Shielded Metal Arc Welding: Preparation & Safety

Media Type: Video
Duration: 60 minutes

Goal: To describe the importance, types and processes of preparation and safety associated with shielded metal arc welding.

Description: This presentation features Pete Stacener, Chairperson, Industrial Technology Department, Program Coordinator and Professor of Welding Technology at South Plains College. Follow along as he explains the preparation and safety as it applies to shielded metal arc welding. After an introduction, Pete covers safety and equipment before moving into electrode selection and classification. Also covered is base metal preparation, types of joints and welds as well as the essentials of a good weld. We finish up with how to strike and arc and a section covering a pad of beads.

Objectives:
1. To define shielded metal arc welding.
2. To identify different types of preparation and safety involved in shielded metal arc welding.
3. To explain different equipment involved.
4. To identify electrode selection and classification.
5. To examine base metals preparation.
6. To describe different types of joints and welds.
7. To learn examples of a good weld.
8. To learn how to strike an arc.
9. To explain how to create a pad of beads.

Horizontal Alignment

Core-Subject Area	Foundation Concept	Basic Understanding
Math	***Logical Skills***	reasoning; problem solving; real-life applications
Language Arts	***Application of Writing Skills***	editing/proofreading; organizing logical arguments; brainstorming; analyzing audiences; utilizing reference materials; vocabulary enhancement
	Analysis of Text, Literature and Information	reading/content literacy; critical thinking; creative thinking; expression of thoughts and ideas; communication skills; developing listening and comprehension skills; creating visual representations
	Technology Applications in Literature	utilizing document processing software; utilizing presentation processing software; internet-based research
Science	***Scientific Thinking and Investigating***	field and laboratory investigations; critical thinking and scientific problem solving; real-world investigations and applications; analytical skills; collecting data; technology-based research; evaluating conclusions; classification/organization skills

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Lesson Plan

Class 1: Distribute the *Worksheet* and *Vocabulary Handout* for students to refer to during the presentation. Pass out the *KWL Activity* and have them fill in the Know and Want to Know sections on the sheet. Have the students keep the *KWL Activity* with their *Worksheet* and *Vocabulary Handout* so they can refer back to it and fill in the Learned sections as they can. Show the *Shielded Metal Arc Welding: Introduction to Shielded Metal Arc Welding* segment to the students. Have the students complete the *Assessment.* Hand out the *Welding & Cutting Processes Comparison Project* for students to begin as homework. Distribute the *AC/DC Venn Diagram* for students to complete as homework.

Video 9 min.

Class 2: Remind students to complete the *Worksheet* as they view the segments. Show the *Shielded Metal Arc Welding: Safety* segment and the *Shielded Metal Arc Welding: Equipment Inspection & Set-up* segment followed by their *Assessments*. Pass out the *Inspection & Set-up Project* to students and allow the remainder of the class to work on the project.

Video 12 min.

Class 3: Remind students to complete the *Worksheet* as they view the segments. Show the *Shielded Metal Arc Welding: Electrode Selection & Classification* segment and the *Shielded Metal Arc Welding: Base Metal Preparation* segment followed by their *Assessments.* Use the rest of the class time to finish up the *Inspection & Set-up Project* and turn it in.

Video 16 min.

Class 4: Show the *Shielded Metal Arc Welding: Types of Joints & Welds* segment and the *Essentials for a Good Weld* segment followed by their *Assessments.* Pass out the *Weld Joint Activity* for the students to complete in class. Distribute the *Currents Activity* for students to complete as homework. Pass out the *Filler Metal Classification System Project* for the students to work on for the remainder of class.

Video 10 min.

Class 5: Show the *Shielded Metal Arc Welding: How to Strike an Arc* segment and the *Shielded Metal Arc Welding: Pad of Beads* segment followed by their *Assessments.* Pass out the *Dry Runs Activity* for the students to complete in class. Pass out the *Pad of Beads Project* for students to work on the remainder of the class.

Video 13 min.

Class 6: Have students complete the *Pad of Beads Project.* Finish the day by having students complete the *Final Assessment.*

Class 7: Students should complete and turn in all *Activities* and *Projects* before the end of class.

Lesson Links

American Welding Society

- http://www.aws.org/w/a/?id=YfPYAoms

OSHA Welding, Cutting and Brazing

- http://www.aws.org/w/a/?id=YfPYAoms

Career & Technical Student Organizations

National FFA

- Agricultural Mechanics

SkillsUSA

- Welding
- Welding Fabrication
- Welding Sculpture Demo

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LESSON PLAN

Career Connections

Using the *Career Connections Activity*, allow students to explore the various careers associated with this lesson. See the *Activity* for more details. *If student licenses have been purchased:* Students will select the interviews to watch based on your directions. *If only a teacher license is purchased:* Show students all the career interviews and instruct them to only complete the interview form for the required number of interviews.

- iCEV50001, Howard Allford, Welder, Self Employed
- iCEV50535, Mary Jo Emrick, Adjunct Welding Professor, Austin Community College
- iCEV50534, Brandon Whatley, Department Chair, Welding Professor, Austin Community College
- iCEV50633, Breann Shirk, Production Welder, John Deere

Lab Activities

KWL

Directions:
Have students fill in the "Know" section before beginning the presentations as well as questions in the "What to Know" section. Students will refer back to this page as the segments are shown and complete the "What I Learned" section. See Teacher Instruction Sheet for more information.

AC/DC Venn Diagram

Directions:
Students will complete the Venn diagram provided.

Dry Run

Directions:
Have the students review the five types of welds. Have them select one joint they would like to practice and have them prepare a metal and an electrode for the weld. Have the students practice several dry runs until they are ready to be graded. Grade the students over the knowledge of the weld, where it would be used and the dry run preformed.

Weld Joint

Directions:
Have students choose one weld joint they would like to demonstrate for a grade. Also, have students describe the weld and when it would be implemented.

Currents

Directions:
Using the Internet, library or any other available resources, students will research the various welding currents and determine their appropriate use. For example, a 3/32 diameter electrode is recommended to be welded with AC at 95 amps. Using their research, students will create a chart detailing their findings as well as determine the recommended currents for each of the scenarios provided.

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Projects

Welding & Cutting Processes Comparison

Directions:

Using the Internet, library or any other available resource, students should research and write a paper which compares and contrasts shielded metal arc welding (SMAW) with other welding and cutting processes. Choices include but are not limited to: flux cored arc welding (FCAW), gas metal arc welding (GMAW), gas tungsten arc welding (GTAW), etc. Students should give a short description of each welding type they discuss. Students should cite any sources used.

Inspection & Set-Up

Directions:

Students will determine the appropriate metal, electrodes and welder for the specific weld you choose. Select a different weld for each student so no two have the same weld. Students will then create a one page, step-by-step procedure detailing the correct way to set-up and perform the weld. Students should also include instructions on what to look for when inspecting the weld. At the end of Class 7, distribute a complete set of procedures to students for reference.

Filler Metal Classification System

Directions:

Using the Internet, library and the American Welding Society website, located at www.aws.org, students will gather information regarding the AWS filler metal classification system. Students will research and write a paper explaining the system, briefly discussing the multiple factors which affect electrode selection for shielded metal arc welding (SMAW).

Pad of Beads

Directions:

Under your supervision, have the students prepare a pad of beads. Explain the process and make sure they understand and are comfortable with preforming the techniques and procedures before they begin. Students will provide the pad of beads for review.