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| **TEXAS CTE LESSON PLAN**  [www.txcte.org](http://www.txcte.org) | |
| **Lesson Identification and TEKS Addressed** | |
| **Career Cluster** | Manufacturing |
| **Course Name** | Welding I |
| **Lesson/Unit Title** | Fluxed Core Arc Welding (FCAW) |
| **TEKS Student Expectations** | **130.363. (c) Knowledge and Skills**  (2) The student explores the employability characteristics of a successful worker in the global economy.  (F) The student is expected to demonstrate skills related to health and safety in the workplace as specified by appropriate governmental regulations.  (3) The student applies academic skills to the requirements of welding.  (A) The student is expected to demonstrate effective communication skills with individuals from varied cultures such as fellow workers, management, and customers  (B) The student is expected to demonstrate mathematical skills to estimate costs  (C) The student is expected to demonstrate technical writing skills related to work orders  (D) The student is expected to apply accurate readings of measuring devices  (E) The student is expected to use appropriate tools to make accurate measurements  (F) The student is expected to compute measurements such as area, surface area, volume, and perimeter  (G) The student is expected to solve problems using whole numbers, fractions, mixed numbers, and decimals  (H) The student is expected to use various methods, including a calculator, to perform computations  (I) The student is expected to perform conversions between fractions and decimals  (J) The student is expected to perform conversions between standards units and metric units  (K) The student is expected to calculate and apply the functions of angles such as using the Pythagorean Theorem  (L) The student is expected to diagram the parts of a circle  (4) The student evaluates the function and application of the tools, equipment, technologies, and materials used in welding  (A) The student is expected to operate welding equipment according to safety standards  (B) The student is expected to identify and properly dispose of environmentally hazardous materials used in welding  (D) The student is expected to choose appropriate personal protective equipment  (5) The student understands welding joint design, symbols, and welds  (A) The student is expected to demonstrate knowledge of engineering drawings, charts, and diagrams  (C) The student is expected to interpret engineering, drawings, charts, and diagrams  (D) The student is expected to analyze components of the welding symbol  (E) The student is expected to identify types of welding joints  (F) The student is expected to identify positions of welding  (G) The student is expected to identify types of welds such as fillet, groove, spot, plug, and flanged  (6) The student analyzes the concepts and intricacies of inspections and related codes  (A) The student is expected to explain weld inspection processes and  (B) The student is expected to interpret welding grooves |
| **Basic Direct Teach Lesson**  (Includes Special Education Modifications/Accommodations and  one English Language Proficiency Standards (ELPS) Strategy) | |
| **Instructional Objectives** | Upon completion of this lesson, the learner will be able to:   1. Upon completion of this lesson, the learner will be able to: 2. Demonstrate proper safety procedures for FCAW. 3. Identify the proper tools and equipment necessary. 4. Set up and troubleshoot equipment 5. Select the proper filler, type of gas, wire, and voltage needed. 6. Weld a pad in at least four positions. 7. Weld a T-joint and Butt-joint with a single-pass. 8. Layout, cut and prepare coupons. 9. Test the coupons. |
| **Rationale** | It is critical that students can demonstrate the proper processes to use in Fluxed Core Arc Welding (FCAW). |
| **Duration of Lesson** | 1 week |
| **Word Wall/Key Vocabulary**  *(ELPS c1a,c,f; c2b; c3a,b,d; c4c; c5b) PDAS II(5)* |  |
| **Materials/Specialized Equipment Needed** | * Sample pieces of flat metal * Sample pieces of various shaped metals * Types of Metals Chart * Standard Metal Shapes Chart * Metal Shapes Test * Metal Types Test * Spark Test record sheet (optional) * Safety equipment * FCAW Equipment (min. amperage of 200-400 constant voltage). * Continuous electrode wire * Electrode feed unit |
