Instructional/Task Analysis

Related Information: What the Student Should Know	Application: What the Student Should Be Able to Do

Unit 1: GMAW Orientation and Safety

Related Information: What the Student Should Know	Application: What the Student Should Be Able to Do
1. Terms and definitions	17. Solve problems concerning GMAW safety
2. Advantages of the GMAW process	
3. Limitations of the GMAW process	
4. Principles of GMAW	
5. GMAW applications	
6. Benefits from learning GMAW	
7. Electrical safety requirements for GMAW	
8. Guidelines for duty cycle safety	
9. Rules for handling cables and gas and coolant hoses	
10. Rules for handling hollow castings or containers	
11. Hazards associated with arc rays	
12. Types of welding hoods	
13. Guidelines for selecting a safe lens shade for GMAW	
14. Protective clothing required for GMAW	
15. Environmental safety requirements	
16. Safety guidelines for working with electrode wire	

Unit 2: GMAW Equipment, Applications, and Techniques

Related Information: What the Student Should Know	Application: What the Student Should Be Able to Do
1. Terms and definitions	
2. Characteristics of short-circuit transfer	
3. Characteristics of globular transfer	
4. Characteristics of spray transfer	
5. Characteristics of pulsed spray transfer	
6. Characteristics of surface tension transfer	
7. GMAW machine controls and their functions	

Related Information: What the Student Should Know	Application: What the Student Should Be Able to Do
Unit 2: GMAW Equipment, Applications, and Techniques (continued)	
8. GMAW electrical controls and their functions	
9. Wire feeder controls and their functions	
10. Roll adjustment requirements for wire feeders	
11. Preventive maintenance requirements for wire feeders	
12. AWS classifications for electrode wires	
13. Basic short-circuit electrode wires and their characteristics	
14. Rules of thumb for GMAW, STT, and GMAW-P electrode wire selection	
15. Guidelines for storing spools and coils of electrode wire	
16. Types of GMAW guns and their characteristics	
17. Parts of a GMAW gun tip and their functions	
18. Steps in assembling contact tips, gas diffusers, nozzles, and insulators	
19. Maintenance requirements for GMAW guns	
20. Electrode extension and its function in GMAW	
21. GMAW shielding gases and their applications	
22. GMAW welding techniques and their characteristics	
23. Techniques for properly ending a GMAW weld	
24. Techniques for position welding with GMAW	
25. Conditions that require special attention with GMAW	
26. Possible causes and corrective actions for undercutting	
27. Possible causes and corrective actions for porosity	
28. Possible causes and corrective actions for incomplete fusion	

Related Information: What the Student Should Know	Application: What the Student Should Be Able to Do
Unit 2: GMAW Equipment, Applications, and Techniques (continued)	
29. Possible causes and corrective actions for incomplete joint penetration	34. Set up wire on a GMAW wire feeder
30. Possible causes and corrective actions for excessive melt-through	35. Set up a flow meter and regulator for a GMAW shielding gas
31. Flow meters and their use in GMAW	36. Set up GMAW equipment for short-circuit transfer on mild steel
32. Flow rates for GMAW shielding gases	37. Prepare mild steel for GMAW
33. Guidelines for troubleshooting GMAW problems	38. Use short-circuit transfer to lay stringer beads and build a pad on mild steel in the flat position
	39. Use short-circuit transfer to weld to specifications a fillet weld lap joint on mild steel in the flat position
	40. Use short-circuit transfer to weld to specifications a fillet weld T-joint on mild steel in the flat position
	41. Use short-circuit transfer to weld to specifications a V-groove butt joint on mild steel in the flat position
	42. Perform a guided-bend test on a welded V-groove butt joint
	43. Use short-circuit transfer to weld to specifications a fillet weld lap joint on mild steel in the horizontal position
	44. Use short-circuit transfer to weld to specifications a fillet weld T-joint on mild steel in the horizontal position
	45. Use short-circuit transfer to weld to specifications a V-groove butt joint on mild steel in the horizontal position
	46. Use short-circuit transfer to weld to specifications a fillet weld lap joint on mild steel in the vertical position
	47. Use short-circuit transfer to weld to specifications a fillet weld T-joint on mild steel in the vertical position

