Trade of Metal Fabrication	
Module 2:	Thermal Processes
Unit 2:	Oxy/Fuel Cutting Machine
	Phase 2

Table of Contents

List of Figures

List of Tables

Document Release History

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18/10/06	First draft	
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Module 2 – Thermal Processes

Unit 2 – Oxy/Fuel Cutting Machine

Duration – 8 Hours

Learning Outcome:

By the end of this unit each apprentice will be able to:

- Set up Oxy/Fuel cutting machine
- Operate Oxy/Fuel cutting machine safely and use cutting track-radius bar

Key Learning Points:

Sk Rk	Assembly and maintenance of equipment. *(See "Equipment Assembly" section in Module 2 Unit 1).*
Rk	Cutting techniques, cutting data, gas pressures, cutting speeds. *(See "Cutting Techniques" section in Module 2 Unit 1).*
Rk	Identification of various types of oxy/fuel cutting machines and their uses.
Sk	Cutting from templates.
H Rk	Hazard identification, safety standards and precautions.
M	Calculation for straight, regular and irregular cuts e.g. kerf width.
P	Communication, safety awareness and attitude.

Training Resources:

- Fabrication workshop facilities
- Oxy/Fuel cutting equipment – pug/quickie cutting machine & tracks
- Instructor demonstrations and lectures
- Handouts
- Safety clothing and equipment

Key Learning Points Code:

M = Maths D= Drawing RK = Related Knowledge Sc = Science

P = Personal Skills Sk = Skill H = Hazards

Typical Light-Duty Oxygen Cutting Machine

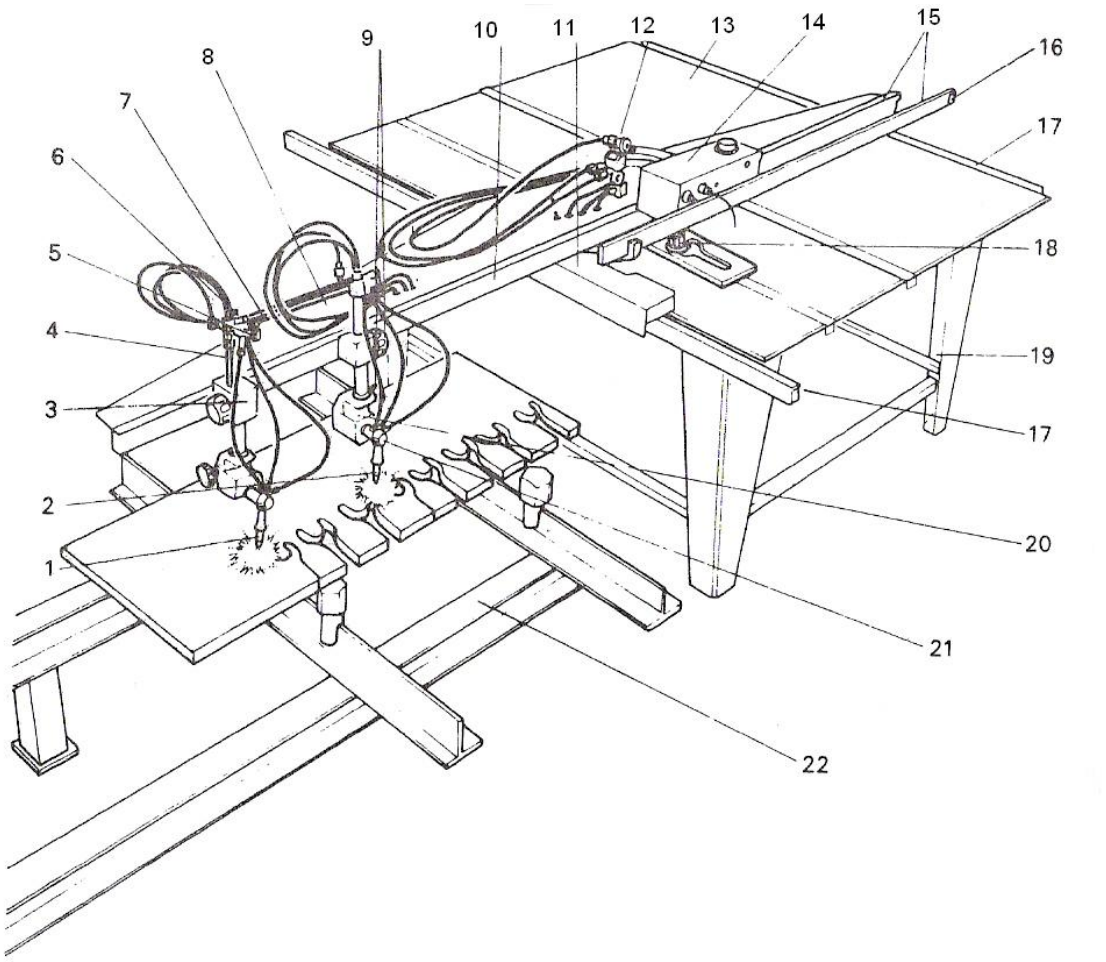

Figure 1 - Typical Light-Duty Oxygen Cutting Machine

(Also known as profile cutter)

