

SAULT COLLEGE OF APPLIED ARTS AND TECHNOLOGY

SAULT STE. MARIE, ON



COURSE OUTLINE

WELDING

COURSE TITLE:

CODE NO.: MET100-3 SEMESTER: 01

PROGRAM: MOTIVE POWER TECHNIQUES - HEAVY EQUIPMENT DIESEL

AUTHOR: D. CLEMENT-SOCCHIA

DATE: May 1998 PREVIOUS OUTLINE DATED: August 1997

APPROVED: *1)/)dl<* *<7).ImJAaU^* *ff/&uW?X*  
DEAN 7} DATE

TOTAL CREDITS 3

PREREQUISITE^: Registration in the Motive Power Techniques - Heavy Equipment Diesel Program.

LENGTH OF COURSE: 2 Hours / Week for 16 Weeks

TOTAL CREDIT HOURS: 32 Hours

**COURSE DESCRIPTION:** A trades curriculum that has been designed to provide a combination of theoretical knowledge and practical (hands on) skill in the safe use and operation of typical SMAW and OFG welding, cutting and heating equipment

**LEARNING OUTCOMES AND ELEMENTS OF THE PERFORMANCE:**  
(Generic Skills Learning Outcomes placement on the course outline will be determined and communicated at a later date.)

**1 Upon successful completion of this course the student will: I**

*Demonstrate and describe a soundworking knowledge of personal and shop safety as related to the OFG process.*

**Potential Elements of the Performance:**

- identify proper eye, hand, face protection
- identify proper footwear and clothing
- locate and identify shop ventilation devices
- locate and identify emergency fire exits
- identify the location of shut-off valves for the shop manifold gas system
- identify procedures for evacuation of shop areas in case of emergency
- describe the physical construction of both oxygen and acetylene cylinders
- identify the built-in safety devices for both oxygen and acetylene cylinders
- describe methods for identifying both oxygen and acetylene cylinders, hoses, regulators and fittings
- identify basic physical properties and dangers associated with oxygen gas
- identify basic physical properties and dangers associated with acetylene gas
- describe procedures for cylinder handling
- describe procedures for setting up, pressurizing, purging and shutting down a portable oxyacetylene station

**LEARNING OUTCOMES AND ELEMENTS OF THE PERFORMANCE**  
(Continued)

*Demonstrate and describe a sound working knowledge of how to set up and operate a typical oxyacetylene workstation.*

**Potential Elements of the Performance:**

- perform a routine inspection of assigned workstations to determine the condition of torch body, hoses, regulators and tips
- correct deficiencies prior to the commencement of work
- understand the basic differences in construction and operation between the balanced pressure and an injector torch
- pressurize and purge regulators, hoses, torch body and tip
- explain the dangers associated to the hazards of backfire and flashback
- explain the correct safe response to backfire and flashback
- identify correct versus unsafe flame ignition procedures
- adjust the oxyacetylene flame to produce flames designated as carburizing, neutral and oxidizing
- describe procedures for the shutting down of die oxyacetylene torch, regulators and assigned workstation

*Demonstrate and describe by means of practical shop assignments and tests, a sound working knowledge of how to perform both fusion and braze welding operations.*

**Potential Elements of the Performance:**

- describe potential fire, fume and explosion hazards associated to the fusion and or braze welding of metals
- identify proper fusion welding and braze welding techniques
- perform appropriate pressure settings and flame adjustments for specific fusion welding and / or braze welding exercises
- perform fusion and braze welding exercises on mild steel
- determine weld soundness by means of visual and / or destructive testing

II. LEARNING OUTCOMES AND ELEMENTS OF THE PERFORMANCE  
(Continued)

4) *Demonstrate and describe by means of practical shop assignments and tests, a sound working knowledge of how to perform flame cutting **and** heating operations.*

Potential Elements of the Performance:

- describe potential fire, fume and explosion hazards associated to process of flame cutting and / or heating of metals
- identify proper flame cutting and heating techniques
- select appropriate pressure settings, flame adjustments and travel speeds
- flame cut mild steel using manual and semi-automatic equipment
- describe potential changes in base metal ductility, brittleness and strength that can occur as a result of their rapid heating and cooling.

5) *Demonstrate and describe by means of 'practical shop assignments a sound working knowledge of personal and shop safety as related to the SMAW process.*

Potential Elements of the Performance:

- identify proper eye, hand, face protection
- identify proper footwear and clothing
- locate / identify shop ventilation devices and emergency fire exits
- identify the location of shut-off valves for the shop gas manifold system
- identify procedures for evacuation of shop areas in case of emergency
- identify hazards associated with the Shielded Metal Arc Welding process

6) *Demonstrate and describe by means of practical shop assignments and tests a sound working knowledge of how to set up and operate a typical SM4W workstation.*

Potential Elements of the Performance:

- identify, select and adjust welding helmets and filter lenses
- identify electrode according to type, size and AWS / CSA numbering system
- identify guidelines for electrode selection and application
- identify techniques for adjusting both welding current and polarity
- perform a routine inspection of assigned workstations to determine the condition of power supply, cables, electrode holder and related equipment

