AUTOMOTIVE COLLISION MIG (GMAW) WELDING
Course Syllabus

Course Number: NSRT-0342
OHLAP Credit: No
OCAS Code: None
Course Length: 105 Hours
Career Cluster: Transportation, Distribution, and Logistics
Career Pathway: Automotive Collision Repair
Career Major(s): Collision Repair Technician

Pre-requisite(s): In this course the student will learn about the specific personal safety equipment used when MIG welding, and how to protect the vehicle when welding. The student will cover the MIG welding equipment and how to tune and troubleshoot the welder. Students will learn to join two pieces of metal using the appropriate process and joint selection. The welding joints covered will be: lap/fillet, butt, butt w/backing and plug. Students will learn techniques for welding in the vertical and overhead position using I-Car specific specifications.


Course Objectives:

A. Perform GMAW (MIG) Welding
1. Protect computers and other electronic control modules during welding procedures according to manufacturer’s specifications.
2. Identify weldable and non-weldable materials used in collision repair. (HP-I) 1
3. Compare the causes of poor welds with the characteristics of a good weld.
4. Determine the correct GMAW (MIG) welder type, electrode, wire type, diameter, and gas to be used in specific welding situations. (HP-I) 1
5. Discuss the usage of shielding gases.
6. Name the two types of power sources for GMAW.
7. Determine work clamp (ground) location and attach. (HP-I) 1
8. Determine correct electrode stick out, amperage, and wire feed speed required for the weld.
9. Determine the correct GMAW (Mig) welder type, electrode, wire type, diameter, and gas to be used in a specific welding situation. (HP-I) 1
10. Set up and adjust the GMAW (MIG) welder to “tune” for proper electrode stickout, voltage, polarity, flow rate, and wire feed speed required for the material being welded. (HP-I) 1
11. Use the proper angle of the gun to the joint, and direction of gun travel for the type of weld being made in flat, horizontal, vertical, and overhead positions. (HP-I) 1
12. Clean and prepare the metal to be welded; assure good metal fit-up, apply weld- through primer if necessary, and clamp as required. (HP-I) ID11 1
13. Determine the joint type (butt weld with backing, lap, etc.) for weld being made. (HP-I) 1
14. Determine the type of weld (continuous, butt weld with backing, plug, etc.) for each specific welding operation. (HP-I)
15. Identify cause of contact tip burn-back and failure of wire to feed; make necessary adjustments. (HP-I) ¹
16. Weld and cut high-strength steel and other steels. (HP-I) ¹
17. Weld damaged or torn steel panels; repair broken welds. (HP-I) ¹
18. Perform the following welds: continuous, stitch, tack, plug, butt weld with and without backing, and fillet weld. (HP-I) ¹
19. Perform visual and destructive tests on each weld type. (HP-I) ¹

B. Perform Oxyacetylene Welding
1. Define terms related to oxyacetylene cutting.
2. Identify the parts of the torch body and cutting equipment.
3. List causes of poor cuts.
4. Compare the results of a backfire to those of a flashback.
5. List in order the steps to follow in case of a flashback.
6. Store, handle, and install high pressure gas cylinders. (HP-I) ¹
7. Identify cutting process for different materials and locations; perform cutting operation. (HP-G) ¹
8. Protect adjacent panels, glass, vehicle interior, etc., from welding and cutting operations. (HP-I) ¹
9. Set up equipment for oxyacetylene cutting.
10. Turn on, light, and adjust to a neutral flame and turn off oxyacetylene cutting equipment.

C. Perform Plasma Arc Cutting
1. Define terms related to the plasma arc process.
2. List advantages of the plasma arc process.
3. Identify the major parts of plasma arc equipment.
4. Discuss various applications of the plasma arc process.
5. Discuss safety considerations (eye protection, proper clothing, shock hazards, dangerous fumes, etc.) before starting to weld.
6. Set up the welder in accordance with manufacturers' instructions; clean the gun and gas nozzle as required.
7. Protect computers and other electronic control modules during welding procedures. (HP-I) ¹
8. Protect glass and interior trim from possible welding damage.
9. Perform plasma cuts on various types of metals.

D. Use Advanced Welding Methods
1. Identify cause of contact tip burn-back and failure of wire to feed; make necessary adjustments. (HP-I) ¹
2. Identify cutting process for different materials and locations; perform cutting operations. (HP-I) ¹
3. Identify the causes of various welding defects; make necessary adjustments. (HP-I) ¹
4. Identify different methods of attaching structural components (squeeze type resistance spot welding (STRSW), riveting, structural adhesive, silicone bronze, etc.) (HP-G) ¹
5. Identify different methods of attaching non-structural components (squeeze type resistant spot welds (STRSW), riveting, non-structural adhesive, silicon bronze, etc.). (HP-G) ¹

E. Perform Aluminum Welding
1. Safely store and handle shielding gas cylinders.
2. Properly secure cylinder to welder using safety chain or strap.
3. List the steps used to protect the vehicle from weld spatter and heat.
4. Demonstrate how to protect electrical parts during welding following vehicle maker’s recommendations.
5. Select the correct electrode series and diameter for a specific welding situation.
6. Install spool gun, electrode wire, and cable liner.
7. Set drive rolls and adjust tension to recommended settings.
8. Remove safety cap and crack cylinder valve to remove contaminants.
10. Adjust voltage and current (wire feed speed) for the thickness of aluminum to be welded.
11. Identify when the welder is in the short-circuit and spray-arc or pulse spray-arc transfer modes.
12. Convert a GMA (MIG) welder used for steel for use on aluminum.
13. Weld and cut aluminum. (HP-G) ¹

¹ASE objective
All unmarked objectives are TTC instructor developed.

Teaching Methods: The class will primarily be taught by the lecture and demonstration method and supported by various media materials to address various learning styles. There will be question and answer sessions over material covered in lecture and media presentations. Supervised lab time is provided for students to complete required projects.

Grading Procedures: 1. Students are graded on theory and shop practice and performance.
2. Each course must be passed with seventy (70%) percent or better.
3. Grading scale: A=90-100%, B=80-89%, C=70-79%, D=60-69%, F=50-59%.

Description of Classroom, Laboratories, and Equipment: Tulsa Technology Center campuses are owned and operated by Tulsa Technology Center School District No. 18. All programs provide students the opportunity to work with professionally certified instructors in modern, well-equipped facilities.

Available Certifications/College Credit The student may be eligible to take state, national or industry exam after completion of the program. College credit may be issued from Oklahoma State University-Okmulgee or Tulsa Community College. See program counselor for additional information.

College Credit Eligibility: The student must maintain a grade point average of 2.0 percent or better.