#115

SAULT COLLEGE OF APPLIED ARTS & TECHNOLOGY

SAULT STE, MARIE, ONTARIO

COURSE OUTLINE

Course Title: VELDING

Code No.: MET6 2/-2

Program: BASIC MARINE & SMALL ENGINES APPRENTICESHIP

Semester:

Pajet 1989 05 19

Author: Bob Senechal

New Revision: XX

APPROVED: Chairperson

WELDING

* **Course Name** **Course Number**

PHILOSOPHY/GOALS:

This course of study provides students with a basic level of skills in dealing with oxy-acetylene welding equipment. It is intended to provide the student with an understanding of metallurgy as it relates to welding.

METHODS OF ASSESSMENT (GRADING METHOD):

MARKING SYSTEM

A -- 85%+
B -- 75% - 84%
C -- 60% - 74%
D -- 50% - 59%
F -- Repeat

2 - Theory Tests	-	30%
Skill Evaluation	-	60%
Attendance/Attitude	-	10%
TOTAL	-	100%

Instructors should provide marks in percentage. A mark of "D" must be balanced with a "B" (in another subject if necessary) to obtain a passing grade of "C" - average.
Instructors should try for a class average of between 70 - 75%.

The instructor will determine which practical exercises will be used for marking.

TEXTBOOK(S):

I.A.S. and notes.
Students should be given a copy of the course outline

OBJECTIVES;

The objectives are to develop good welding and cutting skills and non-fusion welding practices.

Also included are simple identification methods used on metals along with a basic introduction to physical metallurgy.

The student should realize that all objectives may not necessarily be met due to time constraints.

SUMMARY - HDE APPRENTICE - BASIC

TOPIC NO-	PERIODS T-THEORY L-LAB	TOPIC DESCRIPTION	REFERENCE
la	1/2T	Orientation to program.	O.A.W.
b		Introduction and scope: fusion welding, non-fusion welding, cutting, heating.	I.A.S.#1
2a	1L	Assembling and handling of equipment.	Demo/Note
b		Constructionandstorageof equipment.	
c		Repairs to accessories.	Demo
d	1/2T	Types of oxy-actylene flames and fuel mixtures.	O.A.W. I.A.S.#2
e	1/2T	Welding terms, positions, joints	O.A.W. I.A.S.#3
f		Filler metals and their selection.	Notes
g		Weld faults.	O.A.W. I,A.S.#4
3	8L	Fusion welding practices.	Notes/Demo
4		Non-fusion welding practices.	O.A.W, I.A.S.#5
a	2L	Braze welding,	Notes/Demo
b	1L	Brazing	
c	1L	Soldering	
5	2L	Cuttingpractices.	O.A.W. I.A.S.#6 Demo
6	1/2L	Distortion of metals.	O.A.W. I.A.S.#7 Demo
7	2L	Basic heat treatment of metals.	O.A.W. I.A.S.#8 Demo
8a	2T	Intoductionto physical metallurgy,	O.A.W. I.A -S.#9
b	1/2L	Identification of metals.	
9	1/2T	Written Test	

TOTAL HRS. 4T, 20L - 12 WEEKS

TOPIC NO.	PERIODS	TOPIC DESCRIPTION	REFERENCE
	T-THEORY L-LAB		
la	1/2T	Orientation to program. - outline of topics to be covered - grading system: A,B,C,D,F. - method of evaluation - testing modes, dates - shop safety and regulations - personal safety - repair of shop equipment Introduction to O.A.V - Scope: fusion non-fusion cutting heating	O.A.V. I.A.S.U
2a	1L	Assembling and handling of equipment. - assemble and disassemble hoses, regulators, torches, tips - identify and change "0" rings - adjust goggles, strikers - transport welding cylinders and cart	Notes/Demo
		Construction of equipment. - study cross-section of cylinders - location of safety devices - identification and marking of cylinders	Notes/Demo
		Repairs to accessories. - hose splicing, crimping tools, hose diameters	Demo
	1/2T	Types of 0 A. flames and fuel mixtures. lighting torches and adjustment flame type and effect on weld puddle characteristics and uses of other fuel gases: Mapp, natural gas, propane, air-acetylene welding and cutting on containers	O.A.V. I.A.S.#2 Notes/Demo

TOPIC NO.	PERIODS T-THEORY L-LAB	TOPIC DESCRIPTION	REFERENCE
2e	1/2T	Welding terms, positions, joints. - 3 types of velds: bead, groove and fillet - explanation of face, root, throat of weld - 5 types of joints: butt, lap, tee, corner, edge - weld positions in respect to fillet welds - explanation of joint penetration and fusion	O.A.W. I.A.S.#3
f		Filler metals and their selection. - RG45, RG60 - tensile strength, ductility - weld soundness in respect to SI content	Notes
g		Weld faults: identification and prevention. - appearance, overlap, undercut, lack of fusion, brittle welds, porosity, excessive convexity, concavity	O.A.W. I.A.S.#4 Notes
3	8L	Fusion welding practices, 16 gauge metal. - beads, no rod and with rod - edge joint without rod - outside corner joint, with rod - butt joint with rod - lap joint with rod	Notes/Demo
4a	2L	Non-fusion welding practices. - braze welding: definition, uses - advantages and disadvantages - braze weld tee-joint (both sides) 2F; 3F	I.A.S.#5 Notes/Demo
b	1L	- brazing, definition; uses - braze tee-joint 16 gauge metal using Allstate #45 (RB45) - safety: fumes, fluxes	
c		Soldering - definition; uses - fluxes - soldering equipment	

TOPIC NO.	PERIODS	TOPIC DESCRIPTION	REFERENCE
	T-THEORY L-LAB		
	1L	solder steel to steel solder wire connection	
	2L	Cutting practices. - manual cutting, with and without guide bar - piercing - bolt cutting - cutability of metals	0.A.W. I.A.S.#6 Demo
	1/2T	Distortion of metals. - upsetting - heat input - neutral axis - heating for shrink fits	O.A.W. I.A.S.#7 Demo
	2L	Basic heat treatment for metals. - effect of heat on: grain size and microstructure - forging, hardening, tempering a cold chisel - case hardening	O.A.W. I.A.S.#8 Demo
8a	2T	Introduction to physical metallurgy. - tensile strength - yield strength - duetility - elasticity - toughness - impact strength - factor of safety - allowable stress	O.A.W. I.A.S.#9 Metals and How to Weld Them.
	1/2L	Identification of metals. - flame test - spark test - apperance, density of carbon steels - L.A.H.S. steels ~ stainless steels - aluminum, magnesium, white metal - copper based alloys - HR & CR sheet steel	

TOTAL HRS. 4T, 20L - 10 WEEKS