



Welding Technology/ Welder

CIP 48.0508

Program Hours / Duration: 2 Year Half Day Program

Course Description: The welding program prepares individuals to apply technical knowledge and skills to join or cut metal surfaces. Includes instruction in arc welding, resistance welding, brazing, cutting, high-energy beam welding and cutting, solid state welding, ferrous and non-ferrous materials, oxidation-reduction reactions, welding metallurgy, welding processes and heat treating, structural design, safety, and applicable codes and standards.

Learning Activities / Modes of Assessment

- Small Group
- Large Group
- Independent Work
- One-on-One
- Classwork Activities
- Presentations
- Research Projects
- Technology Use
- Tests and Quizzes

Individual Resources

- Textbooks
- Workbooks
- Online Resources
- PowerPoint Presentations
- Computer Applications
- Proprietary Welding Technology Software
- Welding Equipment and Tools
- Welding Lab Simulations

Two-Year Scope & Sequence

Year / MP	Task #	K - Know	U - Understand	D - Do (Performance)
Yr 1 – MP 1	101	Safety rules, PPE, shop layout, basic orientation to welding	Understand importance of safety, shop practices, hazard mitigation	Conduct shop safety inspection; quiz on PPE and safety rules
Yr 1 – MP 1	102	Occupational orientation, roles of welding trades	Understand how welding fits in fabrication / manufacturing	Create an infographic 'Welding Trades in Industry'
YR 1 – MP 1	207	Demonstrate proper use of hand tools.	Proper use of tools with safeguards and what PPE is necessary.	Use tools following safety protocols up to industry standards.
Yr 1 – MP 2	103	Introduction to metals: ferrous, non-ferrous, metal properties	Understand differences in metal selection & behavior under heat	Perform a metals identification lab (spark test, hardness test)
Yr 1 – MP 2	104	Basic electrical principles (current, voltage, circuits)	Understand how electricity is used in welding systems	Build a simple circuit on a breadboard; quiz on Ohm's law
Yr 1 – MP 3	105	Blueprint reading: lines, symbols, orthographic projection	Understand how to interpret fabrication drawings	Decode welding symbols; interpret a simple part drawing
Yr 1 – MP 3	106	Oxy-fuel cutting & brazing fundamentals	Understand cutting techniques and	Practical cutting & brazing lab;

			brazing processes	rubric-based assessment
Yr 1 – MP 4	107	Shielded Metal Arc Welding (SMAW) – theory	Understand electrode selection, arc control, weld parameters	Weld basic root and bead passes on plate; destructive test
Yr 1 – MP 4	108	Discuss proper hot work operation.	Hot work activities require planning and safety controls to prevent fires, injuries, and property damage.	Identify hazards and follow hot work procedures before, during, and after operations
Yr 1 – MP 4	501	Perform safety inspections of SMAW equipment.	Equipment inspections help prevent accidents, equipment damage, and unsafe operating conditions.	Inspect SMAW equipment and identify safety concerns before operation.
Yr 1 – MP 4	502	Make minor external repairs to SMAW equipment.	Proper maintenance improves equipment performance, reliability, and workplace safety.	Perform minor external repairs and routine maintenance on SMAW equipment.
Yr 1 – MP 4	503	Set up and operate SMAW equipment.	Correct equipment setup directly impacts weld quality, safety,	Set up welding equipment and produce welds using SMAW processes.

			and productivity.	
Yr 1 – MP 4	508	Pass fillet weld performance test in flat position.	Welding position influences technique, weld quality, and performance outcomes.	Produce a flat-position fillet weld that meets performance testing requirements.
Yr 1 – MP 4	509	Pass fillet weld performance test in horizontal position.	Welding procedures must be adjusted to account for gravity and position-specific challenges.	Produce a horizontal fillet weld that meets performance testing requirements.
Yr 1 – MP 4	510	Pass fillet weld performance test in vertical position.	Advanced welding positions require greater control of heat, puddle management, and technique.	Produce a vertical fillet weld that meets performance testing requirements.
Yr 1 – MP 4	511	Pass fillet weld performance test in overhead position.	Overhead welding requires precise control and adherence to safety practices to produce quality welds.	Produce an overhead fillet weld that meets performance testing requirements.
Yr 1 – MP 4	512	Pass groove weld performance test in flat	Groove welds require proper joint preparation,	Produce a flat-position groove weld that meets performance

