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SAULT COLLEGE OF APPLIED ARTS & TECHNOLOGY

SAULT STE. MARIE, ONTARIO

COURSE OUTLINE

Course Title: WELDING

Code No.: MET100-3

Program: HEAVY EQUIPMENT DIESEL

Semester: ONE

Date: 1989 05 19

^fcuthor: Bob Senechal

New XX Revision

APPROVED

CRairperson

Date ^ iZkuizJtf.

WELDING MET100-3

Course Name **Course Number**

PHILOSOPHY/GOALS:

Basic welding skills and knowledge of safe operation of welding and cutting equipment are required by the Heavy Equipment Diesel Mechanic.

This course will serve as an introduction to general welding practices in a diesel shop.

METHODS OF ASSESSMENT (GRADING METHOD):

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

TEXTBOOK(S):

I.A.S. Instruction Aid Sheets (handed out)
and notes taken by students.
Students should be given the course outline summary sheet for MET100-3.

OBJECTIVES:

The basic objective is to develop a student with safe work habits in the use of O.A. welding and cutting equipment as well as stick electrode welding in all positions.

The student will gain an appreciation of Mig welding and carbon arc gouging in addition to repair welding practices dealing with mild steel and low alloy high strength steels.

The passing grade is a "C".

SUMMARY OP METlOO-3

TOPIC.NO.	PERIODS THEO/LAB		TOPIC DESCRIPTION	REFERENCE
la	1/2		Orientation to program.	I.A.S.#1
b			Introduction to O.A. Welding.	
2a	1	**1**	Assembling and handling of equipment.	Notes
b		**1**	Construction of equipment.	Notes
c			Repairs to accessories.	Demo
d			Types of O.A. flames and fuel mixtures.	I.A.S.#2 Notes/Demo
e			Welding Terms, positions, joints.	I.A.S.#3
f			Filler metals and their selection.	Notes
g			Weld faults.	I.A.S.#4
3		4	Fusion welding practices.	Notes/Demo
4		2	Non-fusion welding practices.	I.A.S.#5 No tes/Demo
			Cutting practices.	I.A.S.#6 No tes/Demo
6	1/2		Written Test	
TOTAL HRS.	2	10	4 Weeks	
7a	1/2		Introduction to SMAW.	
			Types of welding machines and their adjustments.	I.A.S.#7 Demo
b			Electrical principles.	I.A.S.#8 Demo
c			Repairs to accessories.	Demo
8		24	SMAW practices.	I.A.S.#9 Demo
9a	1		Selection of welding machines.	I.A.S.#10
b			Selection of filler metals.	I.A.S.#11
c			Veld faults, recognition, prevent ion.	I.A.S.#12
d	1		Repair welding practices.	I.A.S.#13 Demo
e			Welding symbols.	I.A.S.#14
10		3	GMAW Practice.	I.A.S.#15 Demo
11		3	Carbon arc cutting practice(AAC).	I.A.S.#16 Demo
12	1/2		Testing	
TOTALS	3	30	11 Weeks	

TOPIC-NO-	PERIODS THEO/LAB	TOPIC DESCRIPTION	REFERENCE
la	1/2	Orientation to program. - outline of topics to be covered - grading systern:A,B,C,R,I,X - method of evaluation - testing modes, dates - shop safety and regulations - personal safety - repair to shop equipment Introduction to O.A.W. - Scope: fusion non-fusion cutting heating	I.A.S.#1
2a	1/2	Assembling and handling of equipment. - assemble and disassemble hoses, regulators, torches, tips	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
		Types of O.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	I.A.S.#2 Notes/Demo

TOPIC-NO.	PERIODS THEO/LAB	TOPIC DESCRIPTION	REFERENCE
		Velding 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	I.A.S.#3
		Filler metals and their selection - RG45, RG60 - tensile strength, ductility - weld soundness in respect to SI content	Notes
		Veld faults: identification and prevention. - appearance, overlap, undercut, lack of fusion, brittle welds, porosity, excessive convexity, concavity	I.A.S.#4 Notes
		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	
		Non-fusion welding practices. - braze welding: definition, uses - advantages and disadvantages - braze weld tee-joint(both sides) - brazing, definition, uses - braze tee-joint 16 gauge metal using Allstate #45 (RB45) - soldering, copper to copper copper to steel - electric wire clips	I.A.S.#5 Notes/Demo

TOPIC,NO.	PERIODS THEO/LAB	TOPIC DESCRIPTION	REFERENCE
5	2	Cutting practices: scope. - manual straight-line cutting with and without guide bar - bevel cutting, mitre cutting - piercing - cutting of round stock, bolts - gouging	I.A.S.#6 Notes/Demo
6	1/2	Written Test Summary	
7a	1/2	Introduction to SMAW. - types of welding machines: transformer - AC transformer/rectifier - AC/DC generator - DC - current adjustment on Lincoln, Hobart and Miller machines - portable welding machines- Hobart and Lincoln	I.A.S.#7 Demo
b		Electrical principles. - polarity, OCV, duty cycle - OCV adjustment on generators - volt-ampere characteristics	I.A.S.#8 Demo Demo Demo
c		Repairs to accessories. - helmet, cables, holders	Demo
8	12	SMAV practices. 1 bead and weave 6011; E7018 1/8 2 bead and weave E7024; 1/8 - E7014 3 bead and weave E7018; 1/8 - pad; 1/8 E7024; 1/8 E7018; beads, flat position 4 2F tee-joint; 5/16" leg; 1/8 E7018; 6 horizontal pad; 1/8 E7018 - vertical up bead and weave; 1/8 E7018 - 3F; bead and weave; 1/8 E7018 - 4F; bead and weave; 1/8 E7018; 1/8 E6011 5 Five basic weldilng joints - edge joint lap joint tee joint outside joint butt joint E7018 - E7024 - E6011	I.A.S.#9 Demo

TOPIC, NO.	PERIODS THEO/LAB		TOPIC DESCRIPTION	REFERENCE
9a	1		Selection of welding machines. - electrical input, phase requirement - output and duty cycle - constant current and variable voltage machines - constant voltage and variable current machines - face plate of a welding machine	I.A.S.#10 Notes
b			Selection of filler metals. - mechanical properties: tensile strength, ductility, impact strength - operating characteristics of electrodes - rod diameters - AVS/CSA classifications of mild steel electrodes - stainless steel electrodes - cast iron electrodes - aluminum electrodes - copper alloy electrodes - hardfacing electrodes	I.A.S.#11
c			Weld faults; recognition, prevention. - veld profile, overlap, undercut, crater cracks, underbead cracking, porosity, arcblov	I.A.S.#12
d			Repair welding practices. - distortion; occurrence, prevention - bead effects on micro structures of steels(H.A.Z.) - welding cast iron, aluminum, stainless steel, manganese steel, L.A.H.S. steel(Tl-plate) - hard facing practices	I.A.S.#13 Metals and How to Veld Them
e			Velding symbols. - reference line and location of welding symbols - groove and fillet weld symbols - intermittent weld symbols	I.A.S.#14
10	2		GMAV practice.	Demo/I.A.S.#15
11	2		AAC-Carbon Arc Cutting.	Demo/I.A.S.#16
12	1/2		Testing	
TOTALS	2	16	9 Weeks	