

Gas Metal Arc Welding: Sheet Metal

Media Type: DVD

Duration: 82 min.

Goal: To describe basic techniques, procedures, safety practices and equipment used in gas metal arc welding on sheet metal.

Description: Understanding how to set up equipment and conduct a weld is essential before beginning to work with any welding process. This presentation features Brandon Whatley, Department Chair and Welding Professor at Austin Community College. Follow along as he explains the correct procedures for safely preparing and using gas metal arc welding equipment as well as noting the commonly seen mistakes while demonstrating the various positions and types of welds used in the industry.

Objectives:

1. To understand and identify the correct procedures to set-up welding equipment.
2. To understand the safety steps needed to conduct gas metal arc welding on sheet metal.
3. To conduct various forms of gas metal arc welding on sheet metal and complete those welds successfully.



Common Core Standards

Agriculture, Food & Natural Resources Career Cluster (AG)

Cluster	Standard
	Analyze how issues, trends, technologies and public policies impact systems in the Agriculture, Food & Natural Resources Career Cluster™.
	Examine and summarize the importance of health, safety and environmental management systems in AFNR businesses.
Power Structural & Technical Systems Career Pathway (AG-PST)	Operate and maintain AFNR mechanical equipment and power systems.
	Service and repair AFNR mechanical equipment and power systems.
	Plan, build and maintain AFNR structures.
	Use control, monitoring, geospatial and other technologies in AFNR power, structural and technical systems.

Architecture & Construction Career Cluster (AC)

Cluster	Standard
	Use vocabulary, symbols and formulas common to architecture and construction.
	Use architecture and construction skills to create and manage a project.
	Comply with regulations and applicable codes to establish and manage a legal and safe workplace.
	Describe career opportunities and means to achieve those opportunities in each of the Architecture & Construction Career Pathways.
Construction Career Pathway (AC-CST)	Describe the approval procedures required for successful completion of a construction project.
	Implement testing and inspection procedures to ensure successful completion of a construction project.
	Apply practices and procedures required to maintain jobsite safety.
	Safely use and maintain appropriate tools, machinery, equipment and resources to accomplish construction project goals.
Maintenance/Operations Career Pathway (AC-MO)	Recognize and employ universal construction signs and symbols to function safely in the workplace.

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College & Career Readiness Anchor Standards for Reading

Reading Standards for Literacy in Science & Technical Subjects

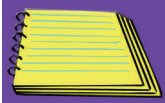
Key Ideas & Details	Read closely to determine what the text says explicitly and to make logical inferences from it; cite specific textual evidence when writing or speaking to support conclusions drawn from the text.	
	9-10.1	Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions.
	11-12.1	Cite specific textual evidence to support analysis of science and technical texts, attending to important distinctions the author makes and to any gaps or inconsistencies in the account.
Craft & Structure	Interpret words and phrases as they are used in a text, including determining technical, connotative, and figurative meanings, and analyze how specific word choices shape meaning or tone.	
	9-10.4	Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 9–10 texts and topics.
	11-12.4	Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 11–12 texts and topics.
Integration of Knowledge & Ideas	Integrate and evaluate content presented in diverse formats and media, including visually and quantitatively, as well as in words.	
	9-10.7	Translate quantitative or technical information expressed in words in a text into visual form and translate information expressed visually or mathematically into words.
	11-12.7	Integrate and evaluate multiple sources of information presented in diverse formats and media in order to address a question or solve a problem.

College & Career Readiness Anchor Standards for Writing

Writing Standards for Literacy in History/Social Studies & Technical Subjects

Text Types & Purposes	Write informative/explanatory texts to examine and convey complex ideas and information clearly and accurately through the effective selection, organization, and analysis of content.	
	9-10.2	Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes.
Production & Distribution of Writing	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.	
	9-10.4	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.
Research to Build & Present Knowledge	Conduct short as well as more sustained research projects based on focused questions, demonstrating understanding of the subject under investigation.	
	Gather relevant information from multiple print and digital sources, assess the credibility and accuracy of each source, and integrate the information while avoiding plagiarism.	
	9-10.7	Conduct short as well as more sustained research projects to answer a question or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation.
	9-10.8	Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the usefulness of each source in answering the research question; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and following a standard format for citation.

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Lesson Plan

Class 1: Distribute the *Gas Metal Arc Welding: Sheet Metal Vocabulary Handout* and *Worksheet* to be completed during the presentation. Show the *Gas Metal Arc Welding: Sheet Metal - Introduction* and *Gas Metal Arc Welding: Sheet Metal - Machine Set-Up* segments. Using the *Sheet Metal Welding Activity* discuss safety practices with the class and review the equipment which will be used in the shop.



