Butler Community College
Career and Technical Education Division

Frank Robinson
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COURSE OUTLINE
Auto Body Welding Principles and Techniques

Course Description
AB 103. Auto Body Welding Principles and Techniques. 4 hours credit. Prerequisite: AB 101 with a C or better. This course will enable the student to gain knowledge of basic skills in auto body welding. The student will learn about safety, protective clothing, tools, and equipment procedures and techniques of Metal Arc Gas (MIG) welding.

Course Relevance
The principles learned in this course will allow the student to be familiar with the welding aspects of auto collision repair. As welding is a major function of auto repair, this course will better prepare the student to enter a career in auto body repair. This course and subsequent courses will be taught according to National Automotive Technicians Education Foundation (NATEF) and Automotive Service Excellence (ASE) standards.

Required Materials
Duffey, J. (2004). *Auto body repair technology* (4th ed.). Albany, NY: Delmar Publishing.

Supplemental materials
Manufacturer's shop manuals applicable to the make and model of automobile being checked (at the discretion of the instructor).

Learning Outcomes
The intention is for the student to be able to:
1. Identify and use proper tools, equipment, and chemicals
2. Perform continuous stitch/pulse, tack and plug welding
3. Perform cutting operations
4. Apply safety principles to welding procedures

Learning PACT Skills that will be DEVELOPED and/or documented in this course
Through the student's involvement in this course, he/she will develop his/her ability in the following PACT skill areas:

Technology Skills
1. Discipline-Specific Technology
    - Through in class exercises, the student will be able to analyze damage and repair outer body panels.

Major Summative Assessment Task(s)
These learning outcomes and the Learning PACT skills will be demonstrated by
1. Performing different types of welds and cutting operations while observing safety procedures

Course Content

I. Themes – Key recurring concepts that run throughout this course:
   A. Safety
   B. Quality
II. Issues- Key areas of conflict that must be understood in order to achieve the intended outcomes:
   A. Lack of preparation before welding
   B. Determining the correct method of welding
   C. Proper heat selection to make a proper weld
III. Concepts – Key concepts that must be understood to address the issues:
   A. Proper preparation of material and welding equipment
   B. Determining the best method for various types of repairs
   C. Proper heat setting of welding equipment
IV. Skills/Competencies – Actions that are essential to achieve the course outcomes:
   A. Identify weldable and non-weldable materials used in collision repair. (HP-1)
   B. Determine the correct Gas Metal Arc Welding (GMAW) (MIG) welder type, electrode, wire type, diameter, and gas to be used in a specific welding situation (HP-1)
   C. Store, handle, and install high-pressure gas cylinders (HP-1)
   D. Determine work clamp (ground) location and attach (HP-1)
   E. Use the proper angle of the gun to the joint and direction of gun travel for the type of weld being made in the flat, horizontal, vertical, and over-head positions (HP-1)
   F. Perform the following welds: continuous, stitch, tack, plug, butt weld, with and without backing, and fillet welds (HP-1)
   G. Perform visual and destructive tests on each weld type (HP-1)
   H. Identify cause of contact tip burn-back and failure of wire to feed; make necessary adjustments (HP-1)
   I. Identify the causes of various welding defects; make necessary adjustments (HP-1)
   J. Weld and cut high-strength steel and other steels (HP-1)
   K. Clean and prepare the metal to be welded, assure good metal fit-up, apply weld-thru primer if necessary, and clamp as required.
   L. Determine the joint type (butt weld with backing, lap, etc.)for weld being made (HP-1)
   M. Determine the type of weld (continuous, butt weld with backing, plug, etc.)for each specific welding operation (HP-1)
   N. 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-1)

Learning Units

I. Shop safety and efficiency:
   A. Personal and environmental safety
   B. Clothing and the use of gloves
   C. Respiratory protection

D. Eye protection
E. Hand tools
F. Power equipment
G. Proper ventilations
H. Handling, storage, and disposal of chemicals/materials in accordance with local, state, and federal safety and environmental regulations.

II. (MIG) wire feed welding principles
A. Set up and adjust welder
B. Safety practices using welding equipment
C. Principles of welding

III. Welding terminology
A. Welding penetration
B. Metal burn-through
C. Metal joint fit up's

IV. Welding characteristics
A. Efficiency in attaching auto body sheet metal components
B. Producing strengths in welding sheet metal components

V. Different types of welds
A. Demonstrate: Continuous, stitch, tack, plug, butt
B. Weld without backing and lap joint
C. Proper use of welding gun angle to produce flat, horizontal, vertical, and over-head welds

VI. Welding problems
A. Weld distortion
B. Weld porosity (holes in weld)
C. Weld cracking

VII. Resistance spot welding
A. Pressure fusion welding
B. Spot welding components
C. Spot welder adjustments

Learning Activities
Learning activities will include lectures, demonstration, and performance. Classroom lecture is designed to enable the student to understand the key principles in auto body repair.

Grade Determination
The student will be graded on learning activities and assessment tasks, written assignment and examinations. Grade determinants may include the following:

assignments, examinations and other methods of evalution employed at the discretion of the instructor.