



MANUAL METAL ARC WELDING

TECHNICAL-PROFESSIONAL

Grade 12

**Three-Term Budget Of Work (BOW)
for Learning Competencies**

**TECHNICAL-PROFESSIONAL
CONSTRUCTION AND BUILDING TECHNOLOGIES
Grade 12**

**Three-Term Budget Of Work
For Learning Competencies**

Please note that each Tech-Pro elective is completed in one term if delivered at Grade 12.

Elective	Manual Metal Arc Welding
Prerequisite	None
Content Standard	Demonstrate an understanding of the concepts and principles of Manual Metal Arc Welding Process (MMAW).
Performance Standard	The learners perform setting-up welding machines, accessories, jigs and fixtures, stringer and weave bead patterns in carbon steel plates. Joint fit-up in workpiece/weld specimen and inspect visually following the safety precautions.

Week	Learning Competency	Suggested Activities
1	Discuss the overview of manual metal arc welding process.	Arc Process Breakdown - A collaborative activity where learners analyze and explain the complete overview of the Manual Metal Arc Welding process, including its principles, equipment, step-by-step procedure, and safety precautions. - Divide learners into groups and have each group create and present a

Week	Learning Competency	Suggested Activities
		labeled flowchart explaining the MMAW process from equipment setup to slag removal. • Welding Process Mapping ◦ A visual-learning activity where learners synthesize their understanding of the MMAW process by identifying key stages, materials, and safety measures involved in shielded metal arc welding. ◦ Ask learners to design a process map or diagram illustrating and briefly explaining each stage of the manual metal arc welding operation.
	• Discuss the weld joint design.	• Joint Design Explorer ◦ A collaborative discussion activity where learners examine and differentiate common weld joint designs—butt joint, lap joint, tee joint, corner joint, and edge joint—and explain their structure, applications, and advantages in fabrication work. ◦ Assign each group one weld joint type to illustrate, describe its features and uses, and present their explanation to the class. • Weld Joint Analysis Workshop

Week	Learning Competency	Suggested Activities
		○ An analytical activity where learners evaluate different weld joint designs based on strength, material thickness, and intended application, and explain why specific joint designs are selected in welding projects. ○ Provide sample fabrication scenarios and have learners identify and justify the most appropriate weld joint design for each case through guided discussion.
	● Interpret technical drawing, sketches and welding symbols in reading blueprints/plans.	● Blueprint Symbol Hunt ○ An interactive activity where learners examine sample welding blueprints and identify, interpret, and explain common welding symbols (e.g., fillet weld, groove weld, size, length, contour, and finish symbols) used in fabrication drawings. ○ Provide learners with a sample welding blueprint and ask them to locate, label, and explain the meaning of all welding symbols shown. ● Sketch-to-Plan Interpretation Challenge ○ A practical analysis activity where learners interpret technical sketches and translate welding symbols and

Week	Learning Competency	Suggested Activities
		dimensions into a clear explanation of the required weld type, size, location, and joint design. ○ Give learners a technical drawing with welding symbols and require them to write a brief interpretation describing the weld specifications and joint requirements indicated in the plan.
	● Discuss welding procedure specification (WPS).	● WPS Breakdown Workshop ○ A guided discussion activity where learners examine the parts of a Welding Procedure Specification (WPS), including welding process, base metal, filler metal, positions, amperage, voltage, and safety requirements, and explain the purpose of each section. ○ Provide a sample WPS form and have learners highlight and explain the function of each major section in small groups. ● Create-a-WPS Activity ○ An applied learning task where learners synthesize their understanding by drafting a simple WPS for a given welding scenario, demonstrating comprehension of

Week	Learning Competency	Suggested Activities
		required variables and procedure details. ○ Present a basic welding task scenario and instruct learners to complete a simplified WPS form based on the given requirements.
2	• Discuss occupational safety and health (OSH).	• Shop Hazard Hunt ○ An awareness-building activity where learners identify common workshop hazards (electrical, fire, fumes, sharp tools, improper PPE use) and explain how proper Occupational Safety and Health (OSH) practices prevent accidents and injuries. ○ Let learners inspect a simulated workshop setup and list identified hazards with corresponding OSH preventive measures. • OSH Role-Play and Response Drill ○ An interactive discussion activity where learners demonstrate understanding of Occupational Safety and Health (OSH) principles by responding to simulated workplace accident scenarios and explaining correct safety procedures.

