

AGRICULTURAL POWER AND TECHNOLOGY: WELDING PROFILE OF TRAINING MASTERY

Instructor _____

Date _____

Program _____	
Grade _____	School _____
Name _____ Soc. Sec. No. _____	
Address _____ Phone _____	
In Case of Emergency, Contact _____	
Address _____ Phone _____	
Allergies/Disabilities that might require special accommodation for training (please specify) _____	
<p>The above information can be used for school records and/or to ensure safety of students. This confidential information is not to be released to employers or the general public.</p>	

Date of Enrollment ____ - ____ - ____ Total Class Hours _____ Total Hours Absent _____

Date of Withdrawal ____ - ____ - ____ Total On-the-Job Training Hours _____ Total Hours Tardy _____

Date of Completion ____ - ____ - ____ Total Lab Hours _____

ON-THE-JOB TRAINING/WORK EXPERIENCE

_____	_____	_____
Duration of Employment	Job Title	Supervisor's Name
_____		_____
Address of Employer		Phone
_____	_____	_____
Duration of Employment	Job Title	Supervisor's Name
_____		_____
Address of Employer		Phone

Use of This Document

This document can be used to record information about the student and skills mastered. This information is useful in documenting student progress during training and in providing information about the student's qualifications to potential employers and/or for entry into advanced training programs. Instructors using these materials are authorized to reproduce this document as required for use in their training programs.

SPECIFIC JOB COMPETENCIES

Instructor: As each competency is mastered, place your initials and the date in the blank on the left. This will verify that the student can perform the skill with a minimum of supervision.

Unit 1 — Welding Orientation and Safety

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| <p>_____ 1. Complete statements about welding processes.</p> <p>_____ 2. Complete statements about cutting processes.</p> <p>_____ 3. Identify welding positions.</p> <p>_____ 4. Identify basic welding joints.</p> <p>_____ 5. Identify basic welding symbols.</p> <p>_____ 6. Select true statements concerning electrical safety for arc welding.</p> <p>_____ 7. Complete statements about rules for handling welding cables.</p> <p>_____ 8. Complete statements about rules for handling hollow castings and containers.</p> <p>_____ 9. Select solutions for hazards from arc rays.</p> <p>_____ 10. Differentiate between types of welding hoods.</p> <p>_____ 11. Complete a list of steps in selecting a safe lens shade for shielded metal arc welding.</p> <p>_____ 12. Solve problems about protective clothing required for arc welding.</p> <p>_____ 13. Solve problems about environmental problems and their safety requirements.</p> <p>_____ 14. Solve problems about shielded metal arc welding safety (Assignment Sheet 1).</p> <p>_____ 15. Complete statements about the ALWAYS rules for welding safety.</p> <p>_____ 16. Complete statements about the NEVER rules for welding safety.</p> <p>_____ 17. Complete statements about guidelines for shielding gas safety.</p> <p>_____ 18. Solve problems about rules for handling gas cylinders safely.</p> <p>_____ 19. Select true statements about guidelines for duty cycle safety.</p> <p>_____ 20. Solve problems about rules for handling cables and gas and coolant hoses.</p> <p>_____ 21. Select true statements about safety guidelines for working with electrode wire.</p> <p>_____ 22. Solve problems concerning gas tungsten arc welding safety (Assignment Sheet 2).</p> <p>_____ 23. Solve problems concerning gas metal arc welding safety (Assignment Sheet 3).</p> <p>_____</p> <p>Pretest Score (%) _____</p> <p>Post Test Score (%) _____</p> <p>Modified Gains Score (%) _____</p> | <p>_____ 20. Differentiate between basic steps in joint preparation.</p> <p>_____ 21. Match good and bad welds with their characteristics.</p> <p>_____ 22. Select causes of and remedies for arc blow.</p> <p>_____ 23. Select causes of and remedies for pinholes and porosity.</p> <p>_____ 24. Select causes of and remedies for undercutting.</p> <p>_____ 25. Select causes of and remedies for weld spatter.</p> <p>_____ 26. Select causes of and remedies for incomplete penetration.</p> <p>_____ 27. Select causes of and remedies for slag inclusion.</p> <p>_____ 28. Select causes of and remedies for excessive weld reinforcement.</p> <p>_____ 29. Select true statements about the principles of air carbon arc cutting.</p> <p>_____ 30. Select true statements about CAC-A power sources.</p> <p>_____ 31. Match types of CAC-A electrodes with their characteristics.</p> <p>_____ 32. Match CAC-A electrode shapes with their uses.</p> <p>_____ 33. Match CAC-A electrode angles with their uses.</p> <p>_____ 34. Complete statements about amperage selection for gouging.</p> <p>_____ 35. Complete statements about air pressure and how it affects gouging.</p> <p>_____ 36. Complete statements about travel speed and how it affects gouging.</p> <p>_____ 37. Match techniques for gouging with their procedures.</p> <p>_____ 38. Complete statements about hardfacing.</p> <p>_____ 39. Select true statements about elements affecting hardfacing.</p> <p>_____ 40. Complete statements about electrode drying ovens.</p> <p>_____ 41. Build a pad on mild steel plate in the flat position with an E6010 electrode. (Job Sheet 1)</p> <p>_____ 42. Weld to specifications a multipass fillet weld on a T-joint in the horizontal position with an E6010 electrode. (Job Sheet 2)</p> <p>_____ 43. Weld to specifications a multipass fillet weld on a T-joint in the vertical position with an E6010 electrode. (Job Sheet 3)</p> <p>_____ 44. Weld to specifications a fillet weld lap joint in the overhead position with an E7018 electrode. (Job Sheet 4)</p> <p>_____ 45. Weld to specifications a V-groove butt joint in the flat position with an E6010 electrode. (Job Sheet 5)</p> <p>_____ 46. Bend test a welded V-groove joint. (Job Sheet 6)</p> <p>_____ 47. Weld to specifications a V-groove butt joint in the horizontal position with an E6010 electrode root and an E7018 electrode fill. (Job Sheet 7)</p> <p>_____ 48. Weld to specifications a V-groove butt joint in the vertical position with an E6010 electrode. (Job Sheet 8)</p> <p>_____ 49. Weld to specifications a V-groove butt joint in the overhead position with an E6010 electrode. (Job Sheet 9)</p> <p>_____</p> <p>Pretest Score (%) _____</p> <p>Post Test Score (%) _____</p> <p>Modified Gains Score (%) _____</p> |
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Unit 2 — Shielded Metal Arc Welding

