



# Metal Fabricator (Fitter)

# 2015

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



## Preface

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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](http://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

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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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|                   |                           |
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## User Guide

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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)*

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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**

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

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

## Essential Skills Profiles

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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](http://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 journey person status.

## Profile Chart

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

## Profile Chart *(continued)*

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

## Recommended Atlantic Level Structure

### Level 1 - 9 Weeks

| Unit Code | Unit Title                                                         | Sugg Hrs* | Pg # | Practical Objectives*                                                                     |
|-----------|--------------------------------------------------------------------|-----------|------|-------------------------------------------------------------------------------------------|
| MENT-700  | Mentoring I                                                        | 6         | 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                                         | 12        | 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.<br>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                                                           | 20        | 51   | 1. Set up, operate & shut down oxy-fuel equip.<br>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-701  | Mentoring II                              | 6         | 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           | 6         | 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                                    |
| WDF-615                                                                          | Plasma Arc Cutting and Gouging                                   |           |                                             |
| 2.04                                                                             | Uses access equipment.                                           | WDF-025   | Access Equipment                            |
| Task 3 - Organizes work.                                                         |                                                                  |           |                                             |
| 3.01                                                                             | Interprets plans, drawings and specifications.                   | WDF-075   | Drawings                                    |
|                                                                                  |                                                                  | MTF-200   | Drawings II                                 |
|                                                                                  |                                                                  | MTF-300   | Drawings III                                |
| 3.02                                                                             | Communicates with others.                                        | WDF-030   | Communication and Trade Documentation       |
| 3.03                                                                             | Organizes project tasks.                                         | MTF-725   | Communication and Work Planning             |
| Task 4 - Performs quality assurance throughout fabrication and assembly process. |                                                                  |           |                                             |
| 4.01                                                                             | Performs visual inspections.                                     | WDF-620   | Quality Assurance/Control I                 |
| 4.02                                                                             | Verifies measurements, welds and layout.                         | WDF-625   | Quality Assurance/Control II                |
| 4.03                                                                             | Tracks materials and parts for traceability.                     | WDF-625   | Quality Assurance/Control II                |
| Task 5 - Handles materials.                                                      |                                                                  |           |                                             |
| 5.01                                                                             | Organizes material.                                              |           |                                             |
| 5.02                                                                             | Determines weights.                                              | WDF-020   | Hoisting, Lifting and Rigging               |
| 5.03                                                                             | Applies rigging practices.                                       | WDF-020   | Hoisting, Lifting and Rigging               |
| 5.04                                                                             | Operates material handling equipment.                            | WDF-020   | Hoisting, Lifting and Rigging               |

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

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

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

| NOA Sub-task                 |                                               | AACS Unit |                                               |
|------------------------------|-----------------------------------------------|-----------|-----------------------------------------------|
|                              |                                               | WDF-600   | GMAW II - Fillet Weld, All Positions          |
|                              |                                               | WDF-635   | Groove Welding I - SMAW, Flat and Horizontal  |
|                              |                                               | WDF-640   | Groove Welding II - GMAW, Flat and Horizontal |
|                              |                                               | MTF-705   | SMAW III - Tack Weld, All Positions           |
|                              |                                               | MTF-710   | GMAW III - Tack Weld, All Positions           |
|                              |                                               | MTF-715   | FCAW II - Tack Weld, All Positions            |
|                              |                                               | MTF-720   | MCAW II - Tack Weld, All Positions            |
| 10.04                        | Applies welding processes.                    | WDF-040   | SMAW I - Set up, Strike and Maintain an Arc   |
|                              |                                               | WDF-045   | SMAW II - Fillet Weld, All Positions          |
|                              |                                               | WDF-050   | GMAW I - Set up and Maintain an Arc           |
|                              |                                               | WDF-600   | GMAW II - Fillet Weld, All Positions          |
|                              |                                               | WDF-055   | FCAW I - Set up and Maintain an Arc           |
|                              |                                               | WDF-060   | MCAW I - Set up and Maintain an Arc           |
|                              |                                               | WDF-635   | Groove Welding I - SMAW, Flat and Horizontal  |
|                              |                                               | WDF-640   | Groove Welding II - GMAW, Flat and Horizontal |
|                              |                                               | MTF-705   | SMAW III - Tack Weld, All Positions           |
|                              |                                               | MTF-710   | GMAW III - Tack Weld, All Positions           |
|                              |                                               | MTF-715   | FCAW II - Tack Weld, All Positions            |
|                              |                                               | MTF-720   | MCAW II - Tack Weld, All Positions            |
|                              |                                               | MTF-730   | GTAW I - Set up and Maintain an Arc           |
|                              |                                               | 10.05     | Corrects welding distortions.                 |
| WDF-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