Week	Learning Competency	Suggested Activities
		Assign groups different workplace incident scenarios and have them role-play the correct OSH response and explain the safety rules applied.
	Perform setting-up welding machine, accessories, positioners, jigs and fixtures.	Welding Equipment Setup Drill - A hands-on performance activity where learners correctly prepare and set up the welding machine, connect accessories (electrode holder, ground clamp), adjust machine settings, and inspect cables and PPE following proper shop procedures. - In small groups, require learners to properly assemble and set up a welding station following a provided setup checklist and safety standards. Jigs and Fixtures Alignment Task - A practical workshop activity where learners install and align workpieces using positioners, jigs, and fixtures to ensure correct joint alignment, stability, and welding position before actual welding. - Provide a sample joint project and instruct learners to set up and secure the materials using appropriate jigs, fixtures, and positioners according to

Week	Learning Competency	Suggested Activities
		the given specifications.
	Prepare tools, materials and equipment for stringer and weave beads.	Bead Preparation Checklist Challenge - A structured hands-on activity where learners identify, inspect, and organize the correct tools, electrodes, base metals, PPE, and welding machine settings needed specifically for producing stringer beads and weave beads. - Provide a preparation checklist and require learners to gather, inspect, and properly set up all tools and materials for performing stringer and weave bead welding. Setup Simulation for Bead Types - A practical workshop simulation where learners compare preparation requirements for stringer beads and weave beads, including electrode selection, amperage setting, plate cleaning, and work positioning. - Assign learners two welding scenarios (stringer and weave) and have them prepare and justify the correct tools, materials, and machine settings for each task before welding.

Week	Learning Competency	Suggested Activities
3	Perform stringer and weave bead patterns in carbon steel plates.	Stringer Bead Control Practice - A hands-on skill development activity where learners perform straight stringer bead runs on carbon steel plates to develop proper arc length control, travel speed, electrode angle, and bead consistency. - Instruct learners to deposit multiple straight stringer beads on a carbon steel plate while maintaining correct arc length, travel speed, and electrode positioning according to set standards. Weave Bead Pattern Application - A practical welding performance activity where learners execute weave bead patterns on carbon steel plates, focusing on side-to-side motion control, uniform bead width, proper fusion, and slag removal. - Require learners to perform controlled weave bead passes on prepared carbon steel plates following specified width, movement pattern, and safety procedures.
	Perform visual weld inspection.	Weld Defect Detection Lab

Week	Learning Competency	Suggested Activities
		○ A hands-on inspection activity where learners examine welded specimens to identify visible weld discontinuities such as cracks, porosity, undercut, overlap, incomplete fusion, and excessive spatter using proper lighting and measuring tools. ○ Provide welded samples and have learners visually inspect, identify, and record observable weld defects using a visual inspection checklist. ● Visual Inspection Simulation and Reporting ○ A performance-based task where learners simulate the role of a welding inspector by evaluating bead appearance, size, contour, and surface quality against given standards and preparing an inspection report. ○ Assign learners a welded plate to assess and require them to complete a visual inspection report stating acceptability based on specified criteria.
	● Apply joint fit-up of the workpiece/ weld specimen.	● Workpiece Alignment Drill ○ A hands-on activity where learners practice properly positioning, aligning,

Week	Learning Competency	Suggested Activities
		and securing two or more metal pieces using clamps, tack welds, and measuring tools to ensure correct joint fit-up before welding. ○ Have learners align and clamp metal plates according to specified joint design, then check for correct gaps, angles, and fit-up tolerances before tacking. ● Joint Gap and Fixture Adjustment Task ○ A practical workshop activity where learners adjust jigs, fixtures, and workpiece spacing to achieve proper alignment and root openings suitable for welding, simulating real fabrication conditions. ○ Assign learners a weld specimen and instruct them to adjust fixtures and workpiece gaps to achieve precise joint fit-up according to drawing specifications.