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| <p>_____ 1. Select true statements about advantages of SMAW.</p> <p>_____ 2. Complete statements about the principles of SMAW.</p> <p>_____ 3. Solve problems about the relationship of arc, base metal, electrode, and flux.</p> <p>_____ 4. Differentiate between elements of flux-covered electrode functions.</p> <p>_____ 5. Select true statements about benefits of learning SMAW.</p> <p>_____ 6. Match welding machines with their electrical characteristics.</p> <p>_____ 7. Match welding machine performance characteristics with their applications.</p> <p>_____ 8. Complete statements about basic SMAW accessories and their purposes.</p> <p>_____ 9. Complete statements about AWS electrode classifications for mild steel and low alloy electrodes.</p> <p>_____ 10. Differentiate between stainless steel and other alloy electrodes.</p> <p>_____ 11. Complete statements about basic elements of arc welding and their importance.</p> <p>_____ 12. Differentiate between electrode angles.</p> <p>_____ 13. Differentiate between SMAW starting techniques.</p> <p>_____ 14. Complete statements about techniques for controlling arc gap.</p> <p>_____ 15. Complete statements about the techniques for using electrode angles.</p> <p>_____ 16. Match bead running techniques with their procedures.</p> <p>_____ 17. Select true statements about the techniques for stopping and restarting an arc.</p> <p>_____ 18. Complete statements about techniques for filling a crater at the end of a weld.</p> <p>_____ 19. Select guidelines for using feathered edges for tie-ins.</p> | <p>_____ 20. Differentiate between basic steps in joint preparation.</p> <p>_____ 21. Match good and bad welds with their characteristics.</p> <p>_____ 22. Select causes of and remedies for arc blow.</p> <p>_____ 23. Select causes of and remedies for pinholes and porosity.</p> <p>_____ 24. Select causes of and remedies for undercutting.</p> <p>_____ 25. Select causes of and remedies for weld spatter.</p> <p>_____ 26. Select causes of and remedies for incomplete penetration.</p> <p>_____ 27. Select causes of and remedies for slag inclusion.</p> <p>_____ 28. Select causes of and remedies for excessive weld reinforcement.</p> <p>_____ 29. Select true statements about the principles of air carbon arc cutting.</p> <p>_____ 30. Select true statements about CAC-A power sources.</p> <p>_____ 31. Match types of CAC-A electrodes with their characteristics.</p> <p>_____ 32. Match CAC-A electrode shapes with their uses.</p> <p>_____ 33. Match CAC-A electrode angles with their uses.</p> <p>_____ 34. Complete statements about amperage selection for gouging.</p> <p>_____ 35. Complete statements about air pressure and how it affects gouging.</p> <p>_____ 36. Complete statements about travel speed and how it affects gouging.</p> <p>_____ 37. Match techniques for gouging with their procedures.</p> <p>_____ 38. Complete statements about hardfacing.</p> <p>_____ 39. Select true statements about elements affecting hardfacing.</p> <p>_____ 40. Complete statements about electrode drying ovens.</p> <p>_____ 41. Build a pad on mild steel plate in the flat position with an E6010 electrode. (Job Sheet 1)</p> <p>_____ 42. Weld to specifications a multipass fillet weld on a T-joint in the horizontal position with an E6010 electrode. (Job Sheet 2)</p> <p>_____ 43. Weld to specifications a multipass fillet weld on a T-joint in the vertical position with an E6010 electrode. (Job Sheet 3)</p> <p>_____ 44. Weld to specifications a fillet weld lap joint in the overhead position with an E7018 electrode. (Job Sheet 4)</p> <p>_____ 45. Weld to specifications a V-groove butt joint in the flat position with an E6010 electrode. (Job Sheet 5)</p> <p>_____ 46. Bend test a welded V-groove joint. (Job Sheet 6)</p> <p>_____ 47. Weld to specifications a V-groove butt joint in the horizontal position with an E6010 electrode root and an E7018 electrode fill. (Job Sheet 7)</p> <p>_____ 48. Weld to specifications a V-groove butt joint in the vertical position with an E6010 electrode. (Job Sheet 8)</p> <p>_____ 49. Weld to specifications a V-groove butt joint in the overhead position with an E6010 electrode. (Job Sheet 9)</p> <p>_____</p> <p>Pretest Score (%) _____</p> <p>Post Test Score (%) _____</p> <p>Modified Gains Score (%) _____</p> |
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Unit 3 — Gas Metal Arc Welding