		position.	penetration, and fusion to achieve structural integrity.	testing requirements.
Yr 1 – MP 4	513	Pass groove weld performance test in horizontal position.	Welding position affects weld puddle behavior and overall weld quality.	Produce a horizontal groove weld that meets performance testing requirements.
Yr 1 – MP 4	514	Pass groove weld performance test in vertical position.	Weld quality depends on proper technique, travel speed, and heat control in challenging positions.	Produce a vertical groove weld that meets performance testing requirements.
Yr 1 – MP 4	515	Pass groove weld performance test in overhead position.	Mastery of welding processes requires the ability to produce code-quality welds in all positions.	Produce an overhead groove weld that meets performance testing requirements.
Yr 2 – MP 1	201	Identify major types of metals (ferrous and nonferrous) used in welding.	Material characteristics influence welding methods, filler selection, weld quality, and final product performance.	Identify and classify ferrous and nonferrous metals commonly used in welding and fabrication.
Yr 2 – MP 1	601	Perform safety	Equipment	Inspect GMAW

		inspections of GMAW equipment.	inspections help ensure safe operation, prevent accidents, and maintain production efficiency.	equipment and identify safety concerns prior to use.
Yr 2 – MP 1	602	Make minor external repairs to GMAW equipment.	Routine maintenance improves equipment performance, reliability, and workplace safety.	Perform minor external repairs and maintenance procedures on GMAW equipment.
Yr 2 – MP 1	603	Set up and operate GMAW equipment.	Proper machine setup and parameter selection directly affect weld quality and production efficiency.	Set up and operate GMAW equipment according to job specifications and safety standards.
Yr 2 – MP 1	607	Pass fillet weld performance test in flat position.	Welding position affects technique, weld appearance, penetration, and overall quality.	Produce a flat-position fillet weld that meets industry performance standards.
Yr 2 – MP 1	608	Pass fillet weld performance test in horizontal position.	Welders must adjust technique to compensate for gravity and positional challenges.	Produce a horizontal fillet weld that meets industry performance standards.
Yr 2 – MP 1	609	Pass fillet weld	Controlling	Produce a

		performance test in vertical position.	heat input and puddle movement is critical when welding in vertical positions.	vertical fillet weld that meets industry performance standards.
Yr 2 – MP 1	610	Pass fillet weld performance test in overhead position.	Advanced welding positions require increased skill, control, and adherence to safety procedures.	Produce an overhead fillet weld that meets industry performance standards.
Yr 2 – MP 1	611	Pass groove weld performance test in flat position.	Groove weld quality depends on proper joint preparation, penetration, fusion, and technique.	Produce a flat-position groove weld that meets industry performance standards.
Yr 2 – MP 1	612	Pass groove weld performance test in horizontal position.	Position-specific welding techniques influence weld soundness, appearance, and structural integrity.	Produce a horizontal groove weld that meets industry performance standards.
Yr 2 – MP 2	701	Perform safety inspections of FCAW equipment.	Equipment inspections help prevent accidents, ensure operational readiness, and support safe	Inspect FCAW equipment and identify potential safety hazards before operation.

			welding practices.	
Yr 2 – MP 2	702	Make minor external repairs to FCAW equipment.	Proper maintenance improves equipment reliability, performance, and workplace safety.	Perform minor external repairs and routine maintenance on FCAW equipment.
Yr 2 – MP 2	703	Set up and operate FCAW equipment.	Proper equipment setup and adjustment are essential for producing quality welds and maintaining safe operations.	Set up and operate FCAW equipment according to welding specifications and safety standards.
Yr 2 – MP 2	707	Pass fillet weld performance test in flat position.	Welding position affects weld quality, penetration, and technique selection.	Produce a flat-position fillet weld that meets industry performance standards.
Yr 2 – MP 2	708	Pass fillet weld performance test in horizontal position.	Welders must adapt their technique to maintain weld quality in different positions.	Produce a horizontal fillet weld that meets industry performance standards.
Yr 2 – MP 2	709	Pass fillet weld performance test in vertical position.	Heat control and weld puddle management are critical to successful	Produce a vertical fillet weld that meets industry performance standards.

			vertical welding.	
Yr 2 – MP 2	710	Pass fillet weld performance test in overhead position.	Welding overhead requires advanced skill, control, and adherence to safety practices.	Produce an overhead fillet weld that meets industry performance standards.
Yr 2 – MP 2	711	Pass groove weld performance test in flat position.	Proper joint preparation, penetration, and fusion are important for structural weld quality.	Produce a flat-position groove weld that meets industry performance standards.
Yr 2 – MP 2	712	Pass groove weld performance test in horizontal position.	Position-specific welding techniques influence weld soundness and structural integrity.	Produce a horizontal groove weld that meets industry performance standards.
Yr 2 – MP 2	713	Pass groove weld performance test in vertical position.	Successful vertical groove welds require consistent control of travel speed, heat, and electrode manipulation.	Produce a vertical groove weld that meets industry performance standards.
Yr 2 – MP 2	714	Pass groove weld performance test in overhead position.	Professional welders must demonstrate the ability to create code-quality welds in all positions.	Produce an overhead groove weld that meets industry performance standards.