Suggested Performance Tasks	• Individual Task: Weld Mastery Challenge ○ An individual performance task where learners set up their welding station, prepare and fit-up a carbon steel workpiece, perform both stringer and weave bead patterns, and conduct visual inspection of their own welds while following all safety rules. ○ Each learner sets up the welding machine and accessories, fit-ups the workpiece, welds stringer and weave beads on carbon steel plates, and visually inspects their welds for quality and defects. • Group Task: Welding Station Simulation ○ A collaborative task where groups of learners organize a complete welding station, assign roles for machine setup, joint fit-up, bead welding, and visual inspection, ensuring safety procedures are followed throughout the process. ○ In groups, learners set up a welding station, prepare and fit-up the workpieces, execute stringer and weave beads collaboratively, and perform visual inspection on each member's welds while following safety precautions.
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Content Standard	Demonstrate an understanding of the concepts and principles of the fillet welding in carbon steel plates in PA (1F), PC (2F), PF (3F) and PE (4F) positions.
Performance Standard	The learners perform fillet welding procedures in carbon steel plates in PA (1F), PC (2F), PF (3F) and PE (4F) positions, following the safety precautions. Inspect visually and compute the service cost based on job requirements.

Week	Learning Competency	Suggested Activities
4	• Discuss fillet welding in carbon steel plates and the prescribed welding positions; PA (1F), PC	• Fillet Welding Position Exploration

Week	Learning Competency	Suggested Activities
	(2F), PF (3F) and PE (4F).	○ An interactive discussion activity where learners examine carbon steel fillet welds in different positions (flat, horizontal, vertical, and overhead), identifying characteristics, techniques, and challenges of PA, PC, PF, and PE welding. ○ Provide sample plates or diagrams and have learners describe and compare fillet welds in PA, PC, PF, and PE positions. ● Welding Position Demonstration Drill ○ A practical skills activity where learners observe or simulate welding in all four prescribed positions on carbon steel plates to understand electrode angles, bead movement, and position-specific techniques. ○ Have learners practice or watch demonstrations of fillet welding in PA (1F), PC (2F), PF (3F), and PE (4F) positions and note key handling techniques and bead appearance.
	● Prepare tools, materials and equipment for fillet welding.	● Fillet Welding Setup Drill ○ A hands-on preparation activity where learners gather, inspect, and organize all necessary tools, electrodes, PPE,

Week	Learning Competency	Suggested Activities
		and equipment specifically for fillet welding operations on carbon steel plates. ○ Have learners assemble and check all tools, electrodes, machine settings, and PPE required for fillet welding before starting the welding task. ● Material and Equipment Checklist Exercise ○ A group-based activity where learners create a checklist of materials, accessories, and welding equipment needed for fillet welding and verify their availability and condition for safe use. ○ In groups, learners develop and use a checklist to prepare and inspect all tools, electrodes, and equipment for fillet welding, ensuring readiness and safety compliance. ●
	● Perform fillet welding in carbon steel plates PA (1F) position.	● PA Position Fillet Bead Practice ○ A hands-on activity where learners practice producing straight and uniform fillet welds on carbon steel plates in the flat (PA/1F) position, focusing on proper electrode angle,

Week	Learning Competency	Suggested Activities
		travel speed, and bead consistency. - Have learners set up their station and weld multiple fillet beads on carbon steel plates in the PA (1F) position while maintaining correct technique and safety precautions. Fillet Bead Quality Inspection Drill - A performance review activity where learners assess their own PA (1F) fillet welds for bead size, penetration, uniformity, and surface quality, reinforcing proper technique and visual inspection skills. - After welding, learners visually inspect their PA (1F) fillet welds and record observations on bead quality, consistency, and defects for self-evaluation.
5	Perform fillet welding in carbon steel plates in PC (2F) position.	PC (2F) Fillet Bead Practice - A hands-on activity where learners practice fillet welding on carbon steel plates in the horizontal (PC/2F) position, emphasizing proper electrode angle, travel speed, and maintaining bead uniformity along the joint.

Week	Learning Competency	Suggested Activities
		- Have learners set up a carbon steel workpiece in the PC (2F) position and perform multiple fillet beads while observing correct technique and safety procedures. Horizontal Fillet Weld Quality Check - A skill reinforcement activity where learners visually inspect their PC (2F) fillet welds for proper bead shape, penetration, and consistency, identifying any defects for correction. - After welding, learners examine their horizontal fillet welds and record observations on bead quality, defects, and uniformity for self-assessment.
	Perform fillet welding in carbon steel plates in PF (3F) position.	Vertical Fillet Bead Practice (PF/3F) - A hands-on activity where learners practice performing fillet welds on carbon steel plates in the vertical (PF/3F) position, focusing on controlling electrode angle, travel speed, and bead uniformity. - Have learners set up carbon steel plates in the PF (3F) vertical position and weld multiple fillet beads while maintaining proper technique and safety precautions.