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| <p>_____ 1. Complete statements about characteristics of short-circuit transfer.</p> <p>_____ 2. Complete statements about characteristics of globular transfer.</p> <p>_____ 3. Complete statements about characteristics of spray transfer.</p> <p>_____ 4. Match GMAW machine controls with their functions.</p> <p>_____ 5. Match GMAW electrical controls with their functions.</p> <p>_____ 6. Match wire feeder controls with their functions.</p> <p>_____ 7. Solve problems about roll adjustment requirements for wire feeders.</p> <p>_____ 8. Select true statements about preventive maintenance requirements for wire feeders.</p> <p>_____ 9. Select true statements about AWS classifications for electrode wires.</p> <p>_____ 10. Match short-circuit electrode wires with their characteristics.</p> <p>_____ 11. Solve problems about rules of thumb for GMAW electrode wire selection.</p> <p>_____ 12. Select true statements about guidelines for storing spools and coils of electrode wire.</p> <p>_____ 13. Complete statements about GMAW guns and their characteristics.</p> <p>_____ 14. Match parts of a GMAW gun tip with their functions.</p> <p>_____ 15. Complete statements about steps in assembling contact tips, gas diffusers, nozzles, and insulators.</p> | <p>_____ 20. Differentiate between basic steps in joint preparation.</p> <p>_____ 21. Match good and bad welds with their characteristics.</p> <p>_____ 22. Select causes of and remedies for arc blow.</p> <p>_____ 23. Select causes of and remedies for pinholes and porosity.</p> <p>_____ 24. Select causes of and remedies for undercutting.</p> <p>_____ 25. Select causes of and remedies for weld spatter.</p> <p>_____ 26. Select causes of and remedies for incomplete penetration.</p> <p>_____ 27. Select causes of and remedies for slag inclusion.</p> <p>_____ 28. Select causes of and remedies for excessive weld reinforcement.</p> <p>_____ 29. Select true statements about the principles of air carbon arc cutting.</p> <p>_____ 30. Select true statements about CAC-A power sources.</p> <p>_____ 31. Match types of CAC-A electrodes with their characteristics.</p> <p>_____ 32. Match CAC-A electrode shapes with their uses.</p> <p>_____ 33. Match CAC-A electrode angles with their uses.</p> <p>_____ 34. Complete statements about amperage selection for gouging.</p> <p>_____ 35. Complete statements about air pressure and how it affects gouging.</p> <p>_____ 36. Complete statements about travel speed and how it affects gouging.</p> <p>_____ 37. Match techniques for gouging with their procedures.</p> <p>_____ 38. Complete statements about hardfacing.</p> <p>_____ 39. Select true statements about elements affecting hardfacing.</p> <p>_____ 40. Complete statements about electrode drying ovens.</p> <p>_____ 41. Build a pad on mild steel plate in the flat position with an E6010 electrode. (Job Sheet 1)</p> <p>_____ 42. Weld to specifications a multipass fillet weld on a T-joint in the horizontal position with an E6010 electrode. (Job Sheet 2)</p> <p>_____ 43. Weld to specifications a multipass fillet weld on a T-joint in the vertical position with an E6010 electrode. (Job Sheet 3)</p> <p>_____ 44. Weld to specifications a fillet weld lap joint in the overhead position with an E7018 electrode. (Job Sheet 4)</p> <p>_____ 45. Weld to specifications a V-groove butt joint in the flat position with an E6010 electrode. (Job Sheet 5)</p> <p>_____ 46. Bend test a welded V-groove joint. (Job Sheet 6)</p> <p>_____ 47. Weld to specifications a V-groove butt joint in the horizontal position with an E6010 electrode root and an E7018 electrode fill. (Job Sheet 7)</p> <p>_____ 48. Weld to specifications a V-groove butt joint in the vertical position with an E6010 electrode. (Job Sheet 8)</p> <p>_____ 49. Weld to specifications a V-groove butt joint in the overhead position with an E6010 electrode. (Job Sheet 9)</p> <p>_____</p> <p>Pretest Score (%) _____</p> <p>Post Test Score (%) _____</p> <p>Modified Gains Score (%) _____</p> |
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Student ratings on specific competencies evaluated during the course are available upon student's written request and/or by calling the instructor. Parent's or guardian's signature is necessary if student is under 18 years of age.