Yr 2 – MP 2	204	Describe industry-accepted welding codes, standards, and procedures and their use.	Welding codes and standards ensure quality, safety, consistency, and compliance throughout the fabrication industry.	Interpret and apply welding codes, standards, and procedures to welding projects.
Yr 2 – MP 2	801	Perform safety inspections of GTAW equipment.	Equipment inspections help prevent accidents, ensure operational readiness, and support safe welding practices.	Inspect GTAW equipment and identify potential safety concerns before operation.
Yr 2 – MP 2	802	Make minor external repairs to GTAW equipment.	Preventive maintenance improves equipment performance, reliability, and workplace safety.	Perform minor external repairs and routine maintenance on GTAW equipment.
Yr 2 – MP 2	803	Set up and operate GTAW equipment.	Proper equipment setup and parameter selection directly influence weld quality, precision, and efficiency.	Set up and operate GTAW equipment according to welding specifications and safety procedures.
Yr 2 – MP 2	806	Set up and operate GTAW	Different materials	Configure and operate GTAW

		on nonferrous materials.	require specific welding techniques, settings, and handling procedures to produce quality welds.	equipment on nonferrous materials using appropriate procedures.
Yr 2 – MP 2	809	Pass fillet weld performance test in flat position on ferrous materials.	Welding position affects heat control, weld appearance, penetration, and weld quality.	Produce a flat-position fillet weld on ferrous material that meets industry performance standards.
Yr 2 – MP 2	810	Pass fillet weld performance test in horizontal position on ferrous materials.	Position-specific welding techniques are required to maintain weld quality and structural integrity.	Produce a horizontal fillet weld on ferrous material that meets industry performance standards.
Yr 2 – MP 2	811	Pass fillet weld performance test in vertical position on ferrous materials.	Successful welding requires consistent control of heat, travel speed, and weld puddle behavior.	Produce a vertical fillet weld on ferrous material that meets industry performance standards.
Yr 2 – MP 2	812	Pass fillet weld performance test in overhead position on ferrous	Advanced welding positions demand greater skill, precision, and safety	Produce an overhead fillet weld on ferrous material that meets industry performance

		materials.	awareness.	standards.
Yr 2 – MP 2	813	Pass fillet weld performance test in flat position on nonferrous materials.	Material characteristics influence welding techniques and operating parameters.	Produce a flat-position fillet weld on nonferrous material that meets industry performance standards.
Yr 2 – MP 2	814	Pass fillet weld performance test in horizontal position on nonferrous materials.	Weld quality depends on adapting techniques to material properties and welding position.	Produce a horizontal fillet weld on nonferrous material that meets industry performance standards.
Yr 2 – MP 2	815	Pass fillet weld performance test in vertical position on nonferrous materials.	Welding different materials requires adjustments in heat control, filler selection, and technique.	Produce a vertical fillet weld on nonferrous material that meets industry performance standards.
Yr 2 – MP 2	816	Pass fillet weld performance test in overhead position on nonferrous materials.	Professional welders must consistently produce high-quality welds across materials and positions to meet industry expectations.	Produce an overhead fillet weld on nonferrous material that meets industry performance standards.
Yr 2 – MP 3	205	Weld discontinuities, defects, NDT / visual	Understand defect types, root causes, inspection	Perform visual & dye-penetrant tests; document

		inspection	methods	defects
Yr 2 – MP 3	206	Clean and prepare materials for welding and/or cutting.	Proper material preparation directly impacts weld quality, strength, appearance, and overall project success.	Prepare materials using appropriate cleaning and preparation methods prior to welding or cutting operations.
Yr 2 – MP 3	901	Perform safety inspections of OFC equipment.	Equipment inspections help identify hazards and ensure safe oxy-fuel cutting operations.	Inspect oxy-fuel cutting equipment and identify potential safety concerns before use.
Yr 2 – MP 3	902	Make minor external repairs to OFC equipment.	Routine maintenance improves equipment reliability, efficiency, and workplace safety.	Perform minor external repairs and maintenance on oxy-fuel cutting equipment.
Yr 2 – MP 3	903	Set up for manual OFC operations on steel.	Proper equipment setup ensures cutting quality, efficiency, and safe operation.	Set up manual oxy-fuel cutting equipment according to specifications and safety requirements.
Yr 2 – MP 3	904	Operate manual OFC equipment.	Effective equipment operation requires the application of safe work practices and	Operate oxy-fuel cutting equipment to perform assigned cutting tasks safely and