Week	Learning Competency	Suggested Activities
		• Vertical Weld Inspection Drill ◦ A performance reinforcement activity where learners visually inspect their PF (3F) fillet welds for bead shape, penetration, uniformity, and defects to reinforce proper welding technique. ◦ After welding, learners examine their PF (3F) fillet beads and record observations on bead quality and defects for self-evaluation.
6	• Perform fillet welding in carbon steel plates in PE (4F) position.	• Overhead Fillet Bead Practice (PE/4F) ◦ A hands-on welding activity where learners perform fillet welds on carbon steel plates in the overhead (PE/4F) position, emphasizing proper electrode control, travel speed, and maintaining bead consistency under challenging angles. ◦ Have learners set up carbon steel plates for PE (4F) overhead welding and perform multiple fillet beads while following proper technique and safety procedures. • Overhead Weld Quality Check ◦ A visual inspection activity where learners examine their PE (4F) fillet

Week	Learning Competency	Suggested Activities
		welds for bead shape, uniformity, penetration, and possible defects, reinforcing welding accuracy and quality awareness. After welding, learners visually inspect their overhead fillet welds and record observations on bead quality, uniformity, and defects for self-assessment.
	Perform visual weld inspection.	Weld Defect Identification Lab - A hands-on activity where learners examine welded specimens to identify common visual defects such as cracks, porosity, undercut, overlap, incomplete fusion, and uneven bead appearance. - Provide welded samples and have learners inspect, identify, and label visible defects on each weld using a visual inspection checklist. Peer Weld Inspection Exercise - A collaborative activity where learners evaluate each other's welds, compare findings, and discuss how identified defects can be corrected to improve weld quality. - Have learners inspect a peer's welds,

Week	Learning Competency	Suggested Activities
		record observations on bead quality and defects, and discuss corrective measures in small groups.
	• Compute the service cost based on the job requirements.	• Individual Service Cost Calculation ○ A problem-solving activity where learners calculate the total service cost for a given welding or fabrication job by considering materials, labor hours, machine use, and overhead expenses. ○ Provide learners with a job scenario and required data, and have them compute the total service cost using a cost computation formula. • Group Job Cost Analysis ○ A collaborative activity where learners work in groups to analyze a project's job requirements, estimate material quantities, labor, and other costs, and prepare a detailed service cost breakdown. ○ Assign each group a fabrication job scenario and have them calculate and present the total service cost based on materials, labor, and overhead.

Content Standard	Demonstrate an understanding of the concepts and principles of the groove welding in carbon steel plates in PA (1G), PC (2G), PF (3G) and PE (4G) positions.
Performance Standard	The learners perform groove welding procedures in carbon steel plates in PA (1G), PC (2G), PF (3G) and PE (4G) positions following the safety precautions. Inspect visually and compute the service cost based on job requirements

Week	Learning Competency	Suggested Activities
7	Discuss groove welding in carbon steel plates and the prescribed welding positions; PA (1G), PC (2G), PF (3G) and PE (4G).	Groove Welding Position Exploration - An interactive activity where learners examine and discuss the characteristics, techniques, and challenges of groove welding in PA, PC, PF, and PE positions on carbon steel plates. - Provide diagrams or sample plates and have learners identify and describe the differences and techniques for groove welding in each position (PA, PC, PF, PE). Position Demonstration and Analysis Drill - A practical observation activity where learners watch demonstrations of groove welding in all four positions and analyze electrode angles, travel speed, and bead appearance for each welding position.

