 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.

2012 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.

2012 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.

2012 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.

2012 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.

2012 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.

2012 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.

Theoretical 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.

2012 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.

2012 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 and maintain 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.

2012 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.

2012 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.

2012 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.

2012 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.

2012 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.

2012 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 Position

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.

2012 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.

2012 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.

2012 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.

2012 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.

2012 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.

2012 National Occupational Analysis Reference:

n/a

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.

2012 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.

2012 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

Unit Code	Title	Hours	Page
WDF-620	Quality Assurance/Control I	9	64
MTF-200	Drawings II	60	66
MTF-205	Layout - Simple Components and Templates	60	67
MTF-210	Fabrication - Simple Components	24	69
MTF-215	Fit and Assemble - Simple Components	12	71
MTF-700	Plasma Arc Cutting II (Review)	3	73
MTF-220	Bending Equipment	6	75
MTF-225	Heat Forming	3	77
MTF-230	Plate Rolling Equipment	6	79
MTF-235	Shape Rolling Equipment	3	81
MTF-240	Press Brake Equipment	6	83
WDF-090	Metallurgy II	12	85
MTF-705	Shielded Metal Arc Welding III - Tack Weld, All Positions.	3	87
MTF-710	Gas Metal Arc Welding III - Tack Weld, All Positions	3	89
MTF-715	Flux Core Arc Welding II - Tack Weld, All Positions	3	91
MTF-720	Metal Core Arc Welding II - Tack Weld, Flat and Horizontal Positions	3	93
MTF-730	Gas Tungsten Arc Welding I - Set up and Maintain an Arc	6	95
MTF-735	Gas Tungsten Arc Welding II - Tack Weld, All Positions	18	97

WDF-620 Quality Assurance/Control I

Learning Outcomes:

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

2014 National Occupational Analysis Reference:

4.01 Performs visual inspections.

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.

2012 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.

2012 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.

2012 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.

2012 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.

2012 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.

2012 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.

2012 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.

2012 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.

2012 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.

2012 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.

2012 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.

2012 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.

2012 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.

2012 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.

2012 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.

2012 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.

2012 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

Unit Code	Title	Hours	Page
MENT-1802	Workplace Mentoring II (NS Specific)	Throughout	100
MTF-300	Drawings III	30	101
MTF-305	Automated Shape Cutting Machines	3	102
MTF-725	Communication and Work Planning	12	103
MTF-310	Layout - Complex Components and Templates	30	105
MTF-315	Fabrication - Complex Components	24	107
MTF-320	Fit and Assemble - Complex Assemblies	24	109
MTF-325	Quality Assurance/Control II	9	111
MTF-330	Finish Preparation	6	113
WDF-650	Metallurgy III	12	116
MTF-740	Program Review	30	118

MENT-1802

Workplace Mentoring II

(Nova Scotia Unit of Instruction)

Learning Outcomes:

- Identify and explain strategies for teaching workplace skills.
- Demonstrate strategies to assist in teaching skills in the workplace

Objectives and Content:

1. Describe the impact of your own experiences in teaching skills.
2. Identify the different roles played by a workplace mentor.
3. Describe the six-step approach to teaching skills.
4. Explain the importance of identifying the point of the lesson.
5. Identify how to choose a good time to present a lesson.
6. Explain the importance of linking the lessons.
7. Identify the components of the skill (the context).
8. Describe considerations for demonstrating a skill.
9. Identify types of skill practice.
10. Describe considerations in setting up opportunities for skill practice.
11. Explain the importance of providing feedback.
12. Identify techniques for giving effective feedback.
13. Describe a skill assessment.
14. Identify methods of assessing progress.
15. Explain how to adjust a lesson to different situations.

Resources:

- Recommended resource to use in the delivery of this unit:
www.apprenticeship.nsc.ca/mentoring/apprentice.htm

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.

2012 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.

2012 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.

2012 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.

2012 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.

2012 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.

2012 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.

Learning Outcomes:

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

2012 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

MTF-330 **Finish Preparation**

Learning Outcomes:

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

2012 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.

2012 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

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.

2012 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 AACCS 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

Suggested Learning Activities:

1. Conduct a mock certification exam to be used for diagnostic purposes.
2. Review the National Occupational Analysis.
3. Review the Apprentice Logbook.
4. Review the Exam Preparation information found at www.nsapprenticeship.ca under Training | Exams, Exam Preparation.
5. Conduct a final mock certification exam.

Resources:

These are the recommended resources to use in the delivery of this unit:

- Exam Preparation information, including videos, occupational analyses, exam counseling sheets, practice exams and sample questions, and other study materials and resources, can be found at www.nsapprenticeship.ca under Training | Exams, Exam Preparation.
- Apprentice's personal logbook
- Applicable codes and regulations
- Program texts

Evaluation: pass/fail

Feedback and Revisions

Thank you for your interest in the development and revision of this document. Upon review of the document, please record your feedback in relation to the following items:

- course division and organization
- relevancy of the content
- errors or omissions
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Overall comments are to be entered on this evaluation form and specific changes are to be entered directly on the document in the relevant area(s). When making proposed corrections(s) in the document, please use red ink. When all feedback has been recorded, return this evaluation form along with the document to the Apprenticeship Office noted at the bottom of the page.

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Trade: Metal Fabricator (Fitter)

Full Name: _____

Type of Position: (Trade Practitioner, Instructor, etc.): _____

Company: _____

Address: _____

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