

Welding/Fabrication Skills Validation Boot Camps: Curriculum Review

March 30, 2013

Welding I/Gas Metal Arc Welding

442-321 - 3 credits

GMAW; MIG; Short-Arc; Wire welding. Instruction in basic safety, equipment usages and procedures with various filler metal in four basic welding positions. Instruction in plasma arc cutting of various metals. Considerable hands-on experience as well as technical information.

1. Identify gas metal arc welding equipment in the lab
2. Weld joints using gas metal arc weld in flat position
3. Cut sheet metal and plate using a plasma arc cutting unit
4. Weld joints using gas metal arch weld in horizontal positions
5. Weld joints using gas metal arc weld in vertical up and down position
6. Explain safety procedures of use of GMAW equipment
7. Weld joints using gas metal arc in the overhead position
8. Weld on various types of metal
9. Weld joints using flux cored arc welding
10. Weld joints using metal cored arc welding
11. Weld joints using inner shield electrodes
12. Set up gas metal arc welding machine

Welding/Advance Gas Metal Arc Welding

442-332 - 3 credits

Provide advance welding applications in GMAW welding using various size and types of electrodes of hard and soft wires on structural applications. Includes Gateway Technical College flux cored weld certification.

1. Disassemble a GMAW weld feeder including wire, rollers, liners and contact tip
2. Weld H beam to H beam in position with .035 electrode
3. Weld H beam to H beam in position with .047 flux cored dual shield electrode
4. Weld 6' pipe to 2G position
5. Weld 2" pipe to 2 1/2" pipe in simulated socket welds with .035 electrode in various positions
6. Weld pipe to pipe with various positions with .047 flux cored dual shield
7. Weld lap, butt and fillet welds in the various positions using inner shield electrodes
8. Weld a 1" vee groove w/45 degree included angle and a back-up using .047 flux cored dual shield to a GTC welding certificate vertical position
9. Weld a 1" vee groove w/45 degree included angle and a back-up using .047 flux cored dual shield to GTC welding certification overhead position

Welding Print Reading & Fabrication Procedures

442-324 - 2 credits

Instruction in basic graphic communication relating to the welding field. Hands-on application of fabrication from blueprints. Follows American Welding Society welding symbol format.

1. Identify various lines, symbols, conventions and notations
2. Sketch mission view of an object
3. Identify the standard welding symbols
4. Apply welding symbols and notations in sketch form
5. Interpret welding blueprints

Metal Fabrication 1

442-302 – 3 credits

This course is an introduction to basic metal fabrication including safety, measuring, hand tools, layout and applications with shearing, drilling, bending, track welding, and inspection of final projects.

1. Demonstrate the safety precautions required before operating the lab shop machines and operating equipment
2. Identify all measuring instruments used in metal shop
3. Use all machine shop measuring tools
4. Select the correct drilling tool for a given job
5. Operate portable electric hand drills
6. Operate drill presses
7. Calculate machine feeds and speeds
8. Operate the pedestal and bench grinder
9. Use a mechanical grinding wheel presser
10. Operate a portable electric abrasive disc grinder
11. Explore various metal used for sheet metal work
12. Draw a pattern layout using methods of pattern development

13. Cut sheet metal using hand tools
14. Bend sheet metal
15. Fasten sheet metal using various types of rivets
16. Solder sheet metal projects using soft solder
17. Apply a sprayed finish to projects
18. Perform Tack welding
19. Set-up for oxyacetylene welding and cutting

Applied Mathematics

804-370 - 2 credits

This is a review of the four basic mathematical operations on whole numbers, fractions and decimals. Also covers basic algebra and trigonometry related to technical fields.

1. Perform arithmetic operations on fractions and decimals
2. Solve percent problems
3. Solve equations
4. Solve right triangles
5. Apply laws of sine and cosine

Workplace Safety MSSC

625-125 – 1 credit

This course introduces the student to safety and loss prevention in the workplace with an emphasis on the workers awareness for maintaining a safe, productive environment. The student will study safety concepts, hazards controls, developing safety and health programs and Federal and State mandated regulations. This course will also focus on specific content in the MSSC Safety module.

1. Promote safety awareness in a manufacturing workplace
2. Identify corrective actions to take when unsafe conditions are identified
3. Suggest processes/procedures that support safety and effectiveness of work environment
4. Provide new employee orientations and safety training programs
5. Organize environmental and safety inspections
6. Train others in the use of safety equipment and procedures
7. Monitor equipment and operator performance
8. Optimize safety while monitoring compliance with federal state and local agencies

Speaking Principles

801-302 – 1 credit

This course covers techniques of verbal and nonverbal communication. Presentation techniques in informative, demonstrative, persuasive, and impromptu situations are stressed.

1. Analyze the basic guidelines for effective verbal and non-verbal communication.
2. Apply verbal and listening skills in a small group and one-to-one communication situations.
3. Apply appropriate verbal and listening skills in a simulated job interview.
4. Demonstrate organization and presentation techniques in speeches.

Welding/GTAW

442-332 – 3 credits

Provide advanced welding application in GMAW welding using various size and types of electrodes of hard and soft wires on structural applications. Includes Flux Cord.