Week	Learning Competency	Suggested Activities
		Have learners observe or simulate groove welding in PA, PC, PF, and PE positions and record key observations about technique, bead quality, and position-specific considerations.
	Prepare tools, materials and equipment for groove welding carbon steel plates.	Groove Welding Setup Drill - A hands-on activity where learners gather, inspect, and organize all necessary tools, electrodes, PPE, and equipment specifically for groove welding operations on carbon steel plates. - Have learners assemble and check all tools, electrodes, machine settings, and PPE required for performing groove welding on carbon steel plates. Materials and Equipment Checklist Exercise - A group-based activity where learners create a checklist of materials, accessories, and welding equipment needed for groove welding and verify their availability and condition. - In groups, learners develop and use a checklist to prepare and inspect all tools, electrodes, and equipment for groove welding, ensuring readiness

Week	Learning Competency	Suggested Activities
		and safety compliance.
	Perform groove welding in carbon steel plates in PA (1G) position.	PA (1G) Groove Bead Practice - A hands-on activity where learners perform groove welds on carbon steel plates in the flat (PA/1G) position, focusing on proper electrode angle, travel speed, and achieving consistent bead penetration. - Have learners set up carbon steel plates in PA (1G) position and perform multiple groove welds while maintaining correct technique and safety precautions. Groove Weld Quality Inspection Drill - A visual inspection activity where learners assess their own PA (1G) groove welds for bead shape, penetration, uniformity, and defects to reinforce proper welding technique. - After welding, learners visually inspect their PA (1G) groove welds and record observations on bead quality, uniformity, and defects for self-assessment.
8	Perform groove welding in carbon steel plates in PC (2G) position.	PC (2G) Groove Bead Practice - A hands-on activity where learners

Week	Learning Competency	Suggested Activities
		perform groove welds on carbon steel plates in the horizontal (PC/2G) position, focusing on controlling electrode angle, travel speed, and bead consistency along the joint. - Have learners set up carbon steel plates in PC (2G) position and weld multiple groove beads while maintaining proper technique and safety precautions. Horizontal Groove Weld Inspection Drill - A visual inspection activity where learners evaluate their PC (2G) groove welds for bead uniformity, penetration, and surface quality, reinforcing quality control skills. - After welding, learners inspect their PC (2G) groove welds and record observations on bead consistency, defects, and overall quality for self-assessment.
Suggested Performance Tasks	Individual Task: Fillet Welding Mastery and Cost Computation - An individual performance task where learners perform fillet welding on carbon steel plates in all four positions (PA, PC, PF, PE), conduct a visual inspection of their welds, and calculate the service cost for their welding job.	

	- Each learner welds carbon steel plates in PA, PC, PF, and PE positions, visually inspects their work for quality, and computes the total service cost based on materials, labor, and overhead. Group Task: Collaborative Welding and Job Cost Analysis - A group performance task where learners collectively set up welding stations, assign roles for welding in the four positions, inspect each other's work visually, and prepare a group computation of the service cost for the entire project. - In groups, learners perform fillet welding in all four positions, inspect each member's welds for quality, and collaboratively calculate the total service cost for the assigned project.
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Content Standard	Demonstrate an understanding of the concepts and principles of the groove welding in carbon steel plates in PA (1G), PC (2G), PF (3G) and PE (4G) positions.
Performance Standard	The learners perform groove welding procedures in carbon steel plates in PA (1G), PC (2G), PF (3G) and PE (4G) positions following the safety precautions. Inspect visually and compute the service cost based on job requirements.

Week	Learning Competency	Suggested Activities
8	Perform groove welding in carbon steel plates in a PF (3G) position.	PF (3G) Vertical Groove Bead Practice - A hands-on activity where learners perform groove welds on carbon steel plates in the vertical (PF/3G) position, focusing on electrode control, travel speed, and proper bead penetration. - Have learners set up carbon steel plates in PF (3G) position and weld

Week	Learning Competency	Suggested Activities
		multiple vertical groove beads while maintaining proper technique and safety precautions. • Vertical Groove Weld Inspection Drill ◦ A visual inspection activity where learners assess their PF (3G) groove welds for bead shape, uniformity, penetration, and surface quality to reinforce proper welding technique. ◦ After welding, learners visually inspect their PF (3G) groove welds and record observations on bead consistency, penetration, and defects for self-assessment.
	• Perform groove welding in carbon steel plates in the PE (4G) position.	• PE (4G) Overhead Groove Bead Practice ◦ A hands-on activity where learners perform groove welds on carbon steel plates in the overhead (PE/4G) position, focusing on electrode control, travel speed, and bead penetration under challenging angles. ◦ Have learners set up carbon steel plates for PE (4G) overhead welding and perform multiple groove beads while maintaining proper technique and safety precautions. • Overhead Groove Weld Inspection Drill