**II. LEARNING OUTCOMES AND ELEMENTS OF THE PERFORMANCE  
(Continued)**

- operate any and all lab /shop equipment according to guidelines prescribed by the college and/or course professor- wear personal protective equipment at all times while in the shop
- return all equipment and unused practice materials to their designated place upon completion of work
- remove all scrap and thoroughly clean individual and / or assigned station

**IV. REQUIRED RESOURCES/TEXTS/MATERIALS:**

C.SA Approved (High Cut) Safety Work Boots  
C.S.A. Approved (Impact Resistant) Safety Glasses  
Appropriate Work Wear  
Notebook c/w Paper  
Two Finger (Gauntlet Type) Welding Gloves  
Module: "Basic OxyFuel Gas Welding  
Text: "New Lessons in Arc Welding"

**V. EVALUATION PROCESS/GRADING SYSTEM**

The evaluation for Learning Outcomes # 1 thru # 7 will be determined by means of *Designated Lab/Shop Assignments and Tests* as well as two *Theory Tests*.

The evaluation for Learning Outcome # 8 will consist of a day to day recording of the Elements of Performance listed. Each infraction will constitute the loss of one percentage point from the *10 percentage points* allocated to this outcome.

While all tests and assignments are designed to be completed with the specified time limit (or less), students **MUST** report to the shop/ classroom fully prepared. Your professor will supply only the assignment or test instructions.

**LEARNING OUTCOMES AND ELEMENTS OF THE PERFORMANCE**  
**(Continued)**

- identify basic of SMAW joint designs
- describe techniques for arc ignition, setting electrode angle and travel speeds
- produce trial beads to identify possible defects and verify initial settings

*Demonstrate and describe by means of practical shop assignments and tests, a sound working knowledge of how to perform SMAW procedures and diagnose / correct defects.*

**Potential Elements of the Performance:**

- describe potential fire, fume and explosion hazards associated to SMAW
- perform appropriate adjustments to SMAW equipment specific to the demands of single and multi-pass fillet welds and groove welds
- make single and multi-pass fillet welds on mild steel
- make single and multi-pass groove welds on mild steel
- describe and diagnose common weld defects
- identify and explain limited repair and service to electrode cables, holders, power sources and protective equipment

*Demonstrate by means of regular attendance, punctuality, respect for fellow students as well as lab /shop equipment, a willingness to assume the responsibilities of employment.*

**Potential Elements of the Performance:**

- be present for all scheduled classes
- provide a satisfactory reason to the professor
- provide a reasonable excuse to the professor for being absent from class
- provide a written statement to the professor explaining the reasons) for being absent on an assignment due date or the day of a scheduled test
- demonstrate behaviour that does not interfere with or obstruct the over-all learning environment
- actively participate in all course assignments and projects

The Final Mark for MET100 will be calculated as follows:

Course Grading Scheme Final Mark

A+	90 - 100%	Outstanding Achievement	Shop Assignments and Tests	50%
A	80 - 89%	Above Average Achievement	Theory Tests	40%
B	70 - 79%	Average Achievement	Employment Readiness	10%
C	60 - 69%	Satisfactory Achievement		

U Unsatisfactory, only given on the midterm report

S Satisfactory, only given on die midterm report

R Repeat, signifies a failing grade

X A temporary grade that is limited to instances where special circumstances have prevented the student from demonstrating the required elements of performance by the end of the course semester. An 'X' grade must have the Dean's approval and has a *maximum* time limit of 120 days after which it becomes an 'R' grade.

VL SPECIAL NOTES:

1. Special Needs

If you are a student with special needs (eg. physical limitations, visual impairments, hearing impairments, learning disabilities), you are encouraged to discuss required accommodations with the instructor and/or contact the Special Needs Office, Room E1204, Ext 493,717,491 so that support services can be arranged for you.

2. Retention of Course Outlines

It is the responsibility of the student to retain all course outlines for possible future use in acquiring advanced standing at other post-secondary institutions.

3. Student evaluations concerning the '**Final Mark\***' are further affected by the conditions set forth in the printed handout, *Welding Department Guidelines*'. Be sure that you receive a copy of these guidelines.

4. Course materials that are discussed and /or explained during any and all lab or shop demonstrations are subject to evaluation. Students are therefore responsible for the content of all lab / shop demonstrations.

SPECIAL NOTES Cont'd:

5. Your Professor reserves the right to modify the course as he/she deems necessary to meet the needs of students.
6. Substitute Course Information is available at the Registrar's Office.
7. Any person caught cheating or substituting another person's work in place of their own for the purpose of grading or evaluation will automatically fail the said assignment or test College policy\* also dictates that such persons may be subject to immediate dismissal.

\* Students should refer to the definition of "academic dishonesty" provided in the Sault College "Statement of Student Rights and Responsibilities".

IL PRIOR LEARNING ASSESSMENT

Students who wish to *apply* for advanced credit should consult the course instructor. Credit for prior learning will be given upon successful completion of the following:

1. The successful completion of an oxyacetylene<sup>flame</sup> cutting and welding course with Learning Outcomes and Elements of Performance that are at least 80% compatible with this course outline...

AND

2. The successful challenge of both theory tests identified by this course outline.

<OR>

3. Documented proof of at least three (3) years of competent trade experience involving the use of both SMAW and OFG welding and flame cutting equipment that is compatible with Learning Outcomes described in MET100...

AND

4. The successful challenge of both theory tests identified by this course outline.