12 min.

Class 2: Show the *Gas Metal Arc Welding: Sheet Metal - Wire Driving System*, *Gas Metal Arc Welding: Sheet Metal - Changing Filler Wire Spool* and *Gas Metal Arc Welding: Sheet Metal - Cable Line Maintenance* segments.



20 min.

Class 3: Show the *Gas Metal Arc Welding: Sheet Metal - Filler Wire Specifications & Maintenance* and *Gas Metal Arc Welding: Sheet Metal - Installing Filler Wire Spool* segments. Take students to the shop and demonstrate how to install filler wire.



15 min.

Class 4: Remind students to continue to fill in the *Worksheet* and use the *Vocabulary Handout* as a reference. Show the *Gas Metal Arc Welding: Sheet Metal - 1F Lap Joint*, *Gas Metal Arc Welding: Sheet Metal - 1F T-Joint*, *Gas Metal Arc Welding: Sheet Metal - 2F Fillet* and *Gas Metal Arc Welding: Sheet Metal - 2F Lap Joint Drag Motion* segments. Assign the *Forehand vs. Backhand Project* for homework. Allow students to continue the *Sheet Metal Welding Activity* by practicing the welds discussed in the presentation.



15 min.

Class 5: Show the *Gas Metal Arc Welding: Sheet Metal - 2F Lap Joint Push Motion*, *Gas Metal Arc Welding: Sheet Metal - 3F Lap Joint Vertical Up & Down* and *Gas Metal Arc Welding: Sheet Metal - 3F T-Joint Vertical Up & Down* segments. Allow students to work on the *Sheet Metal Welding Activity* by practicing welds discussed in the previous classes.



15 min.

Class 5: Show the *Gas Metal Arc Welding: Sheet Metal - 4F Lap Joint Overhead*, *Gas Metal Arc Welding: Sheet Metal - 4F T-Joint Overhead* and *Gas Metal Arc Welding: Sheet Metal - 1G Butt Joint* segments. Assign the *Welding Positions Project* for homework. Allow students to work on the *Sheet Metal Welding Activity* by practicing welds discussed in the previous classes.



10 min.

Class 6: Students should turn in the *Forehand vs. Backhand Project*. Allow students to work on the *Sheet Metal Welding Activity*.

Class 7: Distribute the *Gas Metal Arc Welding: Sheet Metal Assessment*. Once completed, allow students to continue the *Sheet Metal Welding Activity*.

Class 8: Students should turn in the *Welding Positions Project*. Allow students to finish the *Sheet Metal Welding Activity*.

Lesson Links

American Welding Society

- www.aws.org/ad/gtaw.html

Miller

- www.millerwelds.com/pdf/gtawbook.pdf

Career & Technical Student Organizations

FFA

- Agricultural Mechanics

Skills USA

- Welding
- Welding Fabrication

Career Connections

- iCEV50535, Mary Jo Emrick, Adjunct Welding Professor, Austin Community College
- iCEV50773, Dennis Klingman, Manager of Technical Training, Lincoln Electric Welding School
- iCEV50001, Howard Alford, Welder, Self-Employed
- iCEV50633, Brann Shirk, Production Welder, John Deere

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Lab Activities

Sheet Metal Welding

Directions:

During Class 1, remind students about proper safety procedures and review both set-up and shut-down processes for the gas metal arc welding equipment which will be used. During Classes 2 through 8 have students prepare and set up the welding equipment, welding station and conduct the various sheet metal welds presented in the production. Students should then mark each weld with chalk and turn in for inspection. Advise students in ways to improve as well as instruct them on your reasons to pass or fail the weld. Students should redo any welds which did not pass inspection. Once all welds have passed, have students work on any unfinished *Projects* or continue practicing their welding technique.



Projects

Forehand vs. Backhand

Directions:

Students should be able to describe the forehand and backhand welding techniques. They should make a list of pros and cons for each of the techniques and determine which technique they prefer and why they are more comfortable in the position. With the weaker technique, students should describe how they could improve. Have students write a one to two page report on their findings.

Welding Positions

Directions:

There are many different types of welding positions discussed in the presentation. Students should determine their favorite or most comfortable position and the position in which they are weakest or struggle the most. Positions include 1F, 2F, 3F, 4F and 1G. Students should be able to describe how the positions they chose are set up and the type of welding motion used on them. They should also describe why a position is their favorite or most comfortable and why a position is their weakest or why they struggle the most. Remind students to include how they feel they can improve in the position. Have the students write a one to two pages about their findings.