Week	Learning Competency	Suggested Activities
		○ A visual inspection activity where learners evaluate their PE (4G) groove welds for bead uniformity, penetration, and surface quality, reinforcing proper welding technique and quality assessment skills. ○ After welding, learners visually inspect their PE (4G) groove welds and record observations on bead consistency, penetration, and defects for self-assessment.
9	● Perform visual weld inspection.	● Weld Defect Identification Lab ○ A hands-on activity where learners examine welded samples to identify common visible weld defects such as cracks, porosity, undercut, overlap, incomplete fusion, and uneven bead appearance. ○ Provide learners with welded samples and have them visually inspect and label all detectable defects using a checklist. ● Peer Weld Inspection Exercise ○ A collaborative activity where learners inspect each other's welds, discuss observed defects, and suggest

Week	Learning Competency	Suggested Activities
		corrective actions to improve weld quality. ○ In pairs or small groups, learners inspect peer welds, record observations on bead quality and defects, and discuss ways to correct or improve the welds.
	• Compute the service cost based on the job requirements.	• Cost Breakdown Workshop ○ Learners analyze a sample industrial project (e.g., furniture making or metal fabrication) to identify labor, materials, and overhead costs, then calculate the total service cost. ○ Using the project specifications, list all materials, labor hours, and overhead percentages, then compute the total service cost. • Service Quotation Simulation ○ Learners role-play as service providers preparing a quotation for a client's request, including itemized costs, labor charges, and profit margin. ○ Review the client's requirements, assign costs to each component, add labor and profit, and produce a final service quotation.

Suggested Performance Tasks	• Individual Task: Groove Welding Proficiency and Cost Computation ○ An individual task where learners perform groove welds on carbon steel plates in all four positions (PA, PC, PF, PE), visually inspect the welds for quality, and calculate the service cost of their welding job. ○ Each learner welds carbon steel plates in PA, PC, PF, and PE groove positions, inspects their welds visually, and computes the total service cost based on materials, labor, and overhead. • Group Task: Collaborative Groove Welding and Cost Analysis ○ A group task where learners work together to perform groove welds in all four positions, inspect each other's work, and jointly prepare a detailed service cost computation for the completed project. ○ In groups, learners divide welding tasks in PA, PC, PF, and PE positions, inspect all welds for quality, and collaboratively compute the total service cost for the project.
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Content Standard	Demonstrate an understanding of the concepts and principles of groove welding in carbon steel pipes in PA (1G), PC (2G), PH (5G) and H-LO45 (6G) positions.
Performance Standard	The learners perform groove welding in carbon steel pipes in PA (1G), PC (2G), PH (5G) and H-LO45 (6G) positions following the safety precautions. Inspect visually and compute the service cost based on job requirements.

Week	Learning Competency	Suggested Activities
9	• Discuss groove welding in carbon steel plates and the prescribed welding positions; PA (1G), PC (2G), PH (5G) and H-LO45 (6G).	• Groove Welding Demonstration ○ Learners observe an instructor perform groove welding on carbon

Week	Learning Competency	Suggested Activities
		steel plates in different positions (PA, PC, PH, H-LO45), noting techniques, angles, and safety precautions. ○ Watch the demonstration carefully and record the welding positions, electrode angles, and travel speeds for each groove weld. ● Welding Position Simulation ○ Learners practice setting up carbon steel plates in the specified welding positions using a mock or virtual welding setup to understand the challenges of each orientation. ○ Arrange plates in 1G, 2G, 5G, and 6G positions and simulate welding motions while observing proper positioning and safety protocols.
	● Prepare tools, materials and equipment for groove welding in carbon steel pipes.	● Welding Materials Checklist ○ Learners identify and organize all necessary materials (carbon steel pipes, electrodes, filler metals) and consumables needed for groove welding. ○ Inspect the welding area and create a complete checklist of materials and consumables required for the assigned pipe welding task.