- _____ 16. Solve problems about maintenance requirements for GMAW guns.
- _____ 17. Select true statements about electrode extension and its function in GMAW.
- _____ 18. Complete statements about GMAW shielding gases and their applications.
- _____ 19. Differentiate between GMAW welding techniques and their characteristics.
- _____ 20. Solve problems about techniques for properly ending a GMAW weld.
- _____ 21. Select true statements about techniques for position welding with GMAW.
- _____ 22. Complete statements about conditions that require special attention with GMAW.
- _____ 23. Complete a chart of possible causes and corrective actions for undercutting.
- _____ 24. Complete a chart of possible causes and corrective actions for porosity.
- _____ 25. Complete a chart of possible causes and corrective actions for incomplete fusion.
- _____ 26. Complete a chart of possible causes and corrective actions for incomplete joint penetration.
- _____ 27. Complete a chart of possible causes and corrective actions for excessive melt-through.
- _____ 28. Complete statements about flow meters and their use in GMAW.
- _____ 29. Select true statements about flow rates for GMAW shielding gases.
- _____ 30. Solve problems about guidelines for troubleshooting GMAW problems.
- _____ 31. Prepare mild steel for GMAW. (Job Sheet 1)
- _____ 32. Use short-circuit transfer to weld to specifications a fillet weld T-joint on mild steel in the flat position. (Job Sheet 2)
- _____ 33. Use short-circuit transfer to weld to specifications a V-groove butt joint on mild steel in the flat position. (Job Sheet 3)
- _____ 34. Use short-circuit transfer to weld to specifications a fillet weld T-joint on mild steel in the horizontal position. (Job Sheet 4)
- _____ 35. Use short-circuit transfer to weld to specifications a V-groove butt joint on mild steel in the horizontal position. (Job Sheet 5)
- _____ 36. Use short-circuit transfer to weld to specifications a V-groove butt joint on mild steel in the vertical position. (Job Sheet 6)
- _____ 37. Use short-circuit transfer to weld to specifications a V-groove butt joint on mild steel in the overhead position. (Job Sheet 7)

