

SAULT COLLEGE OF APPLIED ARTS AND TECHNOLOGY

SAULT STE. MARIE, ONTARIO



COURSE OUTLINE

COURSE TITLE: WELDING

CODE NO. : HET811 **LEVEL:** 3

PROGRAM: HEAVY DUTY EQUIPMENT TECHNICIAN - Level 3

AUTHOR: Steve Witty
INSTRUCTOR: Bill Hanchuck

DATE: January 2015 **PREVIOUS OUTLINE DATED:** January 2011

APPROVED: *"Corey Meunier"*

CHAIR

TOTAL CREDITS: 3

PREREQUISITE(S): Successful completion of WELDING for the HET Level 2 or its equivalent.

HOURS/WEEK:

Copyright ©2015 The Sault College of Applied Arts & Technology

Reproduction of this document by any means, in whole or in part, without prior written permission of Sault College of Applied Arts & Technology is prohibited.

*For additional information, please contact Corey Meunier, Chair
School of The Natural Environment, Technology & Skilled Trades
(705) 759-2554, Ext. 2610*

I. COURSE DESCRIPTION:

A curriculum that has been designed to:

- Provide a combination of theoretical knowledge and practical (hands on) skill in the safe use and operation of Gas Metal Arc / Shielded Metal Arc welding equipment.
- Produce acceptable fillet and groove welds on a base metal greater than one quarter (1/4) inch thick.

II. LEARNING OUTCOMES AND ELEMENTS OF THE PERFORMANCE:

Upon successful completion of this course, the student will demonstrate the ability to:

1. ***Demonstrate by means of practical shop assignments, a sound working knowledge of both personal and shop safety.***

Potential Elements of the Performance:

- identify proper eye protection as well as the need to wear it at all times while in the welding shop
- identify proper hand and face protection as well as the need to wear it during any and all cutting, heating or welding operations
- identify proper footwear and clothing
- identify the dangers associated with contact lenses, butane lighters, exposed metal jewelry, long hair and beards
- identify the location of commonly used welding tools, face shields and leather jackets
- identify personal safety equipment that must be supplied by the student
- locate and identify shop lighting and ventilation controls
- locate and identify emergency shop exits
- understand emergency shop evacuation procedures
- locate and identify manifold shut-off valves for the shop gas system

2. ***Demonstrate the ability to set up and operate a typical GMAW Workstation.***

Potential Elements of the Performance:

- identify proper eye, hand and face protection
- identify proper footwear and clothing
- identify potential fire, fume and explosion hazards associated to either the Gas Metal Arc Welding process
- briefly describe the differences between a constant current and a constant voltage welding machine
- explain why a constant voltage machine is used for the GMAW process

- identify GMAW electrodes according to type, size, current type, polarity and welding position according to AWS designation
- identify various shielding gases and their potential use(s)
- perform a routine inspection of assigned workstations to determine the condition of wire feeder, cables, torch body, hoses and regulators
- describe procedures for setting shielding gas flow rate, voltage, wire feed speed and visible (electrode) stick-out distance.
- describe techniques for arc ignition, setting gun angle and travel speeds

3. ***Demonstrate the ability to perform GMAW procedures and identify and correct potential weld defects.***

Potential Elements of the Performance:

- produce fillet and groove welds on base metals that are greater than ¼ inch thick
- perform adjustments to voltage and wire feed speed in accordance with the demands of base metal thickness and joint design
- change / replace rolls of electrode wire
- perform in-service adjustments to wire drive rolls, contact tip and nozzle
- identify and troubleshoot the possible cause(s) of common weld defects

4. ***Demonstrate the ability to set up and operate a typical SMAW Workstation.***

Potential Elements of the Performance:

- identify, select and adjust welding helmets and lenses
- identify SMAW electrodes according to type, size, current type, polarity and welding position according to AWS designation
- identify and describe the various types of welding machine according to construction, duty cycle and current type
- perform a routine inspection of assigned workstation to determine the condition of welding machine, cables, electrode holders and related equipment
- understand the hazards of open circuit voltage (OCV) and arc voltage
- identify / set welding machine controls to their designated value(s)
- describe techniques for arc ignition, electrode manipulation and travel speeds
- produce trial weld beads to identify possible defects and verify current settings

5. ***Demonstrate the ability to perform SMAW procedures and identify and correct potential weld defects.***

Potential Elements of the Performance:

- produce fillet and groove welds on base metals greater than ¼ inch thick
- identify and troubleshoot the possible cause(s) of common weld defects
- identify and explain limited repair and service activities related to electrode cables, holders, welding machines and protective equipment

III. TOPICS:

Clients may expect the following list of topics to be covered during this course of instruction.

1. Personal and Shop Safety
2. Set up and Operation of a GMAW workstation
3. GMAW Practices and Procedures
4. Set up and Operation of a SMAW workstation
5. SMAW Practices and Procedures

IV. REQUIRED RESOURCES/TEXTS/MATERIALS:

- CSA Approved (Impact Resistant) Safety Glasses
- CSA Approved (6 inch High Cut) Safety Work Boots
- CSA Approved (Gauntlet Type) Welding Gloves
- Appropriate Work Wear (see Welding Shop Guidelines)
- Modules: Course Pack HET801

V. EVALUATION PROCESS/GRADING SYSTEM:Part 1 NOTES:

1. Re-writes are NOT allowed for any written assignment, quiz or test.
2. Repeats are NOT allowed for any shop test
3. Course attendance is mandatory. One percent (1 %) per hour will be deducted

from the final course grade for apprentices with more than 4 hours of unexcused* absence.

[Any absence without a written, valid reason will be deemed unexcused.]

Valid reasons would include:

- Doctor's note
- Apprenticeship Ministry note
- Family Death or Serious Illness supported by a written note.

Part 2 Final Course Grades:

The final course grade will be determined by means of the following list of weighted factors:

<i>Factor</i>	<i>Value</i>
Shop Assignments & Tests	65 %
Theory Quiz & Test	35 %
Attendance	-1% per Unexcused Hour
Shop Clean-up	-1% per Incident

The following semester grades will be assigned to students:

<i>Grade</i>	<i>Definition</i>	<i>Grade Point Equivalent</i>
A+	90 – 100%	4.00
A	80 – 89%	
B	70 - 79%	3.00
C	60 - 69%	2.00
D	50 – 59%	1.00
F (Fail)	49% and below	0.00

CR (Credit)	Credit for diploma requirements has been awarded.
S	Satisfactory achievement in field /clinical placement or non-graded subject area.
U	Unsatisfactory achievement in field/clinical placement or non-graded subject area.
X	A temporary grade limited to situations with extenuating circumstances giving a student additional time to complete the requirements for a course.
NR	Grade not reported to Registrar's office.
W	Student has withdrawn from the course without academic penalty.

VI. SPECIAL NOTES:

Attendance:

Sault College is committed to student success. There is a direct correlation between academic performance and class attendance; therefore, for the benefit of all its constituents, all students are encouraged to attend all of their scheduled learning and evaluation sessions. This implies arriving on time and remaining for the duration of the scheduled session.

NO CELL PHONES PERMITTED IN LAB AREAS

VII. COURSE OUTLINE ADDENDUM:

The provisions contained in the addendum located on the portal form part of this course outline.