Week	Learning Competency	Suggested Activities
		• Equipment Setup Drill ○ Learners set up welding machines, clamps, and safety gear to ensure proper and safe welding preparation for carbon steel pipes. ○ Arrange and connect all welding equipment and tools according to manufacturer guidelines, ensuring proper safety measures are in place.
10	• Perform groove welding in carbon steel pipes in PA (1G) position.	• Pipe Alignment Practice ○ Learners practice properly aligning carbon steel pipes for groove welding in the PA (1G) position to ensure a clean and straight weld joint. ○ Arrange and clamp two carbon steel pipes horizontally, making sure the edges are properly aligned and gap-free for welding. • PA (1G) Groove Welding Drill ○ Learners perform actual groove welding on carbon steel pipes in the flat (1G) position, focusing on correct electrode angle, speed, and bead quality. ○ Weld the prepared horizontal pipe joint using proper electrode angle,

Week	Learning Competency	Suggested Activities
		travel speed, and safety precautions to produce a continuous groove weld.
	Perform groove welding in carbon steel pipes PC (2G) position.	Vertical Pipe Setup - Learners practice properly positioning and clamping carbon steel pipes for groove welding in the vertical (2G) position to ensure stability and accurate alignment. - Secure two carbon steel pipes vertically in a clamp or fixture, ensuring the joint is aligned for smooth vertical welding. PC (2G) Groove Welding Drill - Learners perform groove welding on carbon steel pipes in the vertical 2G position, focusing on controlling weld pool, travel speed, and electrode angle. - Weld the vertical pipe joint with consistent upward or downward motion while maintaining proper electrode angle and bead quality.
	Perform groove welding in carbon steel pipes PH (5G) position.	Horizontal Pipe Rigging - Learners practice positioning and securing carbon steel pipes in the PH (5G) position, which involves

Week	Learning Competency	Suggested Activities
		horizontal rotation of the pipe for welding. - Mount the pipe on a rotatable fixture, ensuring it is stable and aligned for welding while allowing controlled rotation. 5G Groove Welding Drill - Learners perform groove welding on carbon steel pipes in the PH (5G) position, focusing on maintaining proper weld quality while the pipe is rotated. - Weld the rotating horizontal pipe joint steadily, adjusting electrode angle and speed to produce a uniform groove weld.
	Perform groove welding in carbon steel pipes H-LO45 (6G) position.	6G Pipe Setup & Alignment - Learners practice positioning carbon steel pipes at a 45° inclined angle (6G position) and securing them for groove welding, emphasizing proper alignment and stability. - Clamp the pipe at a 45° angle on a rotatable fixture, ensuring it is stable and properly aligned for welding. 6G Groove Welding Drill - Learners perform groove welding on

Week	Learning Competency	Suggested Activities
		carbon steel pipes in the H-LO45 (6G) position, focusing on controlling the weld pool, travel speed, and electrode angle in the challenging inclined position. Weld the inclined pipe joint steadily, adjusting electrode angle and speed to maintain a consistent groove weld while rotating or manipulating the pipe as needed.
	Perform visual weld inspection.	Weld Defect Identification - Learners examine sample welded joints to identify common defects such as cracks, porosity, undercut, and incomplete fusion. - Inspect each welded joint carefully and mark or list any visible defects using a weld defect chart. Quality Assessment Drill - Learners evaluate the overall quality of welds by checking bead uniformity, size, alignment, and compliance with specifications. - Measure and observe the weld bead, noting deviations from standards, and classify the weld as acceptable or needing repair.

Week	Learning Competency	Suggested Activities
	Compute the service cost based on the job requirements.	Job Cost Breakdown - Learners analyze a sample industrial job, identifying costs for materials, labor, overhead, and other expenses to compute the total service cost. - List all materials, labor hours, and overhead costs for the job, then calculate the total service cost using basic arithmetic or a spreadsheet. Service Quotation Exercise - Learners create a realistic service quotation for a client's request, including itemized costs, labor charges, and profit margin. - Review the job requirements, assign costs to each component, add labor and profit, and produce a final quotation for the client.
Suggested Performance Tasks	Individual Task: Pipe Groove Welding and Cost Computation - An individual task where learners perform groove welding on carbon steel pipes in PA (1G), PC (2G), PH (5G), and H-LO45 (6G) positions, inspect their welds for quality, and calculate the service cost for the welding job. - Each learner welds carbon steel pipes in PA, PC, PH, and H-LO45 positions, visually inspects their welds for defects, and computes the total service cost based on materials, labor, and overhead. Group Task: Collaborative Pipe Welding and Cost Analysis	

	○ A group task where learners work together to perform groove welding on carbon steel pipes across the specified positions, conduct peer inspections, and prepare a group computation of the service cost for the entire project. ○ In groups, learners divide welding tasks for PA, PC, PH, and H-LO45 positions, inspect all welds for quality, and collaboratively compute the total service cost for the assigned piping project.
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