Pretest Score (%) _____
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Unit 4 — Gas Tungsten Arc Welding

- _____ 1. Match GTAW machine controls with their functions.
- _____ 2. Complete statements about the concept of pulse current and its use in GTAW.
- _____ 3. Differentiate between types of GTAW systems.
- _____ 4. Select true statements about cooling system safety.
- _____ 5. Complete definitions of types of power cables and their characteristics.
- _____ 6. Identify basic parts of a GTAW torch.
- _____ 7. Complete statements about the gas lens and its uses.
- _____ 8. Match types of nozzles with their functions.
- _____ 9. Arrange in order the steps in GTAW nozzle selection.
- _____ 10. Select true statements about GTAW shielding gases and their characteristics.
- _____ 11. Select true statements about flow meter design and use.
- _____ 12. Complete statements about flow rates for GTAW shielding gases.
- _____ 13. Complete a chart about tungsten electrodes, their characteristics and applications.
- _____ 14. Select true statements about guidelines for preparing tungsten electrodes for DC welding.
- _____ 15. Complete statements about guidelines for grinding electrodes for DC welding.
- _____ 16. Solve problems about guidelines for preparing electrodes for AC welding.
- _____ 17. Select true statements about guidelines for GTAW electrode extension.
- _____ 18. Select true statements about guidelines for filler metal selection and use.
- _____ 19. Complete statements about requirements for base metal preparation.
- _____ 20. Select true statements about special problems with contamination and air movement.

- _____ 21. Arrange in order the steps in manual welding with a filler rod.
- _____ 22. Select true statements about backup bars and their uses in GTAW.
- _____ 23. Complete statements about guidelines for troubleshooting GTAW problems.
- _____ 24. Set up a flow meter regulator for GTAW shielding gases. (Job Sheet 1)
- _____ 25. Set up and shut down GTAW equipment for welding mild or stainless steel. (Job Sheet 2)
- _____ 26. Prepare mild or stainless steel for GTAW. (Job Sheet 3)
- _____ 27. Prepare a tungsten electrode for welding mild or stainless steel. (Job Sheet 4)
- _____ 28. Strike and maintain an arc to make stringer beads on mild or stainless steel without filler metal in the flat position. (Job Sheet 5)
- _____ 29. Strike and maintain an arc to make stringer beads on mild or stainless steel with filler metal in the flat position. (Job Sheet 6)
- _____ 30. Set up and shut down GTAW equipment for welding aluminum. (Job Sheet 7)
- _____ 31. Weld to specifications a square-groove butt joint on aluminum in the flat position. (Job Sheet 8)
- _____ 32. Weld to specifications a fillet weld T-joint on aluminum in the horizontal position. (Job Sheet 9)
- _____ 33. Weld to specifications a square-groove butt joint on aluminum in the vertical position. (Job Sheet 10)

Pretest Score (%) _____
 Post Test Score (%) _____
 Modified Gains Score (%) _____

