Welding Technology

Career Cluster	Manufacturing
Course Code	13207
Prerequisite(s)	None
Credit	0.5 to 1
Program of Study and Sequence	Cluster Course – **Welding Technology** – Advanced Welding Technology
Student Organization	SkillsUSA
Coordinating Work-Based Learning	Manufacturing tours
Industry Certifications	AWS or OSHA 10
Teacher Certification	Welding; Manufacturing Cluster Endorsement; Welding & Precision Machining Pathway Endorsement
Resources	AWS, National Center for Construction Education (NCCER), and Industry

Course Description:

Welding Technology provides students with an understanding of manufacturing processes and systems common to careers in welding and related industries. Welding Technology is based on, but not limited to, American Welding Society (AWS) Guidelines for the Entry Level Welder.

Program of Study Application

Welding Technology is the first pathway course in the Manufacturing cluster, welding pathway. It follows a cluster course and is a prerequisite for the Advanced Welding course.

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Course Standards

WT 1 Identify and understand welding safety.

Webb Level	*Sub-indicator*	*Integrated Content*
Two Skill/Concept	WT 1.1 Identify and demonstrate proper industry safety standards. Examples: • Complete 10 hour Occupational Safety Health Administration (OSHA) certification • American Welding Society (AWS) Safety Certification • Identify some common hazards in welding • Explain and identify proper personal protections used in welding • Describe how to avoid welding fumes and the dangers associated with them • Identify and explain uses for material Safety Data Sheets (SDS) • Explain safety techniques for storing and handling cylinders • Describe proper material handling methods • Assume responsibilities under HazCom (Hazard Communication) regulations • Maintain a portfolio record of written safety examinations and equipment examinations for which the student has passed	

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WT 2 Read, comprehend, and communicate written and spoken technical terminology and instructions related to welding and welded assemblies

Webb Level	*Sub-indicator*	*Integrated Content*
Two Skill/Concept	WT 2.1 Demonstrate mathematical skills related to work assignments. Examples: • Add, subtract, multiply, and divide whole numbers, fractions, mixed numbers, and decimals • Comprehend, demonstrate, and record measurements derived from using measuring devices • Analyze the functions of angles and parts of a circle • Construct parts using the principles of geometry	
One Recall	WT 2.2 Read and demonstrate understanding of welding terms and definitions from American National Standards Institute (ANSI)/American Welding Society (AWS) A3.0, *Standard Welding Terms and Definitions.* Examples: • Pronounce and use welding terms in conversation and in written work	

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WT 3 Interpret drawings and welding symbol information.

Webb Level	*Sub-indicator*	*Integrated Content*
Three Strategic Thinking	WT 3.1 Read and sketch drawings. Examples: • Sketch parts and assign measurements to the sketch • Identify the six possible views of an object • Label height, width, and depth dimensions	
One Recall	WT 3.2 Identify basic weld symbols. Examples: • Understand basic weld symbols and their location significance within the weld symbol • Understand all supplementary weld symbols • Understand standard location of the elements of a weld symbol • Understand basic joint types	AWS A2.4 Weld symbols chart
One Recall	WT 3.3 Identify lines and joints. Examples: • Label objective, hidden, center, and break lines • Label butt, tee, lap, edge, and corner joints	

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WT 4 Understand and Perform metal cutting operations.

Webb Level	*Sub-indicator*	*Integrated Content*
Two Skill/Concept	WT 4.1 Identify and explain the use of oxyfuel and plasma cutting equipment. Examples: • Set up oxyfuel equipment • Light and adjust an oxyfuel torch • Shut down oxyfuel cutting equipment • Disassemble oxyfuel equipment • Change cylinders on oxyfuel equipment • Use a combination torch with welding, cutting and heating attachments • Properly set plasma cutting parameters • Identify parts of the plasma system torch: electrode, nozzle, contact tip, etc.	
Two Skill/Concept	WT 4.2 Prepare layouts for cutting individual parts. Examples: • Utilize rulers, straightedges, chalklines, scribes and other layout equipment to make a layout suitable for guiding a cutting operation • Use principles of algebra and geometry to assist in complex layout operations	
Two Skill/Concept	WT 4.3 Perform cuts using oxyfuel and plasma cutting processes. Examples: • Cut parts to specific dimensions • Cut shaped parts such as parts with radii and diameters • Cut beveled parts • Perform Piercing operations	

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WT 5 Exhibit knowledge and perform base metal preparation.

Webb Level	*Sub-indicator*	*Integrated Content*
Two Skill/Concept	WT 5.1 Prepare base metal for various welding processes. Examples: • Clean base metal for welding or cutting • Identify and explain joint design • Explain joint design considerations • Mechanically bevel the edge of a mild steel plate • Thermally bevel the end of a mild steel plate • Select the proper joint design based on a welding procedure specification (WPS) or instructor direction	

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WT 6 Understand and Perform Shielded Metal Arc Welding (SMAW) process

Webb Level	*Sub-indicator*	*Integrated Content*
One Recall	WT 6.1 Identify and understand SMAW equipment and setup. Examples: • Identify and explain shielded metal arc welding (SMAW) safety • Explain welding electrical circuit • Identify welding power supplies and their characteristics • Explain how to set up welding power supplies • Set up a machine for welding • Understand the difference between Direct Current Electrode Positive (DCEP) and Direct Current Electrode Negative (DCEN)	
One Recall	WT 6.2 Define and understand the application for different Shielded Metal Arc (SMAW) electrodes. Examples: • Identify electrodes using the AWS specifications • Identify factors that affect electrode selection • Identify different types of filler metals • Explain the storage and control of filler metals • Identify and select the proper electrode for a specific welding task	
Two Skill/Concept	WT 6.3 Demonstrate knowledge of Shielded Metal Arc Welding (SMAW) process. Examples: • Demonstrate fillet welds in one or more positions. (Flat, horizontal (1F, 2F)) • Demonstrate grove welds in one or more positions (Flat, horizontal (1G, 2G)) • Complete a test plate in one or more positions	

Notes

WT 7 Identify and demonstrate knowledge of quality control of the welding process.

Webb Level	*Sub-indicator*	*Integrated Content*
Three Strategic Thinking	WT 7.1 Demonstrate knowledge of weld quality Examples: • Identify and explain codes governing welding • Identify and explain weld imperfections and their causes • Identify and explain nondestructive examination practices • Identify and explain welder qualification tests • Explain the importance of quality workmanship • Identify common destructive testing methods • Perform visual inspection of fillet welds	Acceptance per AWS D1.1 Table 6.1 for 7ga and thicker and AWS D1.3 Table 6.1 for all thinner steel materials.

Notes

WT 8 Participate in career exploration activities

Webb Level	*Sub-indicator*	*Integrated Content*
Two Skill/Concept	WT 8.1 Research career opportunities in manufacturing/welding fields. Examples: • Utilize career exploration software • Research and write a report on career opportunities in the manufacturing field • Utilize the career exploration software to research educational requirements for a chosen career path • Utilize career exploration software, update a student portfolio • Invite local industry experts to speak in the classroom	SD MyLife

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WT 9 Practice ethical work behaviors

Webb Level	***Sub-indicator***	***Integrated Content***
One **Recall**	WT 9.1 Students will follow the following required ethical practices of Manufacturing Industry: • Complete assignments efficiently and on time • Be aware of the importance of attendance • Utilize principles of time management • Present a positive attitude • Work well with peers/supervisor • Be prepared for work assignments	Student handbook and student contract [Lean manufacturing website]

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