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## **MENT-700     Mentoring I**

### **Learning Outcomes:**

- Demonstrate knowledge of effective communication practices as a learner.
- Demonstrate knowledge of strategies for learning skills in the workplace.

### **Red Seal Occupational Standard Reference:**

6.01 Uses communication techniques

6.02 Uses mentoring techniques

### **Suggested Hours:**

6 hours

### **Theoretical Objectives:**

1. Describe the importance of one's own individual experiences.
2. Identify behaviours that demonstrate positive learning experiences.
3. Identify the benefits of workplace mentoring for the apprentice, mentor, and employer.
4. Identify the partners involved in apprenticeship training.
5. Describe the shared responsibilities for workplace learning in apprenticeship.
6. Identify different learning needs and strategies to address challenges or barriers in the workplace.
  - i) learning disabilities
  - ii) language
  - iii) underrepresentation
7. Identify the components that create a positive and inclusive workplace culture.
  - i) workplace characteristics
  - ii) individual behaviours

8. Identify various learning styles and determine one's own learning preferences.
9. Explain how learning preferences impact learning new skills.
10. Identify different learning strategies to meet individual learning needs.
11. Describe the importance of adapting to a variety of teaching and learning methods in the workplace.
12. Identify techniques for effective communication as a learner.
  - i) verbal and non-verbal
  - ii) active listening
13. Identify and describe personal responsibilities and attitudes that contribute to on-the-job success.
  - i) self advocating
  - ii) asking questions
  - iii) accepting constructive feedback
  - iv) working safely
  - v) employing time management techniques and being punctual

**Practical Objectives:**

N/A

## **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. Identify types of communication devices and describe their applications.
2. 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:**

12 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.

**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:**

20 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 (1<sup>st</sup> and 3<sup>rd</sup> 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 |
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**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

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## **MENT-701**

## **Mentoring II**

### **Learning Outcomes:**

- Demonstrate knowledge of effective communication practices as a mentor.
- Demonstrate knowledge of strategies for teaching workplace skills.

### **Red Seal Occupational Standard Reference:**

6.01 Uses communication techniques

6.02 Uses mentoring techniques

### **Suggested Hours:**

6 hours

### **Theoretical Objectives:**

1. Identify the different roles played by a workplace mentor.
2. Identify strategies to create a supportive learning environment.
3. Identify techniques for effective communication as a mentor.
  - i) constructive feedback
  - ii) active listening
  - iii) leading meetings and one-on-one sessions
4. Describe the steps in teaching a skill.
  - i) identifying the point of lesson
  - ii) linking the lesson
  - iii) demonstrating the skill
  - iv) providing practice
  - v) giving feedback
  - vi) assessing skill and progress
5. Identify strategies to assist in teaching a skill while meeting individual learning needs.
  - i) principles of instruction
  - ii) coaching skills
6. Explain how to adjust a lesson for various situations.

## **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:

6 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](http://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](http://www.nsapprenticeship.ca) under Training | Exams, Exam Preparation.
- Apprentice's personal logbook
- Applicable codes and regulations
- Program texts

**Evaluation:** pass/fail

## Feedback and Revisions

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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
- other suggestions for improvement and consideration

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.

(PLEASE PRINT)

Trade: Metal Fabricator (Fitter)

Full Name: \_\_\_\_\_

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

Company: \_\_\_\_\_

Address: \_\_\_\_\_

Telephone: \_\_\_\_\_

Comments: (Use a separate sheet of paper if necessary)

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Halifax, NS B3J 2S9