Unit 5 — Oxyacetylene Cutting

- _____ 1. Select true statements about advantages of oxyacetylene cutting.
- _____ 2. Complete statements about safety requirements for oxyacetylene cutting.
- _____ 3. Complete statements about safety rules for the oxyacetylene workplace.
- _____ 4. Select solutions for personal safety requirements.
- _____ 5. Solve problems about pressure regulating valves.
- _____ 6. Differentiate between hoses and their characteristics.
- _____ 7. Identify parts of an oxyacetylene cutting torch.
- _____ 8. Solve problems about types of mixers and their purposes.
- _____ 9. Solve basic problems about basic safety rules of oxyacetylene cylinders and gases.
- _____ 10. Complete a chart of oxyacetylene flame characteristics and uses.
- _____ 11. Select true statements about guidelines for flame adjustment.
- _____ 12. Complete statements about characteristics and causes of backfire and flashback.
- _____ 13. Arrange in order the steps in setting up cylinders and regulators.
- _____ 14. Select true statements about steps in purging oxygen and fuel gas regulators.
- _____ 15. Select correct procedures for final steps in setting up oxy-fuel equipment.
- _____ 16. Select true statements about cutting tip design.
- _____ 17. Select guidelines for cutting tip selection.
- _____ 18. Select true statements about guidelines for cleaning cutting tips.
- _____ 19. Match tip cleaning tools with their uses.
- _____ 20. Select true statements about rules for tip use.
- _____ 21. Select true statements about guidelines for metal preparation for oxyacetylene cutting.
- _____ 22. Arrange in order the steps for properly starting a cut.
- _____ 23. Complete statements about techniques for restarting a cut.
- _____ 24. Select true statements about techniques for cutting straight lines.
- _____ 25. Select techniques for controlling kerf and drag.
- _____ 26. Complete statements about elements of a good cut.
- _____ 27. Select causes for characteristics of poor cuts.
- _____ 28. Set up, adjust cutting flame, and shut down oxyacetylene cutting equipment. (Job Sheet 1)
- _____ 29. Make 90° cuts and restart a cut on mild steel. (Job Sheet 2)
- _____ 30. Make a flame-beveled cut on mild steel plate. (Job Sheet 3)
- _____ 31. Cut holes in mild steel. (Job Sheet 4)

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Unit 6 — Oxyacetylene Braze Welding and Surfacing

- _____ 1. Differentiate between the definitions of fusion welding and braze welding.
- _____ 2. Differentiate between the definitions of brazing and braze welding.
- _____ 3. Complete statements about pre-coating in braze welding.
- _____ 4. Select true statements about the purposes of flux.
- _____ 5. Complete statements about important factors in successful braze welding.
- _____ 6. Select true statements about techniques used in preparing joints for braze welding.
- _____ 7. Complete statements about techniques used to remove oxides in preparing joints for braze welding.
- _____ 8. Complete statements about techniques used for braze welding steel and cast iron.
- _____ 9. Match braze welding problems with their causes.
- _____ 10. Differentiate between the definitions surfacing and hardfacing.
- _____ 11. Select true statements about the advantages of bronze surfacing.
- _____ 12. Select true statements about preheating and cooling requirements for hardfacing.
- _____ 13. Braze weld a square groove butt joint in the flat position. (Job Sheet 1)
- _____ 14. Braze weld a lap joint in the horizontal position. (Job Sheet 2)

_____ Pretest Score (%) _____

_____ Post Test Score (%) _____

_____ Modified Gains Score (%) _____

Unit 7— Plasma Arc Cutting

- _____ 1. Complete statements about basic characteristics of plasma arc cutting.
- _____ 2. Match basic components with their functions in an air cut PAC system.
- _____ 3. Select true statements about plasma arc electrical safety.
- _____ 4. Complete statements about plasma arc environmental safety.
- _____ 5. Solve problems about plasma arc workplace safety.
- _____ 6. Select true statements about advantages of plasma arc cutting.
- _____ 7. Select true statements about characteristics of plasma arc transfer modes.
- _____ 8. Solve problems about guidelines for PAC electrode selection.
- _____ 9. Select true statements about guidelines for cutting nozzle selection and installation.
- _____ 10. Solve problems about shielding cups, their design and uses.
- _____ 11. Select true statements about plasma air and secondary air used with PAC.
- _____ 12. Solve problems about PAC consumables, their characteristics and maintenance.
- _____ 13. Solve problems about PAC system duty cycles.
- _____ 14. Select true statements about guidelines for setting PAC flow rate and flow pressure.
- _____ 15. Solve problems about guidelines for using compressed air with a PAC system.
- _____ 16. Select true statements about factors affecting cutting speeds.
- _____ 17. Select true statements about techniques for contact and stand-off cutting.
- _____ 18. Select true statements about techniques for cutting expanded metal.
- _____ 19. Solve problems about techniques for gouging metal.
- _____ 20. Select true statements about techniques for piercing and beveling metal.
- _____ 21. Match cutting faults with their probable causes.
- _____ 22. Prepare a PAC machine for operation. (Job Sheet 1)
- _____ 23. Complete a contact cut on selected metal. (Job Sheet 2)

_____ Pretest Score (%) _____

_____ Post Test Score (%) _____

_____ Modified Gains Score (%) _____