1. Identify gas tungsten arc welding equipment in the lab.
2. Weld joints using gas tungsten arc weld with steel filler rod in flat position.
3. Weld joints using gas tungsten arc weld with aluminum, filler rod in flat position.
4. Identify the uses and application of electrodes, metals and gases.
5. Weld joints using gas tungsten arc weld with steel filler rod in horizontal position.
6. Weld joints using gas tungsten arc weld with aluminum filler rod in horizontal position.
7. Weld joints using gas tungsten arc weld with steel filler rod in vertical up and down position.
8. Weld joints using gas tungsten arc weld with aluminum filler rod in vertical up and down position.
9. Explain safety procedures for use of GTAW equipment.



Critical Core Manufacturing Skills - Learning Objectives

Module 1: Work Productively

- 1.1 Complete projects within a specified time frame.
- 1.2 Complete projects within the resource parameters allowed.
- 1.3 Prioritize goal related tasks on projects according to the project timeline.
- 1.4 Apply industry standards and practices to ensure quality work.
- 1.5 Work independently up to the required speed and quality levels.
- 1.6 Seek out opportunities to increase quality and or reduce time requirements for projects.

Module 2: Follow Directions

- 2.1 Evaluate directions in order to both: follow them exactly and uncover unknown problems.
- 2.2 Interpret a set of written instructions accurate to its original intent.
- 2.3 Interpret a set of verbal instructions accurate to its original intent.
- 2.4 Clarify instructions prior to producing a product to ensure the desired quality.
- 2.5 Apply step-by-step procedures to produce a product to the exact required specifications.
- 2.6 Complete a task independently based on clarified verbal and/or written instructions.

Module 3: Maintain a Safe Work Environment

- 3.1 Identify unsafe conditions.
- 3.2 Carry out safety procedures.
- 3.3 Correct unsafe conditions.
- 3.4 Maintain an organized, clutter free work area.
- 3.5 Complete safety training.
- 3.6 Evaluate safety procedures for ways to improve them.

Module 4: Think Critically

- 4.1 Differentiate assumptions from reality.
- 4.2 Question assumptions.
- 4.3 Maintain an open mind approaching concepts and problems from different views and perspectives.
- 4.4 Use systematic logical thinking to analyze a process.
- 4.5 Propose alternate problem-solving methods for technical problems.
- 4.6 Make decisions independently.

Module 5: Apply Problem Solving Strategies

- 5.1 Devise strategies to enable completion of tasks with incomplete information and/or unavailable resources.
- 5.2 Analyze a process or procedure by breaking it down into manageable individual tasks or steps.
- 5.3 Separate the symptoms from the causes of problems.
- 5.4 Identify “root causes” of a problem.
- 5.5 Use quality tools and techniques to arrive at possible solutions to problems.
- 5.6 Establish reasoned criteria in order to select the best potential solutions.

Module 6: Apply Mathematical Reasoning

- 6.1 Identify the mathematical formula or theory that would apply to a specific manufacturing task.
- 6.2 Apply math skills to industry problems.
- 6.3 Apply math skills to quality tools.
- 6.4 Use measurement related math skills in dimensional drawings to arrive at exact specifications.
- 6.5 Use math skills in interpreting blueprints or dimensional drawings to reveal unprinted information.

Module 7: Work Cooperatively in Teams

- 7.1 Work with others on a team to solve problems.
- 7.2 Identify your individual role as a team member.
- 7.3 Participate in group decision making.
- 7.4 Contribute to the successful completion of group projects.
- 7.5 Apply the strengths and opinions of others to assist in completing projects.
- 7.6 Participate in cross-program group projects requiring team participation.

Module 8: Communicate Clearly

- 8.1 Communicate using language appropriate for a business/industry setting that is free of slang.
- 8.2 Communicate verbally and in writing using terminology and grammar appropriate to the discipline.
- 8.3 Communicate in writing using grammar, spelling, format and technical terms according to established writing standards.
- 8.4 Be clear and concise when giving directions.
- 8.5 Present information in an organized format.
- 8.6 Develop a systematic approach to optimize the communication of group knowledge and resources.

Module 9: Listen Effectively

- 9.1 Listen so that specific and complicated directions are not misunderstood or misapplied.
- 9.2 Listen so that the message can be accurately interpreted.
- 9.3 Provide feedback while listening to demonstrate active receipt of a message.
- 9.4 Formulate a response to a message after actively listening.
- 9.5 Incorporate body language into the listening process that supports effective listening.
- 9.6 Listen to machines, equipment, and/or technology to determine if they are functioning properly or not.

Module 10: Demonstrate Integrity

- 10.1 Produce your own work.
- 10.2 Credit others for their contributions.
- 10.3 Demonstrate consistency in your actions to instill trust.
- 10.4 Demonstrate trustworthiness by being honest, dependable and reliable.
- 10.5 Apply ethical standards of the industry to workplace conduct whether observed or unobserved.
- 10.6 Analyze the available data for a project or situation and take the initiative.
- 10.7 Demonstrate pride in your work by striving for the highest possible quality.

Module 11: Demonstrate a Positive Attitude

- 11.1 Project a positive influence to others by holding a positive attitude.
- 11.2 Maintain control of your own attitude and do not abdicate control of it to others.
- 11.3 Accept constructive criticism in a positive manner.
- 11.4 React to negativity in a neutral tone.
- 11.5 Volunteer for tasks.
- 11.6 Be prepared for work responsibilities.

Module 12: Adapt to Change

- 12.1 Apply a change model and its methodology to a manufacturing change.
- 12.2 Cope with change using positive behaviors.
- 12.3 Adopt a personal philosophy incorporating lifelong learning as a means of maintaining adaptability.
- 12.4 Respond quickly to unexpected events.
- 12.5 Contribute to innovative approaches.
- 12.6 Think creatively.