			proper cutting techniques.	efficiently.
Yr 2 – MP 3	905	Perform straight cutting operations on steel.	Precise cutting techniques contribute to dimensional accuracy and fabrication quality.	Produce straight cuts that meet project specifications and quality standards.
Yr 2 – MP 3	906	Perform shape cutting operations on steel.	Various cutting techniques allow fabricators to create components that meet design requirements.	Produce shape cuts on steel according to specified dimensions and layouts.
Yr 2 – MP 3	907	Perform bevel cutting operations on steel.	Bevel preparation influences weld penetration, fit-up, and structural performance.	Produce bevel cuts that meet welding and fabrication requirements.
Yr 2 – MP 3	908	Perform piercing operations on steel.	Specialized cutting operations expand fabrication capabilities and improve production flexibility.	Perform piercing operations safely and accurately on steel materials.
Yr 2 – MP 3	1001	Perform safety inspections of mechanized	Inspection procedures prevent	Inspect mechanized OFC equipment

		OFC equipment.	equipment failures and promote safe mechanized cutting operations.	and identify maintenance or safety concerns.
Yr 2 – MP 3	1002	Make minor external repairs to mechanized OFC equipment.	Proper maintenance extends equipment life and supports consistent cutting performance.	Perform minor external repairs and maintenance on mechanized OFC equipment.
Yr 2 – MP 3	1003	Set up and operate mechanized OFC equipment on steel.	Mechanized cutting systems improve precision, consistency, and production efficiency.	Set up and operate mechanized OFC equipment according to job specifications.
Yr 2 – MP 3	1004	Perform straight mechanized OFC operations on steel.	Automated systems improve repeatability and accuracy during fabrication processes.	Produce straight mechanized cuts that meet quality and dimensional requirements.
Yr 2 – MP 3	1005	Perform bevel mechanized OFC operations on steel.	Proper bevel cuts support successful weld preparation and structural integrity.	Produce bevel cuts using mechanized OFC equipment according to specifications.
Yr 2 – MP 3	1101	Perform safety inspections of PAC equipment.	Equipment inspections help ensure safe operation	Inspect PAC equipment and identify potential safety

			and prevent accidents during plasma cutting.	issues before operation.
Yr 2 – MP 3	1102	Make minor external repairs to PAC equipment.	Preventive maintenance improves reliability, efficiency, and equipment longevity.	Perform minor external repairs and routine maintenance on PAC equipment.
Yr 2 – MP 3	1103	Set up and operate manual PAC operations on ferrous and nonferrous materials.	Different materials require adjustments in equipment setup and operating procedures for quality results.	Set up and operate PAC equipment on ferrous and nonferrous materials.
Yr 2 – MP 3	1104	Perform straight and shape PAC operations on ferrous and nonferrous materials.	Precision cutting techniques affect part accuracy, material usage, and fabrication quality.	Produce straight and shape cuts that meet design and quality requirements.
Yr 2 – MP 3	1105	Perform gouging and scarfing PAC operations to remove base and weld metal.	Material removal processes support weld repair, preparation, and fabrication efficiency.	Perform gouging and scarfing operations safely and effectively using PAC equipment.
Yr 2 – MP 3	1201	Perform safety inspections of CAC-A	Safety inspections help identify	Inspect CAC-A equipment and accessories

		equipment and accessories.	equipment defects and reduce workplace hazards.	before operation.
Yr 2 – MP 3	1202	Make minor external repairs to CAC-A equipment and accessories.	Routine maintenance helps ensure reliable performance and safe operation.	Perform minor external repairs and maintenance on CAC-A equipment and accessories.
Yr 2 – MP 3	1203	Set up and operate manual CAC-A gouging and cutting operations on steel.	Proper setup and operation are necessary to achieve safe and efficient material removal.	Set up and operate CAC-A equipment for gouging and cutting steel.
Yr 2 – MP 3	1204	Perform gouging and scarfing operations to remove base and weld metal on steel.	Material removal techniques are important for weld repair, joint preparation, and quality improvement.	Perform gouging and scarfing operations that meet fabrication and repair requirements.
Yr 2 – MP 4	Value-Added Task	Pipe welding fundamentals (5G, 6G positions)	Understand positional challenges, root passes, backing gas	Weld open-root pipe in 5G/6G positions; inspect with acceptance criteria
Yr 2 – MP 4	Value-Added Task	Capstone Project & Certification prep	Understand integration of all learned skills, AWS standards	Complete a comprehensive weldment project; mock certification

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