Key:

1. Cutter (optional)
2. Cutter
3. Cutter mounting block
4. Cutter mounting tube
5. Trimming valve (heating oxygen)
6. Trimming valve (fuel gas)
7. Trimming valve (cutting oxygen)
8. Web plates
9. Grip knob
10. Cutter mounting bar
11. Cross carriage unit
12. ON/OFF cock (cutting oxygen)
13. Tracing table
14. Drive unit
15. Traversing carriage rails
16. Rail connecting fitting
17. Cross carriage rails
18. Following head
19. Mounting frame
20. Cutter head mounting block
21. Cutter head
22. Work rests (optional)

Profile Cutting Machine Tracing Heads

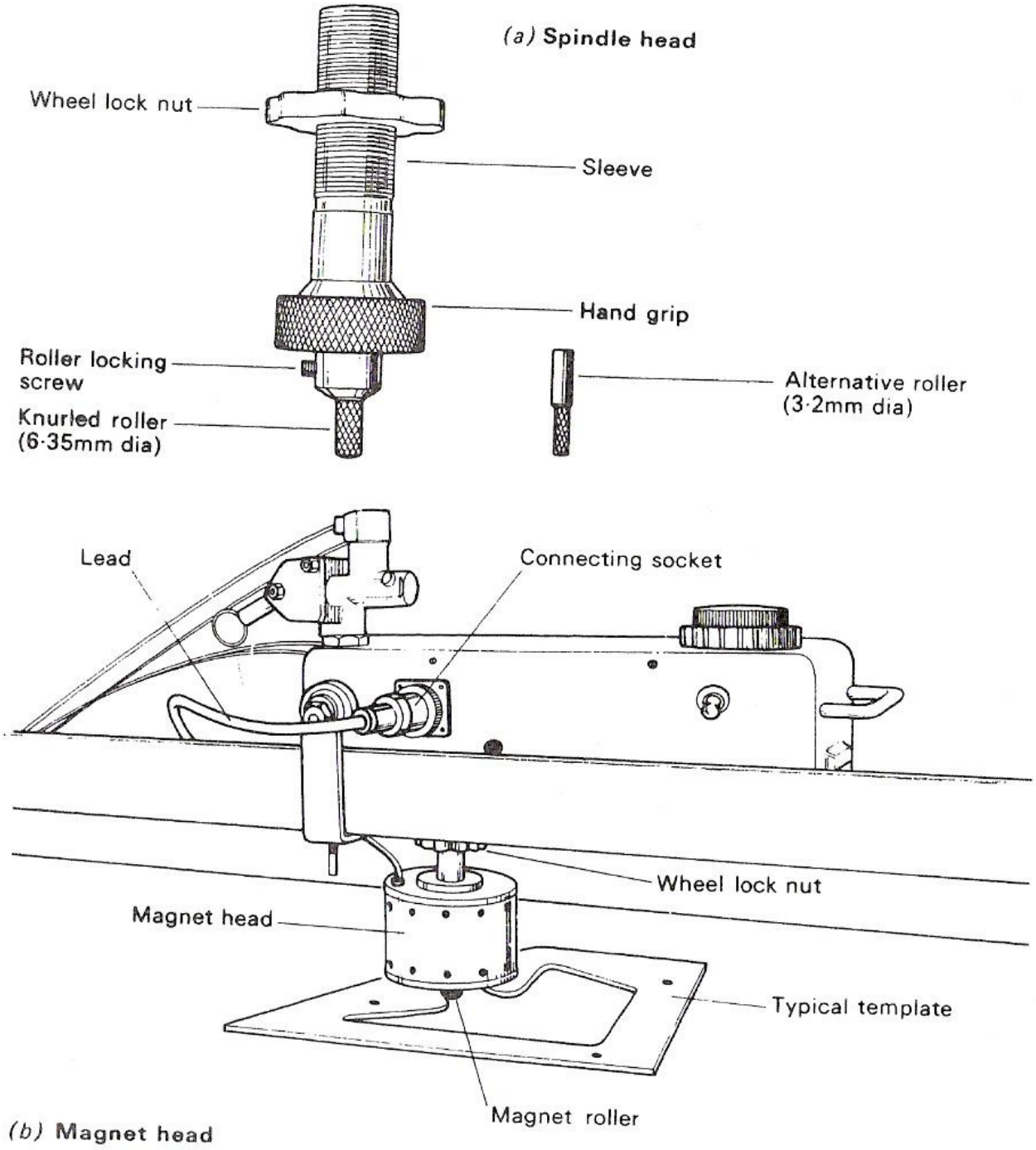

Figure 2 - Profile Cutting Machine Tracing Heads

Fuel Gas - Acetylene

Vertical cutting

PLATE THICKNESS		NOZZLE		GAS PRESSURES				NOZZLE HEIGHT ABOVE PLATE		CUTTING SPEED APPROX.	
				ACETYLENE		OXYGEN					
in	mm	mm	in	lbf/in^2	Bar (6)	lbf/in^2	Bar (b)	in	mm	in/min	m/min
1/8	3·2	0·75	1/32	2	0·14	20	1·41	1/4	6	28	0·71
1/4	6·4	0·75	1/32	2	0·14	30	2·11	1/4	6	21	0·53
1/2	12·5	1·0	3/64	2	0·14	30	2·11	1/4	6	16	0·41
1	25·4	1·5	1/16	2	0·14	40	2·80	5/16	8	15	0·38
2	51	1·5	1/16	2	0·14	55	3·80	5/16	8	11	0·28
4	100	2·0	5/64	3	0·21	70	4·9	3/8	9·5	6·7	0·15–0·18
30° BEVEL CUTTING											
1/8	3·2	0·75	1/32	2	0·14	25	1·75	1/4	6	20	0·51
1/4	6·4	0·75	1/32	2	0·14	30	2·11	1/4	6	18	0·46
1/2	12·5	1·0	3/64	2	0·14	50	3·50	1/4	6	16	0·41
1	25·4	1·5	1/16	2	0·14	50	3·50	5/16	8	13	0·33
2	51	1·5	1/16	2	0·14	70	4·92	5/16	8	9	0·23

Fuel Gas — Propane

Vertical cutting

PLATE THICKNESS		NOZZLE		GAS PRESSURES				NOZZLE HEIGHT ABOVE PLATE		CUTTING SPEED APPROX.	
				PROPANE		OXYGEN					
in	mm	mm	in	lbf/in^2	Bar (6)	lbf/in^2	Bar (b)	in	mm	in/min	m/min
1/8	3·2	9·75	1/32	3	0·21	25	1·76	1/4	6	20	0·51
1/4	6·4	0·75	1/32	3	0·21	25	1·76	1/4	6	19	0·48
1/2	12·5	1·0	3/64	3	0·21	40	2·81	1/4	6	16	0·41
1	25·4	1·5	1/16	3	0·21	45	3·17	5/16	8	14	0·36
2	51	1·5	1/16	3	0·21	50	3·52	5/16	8	10	0·25
4	100	2·0	5/64	4	0·28	75	5·3	3/8	9·5	6·7	0·15–0·18
30° BEVEL CUTTING											
1/8	3·2	1·0	3/64	3	0·21	25	1·76	1/4	6	16	0·41
1/4	6·4	1·0	3/64	3	0·21	30	2·11	1/4	6	11	0·28
1/2	12·5	1·5	1/16	3	0·21	50	3·52	1/4	6	11	0·28
1	25·4	1·5	1/16	3	0·21	55	3·87	5/16	8	10	0·25