Related Information: What the Student Should Know	Application: What the Student Should Be Able to Do
Unit 2: GMAW Equipment, Applications, and Techniques (continued)	
	48. Use short-circuit transfer to weld to specifications a V-groove butt joint on mild steel in the vertical position
	49. Use short-circuit transfer to weld to specifications a fillet weld lap joint on mild steel in the overhead position
	50. Use short-circuit transfer to weld to specifications a fillet weld T-joint on mild steel in the overhead position
	51. Use short-circuit transfer to weld to specifications a V-groove butt joint on mild steel in the overhead position
	52. Set up GMAW equipment for spray transfer on mild steel
	53. Use spray transfer to weld to specifications a fillet weld lap joint on mild steel in the flat position
	54. Use spray transfer to weld to specifications a fillet weld T-joint on mild steel in the flat position
	55. Use spray transfer to weld to specifications a fillet weld lap joint on mild steel in the horizontal position
	56. Use spray transfer to weld to specifications a fillet weld T-joint on mild steel in the horizontal position
	57. Use spray transfer to weld to specifications a V-groove butt joint on mild steel in the flat position
	58. Set up GMAW equipment for spray transfer on aluminum
	59. Prepare aluminum for GMAW
	60. Use spray transfer to weld to specifications a fillet weld lap joint on aluminum in the flat position
	61. Use spray transfer to weld to specifications a fillet weld T-joint on aluminum in the flat position
	62. Use spray transfer to weld to specifications a fillet weld lap joint on aluminum in the horizontal position
	63. Use spray transfer to weld to specifications a fillet weld T-joint on aluminum in the horizontal position

Related Information: What the Student Should Know	Application: What the Student Should Be Able to Do
Unit 2: GMAW Equipment, Applications, and Techniques (continued)	
	64. Use spray transfer to weld to specifications a fillet weld lap joint on aluminum in the vertical up position
	65. Use spray transfer to weld to specifications a fillet weld T-joint on aluminum in the vertical up position
	66. Use spray transfer to weld to specifications a fillet weld lap joint on aluminum in the vertical down position
	67. Use spray transfer to weld to specifications a fillet weld T-joint on aluminum in the vertical down position
	68. Use spray transfer to weld to specifications a fillet weld lap joint on aluminum in the overhead position
	69. Use spray transfer to weld to specifications a fillet weld T-joint on aluminum in the overhead position
	70. Set up GMAW-P equipment for pulsed-spray transfer on mild steel
	71. Use pulsed-spray transfer to weld to specifications a V-groove butt joint on mild steel in the flat position
	72. Use pulsed-spray transfer to weld to specifications a V-groove butt joint on mild steel in the horizontal position
	73. Use pulsed-spray transfer to weld to specifications a V-groove butt joint on mild steel in the vertical position
	74. Set up STT equipment for surface tension transfer on mild steel
	75. Use surface tension transfer to weld to specifications a V-groove butt joint on mild steel in the flat position
	76. Use surface tension transfer to weld to specifications a V-groove butt joint on mild steel in the horizontal position
	77. Use surface tension transfer to weld to specifications a V-groove butt joint on mild steel in the vertical position

Instructional/Task Analysis

Related Information: What the Student Should Know	Application: What the Student Should Be Able to Do

Unit 3: Flux-Cored Arc Welding

1. Terms and definitions
2. Advantages of FCAW
3. Limitations of FCAW
4. How students benefit from learning FCAW
5. Equipment required for semiautomatic self-shielded FCAW
6. Types of flux-cored arc welding processes
7. Types of FCAW guns and their uses
8. Classifications for FCAW electrode wires
9. Electrode extension and visible electrode extension
10. Basic types of flux-cored wire feeders
11. Guidelines for using drive rolls and guide tubes
12. Steps for starting an arc with the semiautomatic process
13. Operating variables with flux-cored electrode wires
14. Guidelines for preparing FCAW applications
15. Guidelines for semiautomatic FCAW
16. Safety requirements for FCAW
17. Guidelines for troubleshooting FCAW problems
18. Set up or replace wire on a flux-cored wire feeder
19. Set up FCAW equipment for semiautomatic flux-cored welding
20. Prepare mild steel for FCAW
21. Weld to specifications a fillet weld lap joint on mild steel in the flat position
22. Weld to specifications a fillet weld T-joint on mild steel in the flat position
23. Weld to specifications a fillet weld lap joint on mild steel in the horizontal position
24. Weld to specifications a fillet weld T-joint on mild steel in the horizontal position
25. Weld to specifications a fillet weld lap joint on mild steel in the vertical position
26. Weld to specifications a fillet weld T-joint on mild steel in the vertical position
27. Weld to specifications a fillet weld lap joint on mild steel in the overhead position
28. Weld to specifications a fillet weld T-joint on mild steel in the overhead position
29. Weld to specifications a v-groove butt joint on mild steel in the flat position
30. Weld to specifications a v-groove butt joint on mild steel in the horizontal position
31. Weld to specifications a V-groove butt joint on mild steel in the vertical position
32. Weld to specifications a V-groove butt joint on mild steel in the overhead position