| **Anticipatory Set**  (May include pre-assessment for prior knowledge) | In the industry of welding, there are many different types of materials joined together. The school welding shop is far more limited in the types of materials, but it is necessary to know the most commonly used metals in the field of welding. Knowledge of the materials will help you make better choices concerning filler metals and uses of the fabrication.  One of the types of welding that you should know it FCAW. |
| **Direct Instruction \*** | I. Safety Terms  i. NEMA- National Electrical Manufacturer’s Association  ii. contaminants- impurities formed from chemical reactions  iii. Toxic hazards- Fumes, vapors, and poisonous gases produced in the welding process  iv. Oxygen Displacement- Welding often reduces the amount of oxygen around the area being welded  v. Duty cycle- 10 minute break to avoid overheating the welding machine  vi. Safety Lens   1. Nonferrous 2. Ferrous   II. FCAW Terms  i. FCAW- the weld is completed by the feed of the electrode through the weld joint at a controlled rate  ii. Automatic- process where mechanical devices control the welding  iii. Semi-automatic-the welder controls the process  iv. WFS- Wire Feed Speed  v. ESO- Electrode Stickout  vi. dual shielded- a shielding gas is used with the flux-core electrode for double protection  vii. self-shielded- when the arc is made, the electrode is released that protects the weld zone from contaminants  III. Why use FCAW/  IV. Pass out and explain rubric  V. Preparing to weld  i. Preparations  ii.Guidelines  iii. Safety  iv. Set up wire feeder  v. Semi-automatic/automatic  VI. Students practice FCAW welding with instructor guidance  VII. Independent Practice  VIII. Review and check for mastery  IX. Students perform layout, cut, and prepare coupons and are tested on them (see rubric).  X. Breakdown and Cleanup  *Individualized Education Plan (IEP) for all special education students must be followed. Examples of accommodations may include, but are not limited to:*  NONE |
| **Guided Practice \*** | The teacher will demonstrate safety, set up, and weld  *Individualized Education Plan (IEP) for all special education students must be followed. Examples of accommodations may include, but are not limited to:*  NONE |
| **Independent Practice/Laboratory Experience/Differentiated Activities \*** | 1. Safety setup (students must be checked off on safety) 2. Equipment setup. 3. Students practice weld. Instructor goes around and checks for understanding and safety.   *Individualized Education Plan (IEP) for all special education students must be followed. Examples of accommodations may include, but are not limited to:*  NONE |
| **Lesson Closure** | Check for mastery/understanding by orally reviewing the students on the information. Answer any questions the class may have. Ask individual students identify stages of the process. |
| **Summative/End of Lesson Assessment \*** | Mastery of at least 70% on the rubric.  *Individualized Education Plan (IEP) for all special education students must be followed. Examples of accommodations may include, but are not limited to:*  NONE |
| **References/Resources/**  **Teacher Preparation** | American Welding Society (AWS)  Modern Welding (2004)  Welding Principles and Applications (1999) |
| **Additional Required Components** | |
| **English Language Proficiency Standards (ELPS) Strategies** |  |
| **College and Career Readiness Connection[[1]](#footnote-1)** |  |
| **Recommended Strategies** | |
| **Reading Strategies** |  |
| **Quotes** |  |
| **Multimedia/Visual Strategy**  **Presentation Slides + One Additional Technology Connection** |  |
| **Graphic Organizers/Handout** |  |
| **Writing Strategies**  **Journal Entries + 1 Additional Writing Strategy** |  |
| **Communication**  **90 Second Speech Topics** |  |
| **Other Essential Lesson Components** | |
| **Enrichment Activity**  (e.g., homework assignment) | For those students who need remediation, a re-teach and review session will reinforce the topics of concern. The remediation will need to be tailored to the individual needs of the student.  Students can use this lesson to prepare for SkillsUSA competition. |
| **Family/Community Connection** |  |
| **CTSO connection(s)** | SkillsUSA |
| **Service Learning Projects** |  |
| **Lesson Notes** |  |

1. Visit the Texas College and Career Readiness Standards at <http://www.thecb.state.tx.us/collegereadiness/CRS.pdf>, Texas Higher Education Coordinating Board (THECB), 2009. [↑](#footnote-ref-1)