2	51	1·5	1/16	3	0·21	70	4·92	5/16	8	7	0·18

Note: The above figures are given only as a guide since the actual requirements may vary according to the nature of the work.

Table 1 - Cutting Data for Profile Cutting Machines

To obtain the best results for accurate cutting, templates should conform to the following basic requirements.

1. Minimum thickness 3 mm.
2. Edges must be square. Plywood or hardwood templates should have their edges prepared with a coarse sandpaper finish, and metal template edges should have a good file finish but not too smooth, in order to provide sufficient frictional grip for the knurled steel rollers.
3. When the inside corner of the component to be cut is radiused, the corner radius on the template must be greater than that of the roller.
4. Correct allowances must be made in respect of the width of the KERF and the diameter of the tracing roller.

Allowances for Flame Cutting

These will vary according to the width of the kerf, the diameter of the racing roller and whether an internal or external template is used.

The kerf

This is a term used to define the width of the metal consumed in the cutting process. It may vary between 1½ and 2 times the diameter of the cutting oxygen orifice of the cutting nozzle used; for example, a 1.6 mm diameter nozzle will produce a kerf of between 2.4 mm and 3.2 mm in width.

Allowances (to compensate for the kerf and the diameter of tracing roller) must be made on the size of the template and these will differ PLUS or MINUS depending whether an internal or external template is used.

For future use it is advisable to mark templates with the following information:

1. Nozzle type and size.
2. Fuel gas used.
3. Tracing roller diameter.
4. Thickness of plate cut.
5. Speed of cut.
6. Part number (if applicable) of component.

When using a WHEEL TRACING HEAD, allowances must be made on the drawing dimensions for the kerf width. As a general guide, allow the diameter of the cutting nozzle orifice per side, plus or minus for external and internal cuts respectively.

Self Assessment

Questions on Background Notes – Module 2.Unit 2

No Suggested Questions and Answers.

Index