SAULT COLLEGE OF APPLIED ARTS & TECHNOLOGY

SAULT STE. MARIE, ONTARIO

COURSE OUTLINE

Course Title: WELDING

Code No.: MET 100--3

Program: HEAVY EQUIPMENT DIESEL

Semester: 2

Date: Decern ber , 1982

Author: Ivan Mm•phy

New: Revision: x

APPROVED

Chairperson Dale

Sault College of Applied Arts and Technology sault ste. marie

Course Outline

HEAVY EQUIPMENT DIESEL

MET 100-3

OXY - ACETYLENE & ELECTRIC ARC WELDING OBJECTIVES

revised DECEMBER, 1982 BY: I. MURPHY

MET 100-3 - A

H.E.D. RELATED WELDING

OXY-ACETYLENE WELDING OBJECTIVES

BLOCK	THE STUDENT WILL BE ABLE TO:
1.	Understand the oxy-fuel gas flame characteristics.
2.	Use Oxy-Acetylene welding equipment safely.
3.	Make basic repairs.
4.	Fusion weld basic joints in light gauge metal in position.
5.	Braze weld cast irons.
6.	Braze and solder copper joints.
7.	Cut plate and bars.
8.	Safeguard against fires and explosives.
9.	Heat treat a cold chisel.
10*	Lay out angle iron frames and bend rounds.

TOPIC	PERIODS THEORY	PERIODS PRACTICAL	TOPIC DESCRIPTION	REFERENCE
			A. Acetylene Gas - Manufacture - Density - Flammability Range - Explosive Nature (Pressure, Copper, Ox-Acetylene Mixture) - Storage in Tanks - Tank construction withdrawal rates - Backfire & Flashback prevention	
			B. Oxygen Gas - Manufacture - Physical & Chemical Characteristics - Storage in Tanks - Tank construction	
			- Oxy-Acetylene flame characteristics and applications - Oxygen-Propane Flame characteristics and applications - Air Acetylene Flame characteristics and applications	
			A. Assembly of Equipment B. Regulator, Hose, Torch, and Tip construction C. Storage and Transportation of Equipment D. Lighting The Torch, Pressure Adjustments E. Tip changing & selection F. Personal Safety G. Shop safety	

TOPIC	PERIODS THEORY	PERIODS PRACTICAL	TOPIC DESCRIPTION	REFERENCE
			A. Replacement of O-Rings - Checking & Repair of Leaks - Reconditioning of tips - tightening of valves - Replacing faulty hoses	
			A. Weld a bead without & with filler Metal; Forehand - Designation & Selection of Filler Metal - Edge Joint - no filler - Corner Joint - no filler - Lap Joint - Tee Joint - Butt Joint - Pressure Test Box	
			B. Recognition & Correction of 5 basic weld faults C. Distortion; causes & correction	
			- Braze Welding Definition - Advantages & disadvantages of process - Types of cast irons - Joint Preparation - Use of Fluxes; Ventilation	
			A, Brazing & soldering Definitions; Applications	
			B. Toxic Fumes from lead, cadmion, zinc, Beryllium, fluorides	
			C. Selection of Easy-flow fillers & fumes; silphos, Rosin and acid core solders	
			D. Suitability of metals & types of joints	
			E. Comparison of fusion & non-fusion welding	

PERIODS				
TOPIC	THEORY	PRACTICAL	TOPIC DESCRIPTION	REFERENCE
			Chemistry of cutting; cutability of metals - freehand and guided cutting; circle cutting; piercing; bolt cutting; bevel cutting - cutting of pipe rounds & structurals - pressure & tip selection	
			Welding & Cutting - on containers and hollow sections - on machinery - recognition of unsafe locations & jobs - fire prevention & fire fighting - types of fires	
			Forging Techniques Grinding & filing Heating, quenching and tempering	
10			- 45° angle iron layout - Copying & Notching - One piece 90° bend layout on pipe - Hot & Cold bending Methods or rounds & pipe - Bend allowance and use of neutral axis	

MET 100-3 - B

HEP RELATED WELDING

ELECTRIC ARC WELDING OBJECTIVES

BLOCK	THE STUDENT WILL BE ABLE TO:
1	Understand the rating, drooping characteristic and controls of welding machines as well as maintenance needs.
2	Employ normal precautions regarding personal and shop safety.
3	Use the A.W.S. and N.E.M.A. classification for mild steel and low alloy-high strength electrodes.
4	Recognize common weld faults and correct them.
5	Produce sound welds with emphasis on the following electrodes: E 6010/11 E 7016/18 E 7024/28
6	Use arc-air gouging equipment.
7	Do basic maintenance & fabrication welding.

TOPIC	PERIODS THEORY	PERIODS PRACTICAL	TOPIC DESCRIPTION	REFERENCE
1	1		Development of Volt-ampere Curve Explanation of - open circuit voltage - duty cycle - rated & Max. output - voltage drop inlines - magnet field - current adjustment - polarity - maintenance of equipment and accessories	
2	*h*		Personal Safety - type of clothes, boots gloves, hard hats - flash goggles, filter lenses - arc radiation, electric shock - ventilation - shop safety - housekeeping rules - ground connections, stray currents through gears, pistons, batteries, power tools	
3	*h*		Selection of Mild Steel Electrodes Mechanical Properties & Operating Characteristics of: E 6010/11 E 6012/13 E 7014/24,28 E 7016/18,28 E 9018 E 12018 Selection of low alloy-high strength electrodes	

TOPIC	PERIODS THEORY	PRACTICAL	TOPIC DESCRIPTION	REFERENCE
4	*h*		Visual Defects inclusions, porosity bead shape & size in relation to craking under-bead cracking weld terminology	
5		10	Bead & Weave-E6010/ll on plate in position pad flat & horizontal-E7024/28 bead/weave/pad with E7016/18 in position single pass fillet welds E7024/28 Multi-pass fillet welds with 3/16-6011 *&* 5/32-70181; flat, horizontal & vertical up Butt Joint; 3/8 plate F3/F4 rods 14GA metal - 1/8 E6013	
6		1	Set-up and construction of Equipment Choice of current and polarity Air pressure, carbon electrodes DIA & current relation Removal of Weld section Edge preparation for welding Cast iron cutting Post Cleaning needs	
7	1%		Maintenance Welding Considerations - identification of basic metal - weldability of cast iron, T, Plate, aluminum, stainless steel, Austenitic manganese, cutting edges - hard facing	