

Program Name: Welding Technologies

Course Description:

Maplewood Career Center Adult Education Division is requesting a full time Career Development Welding Technologies program. The purpose of this career development program is to prepare an individual for an entry-level position as a welder. This program includes a mixture of technical knowledge and practical experience needed to be successful in the welding & fabricating field. This full time course would be one that focuses on the competencies and disciplines to prepare the adult learner for employment in one of the following fields:

- Tack Welder
- Production SMA, GTA or GMA Welder
- Production machine operator
- Construction Welder
- Welder assembler
- Welder fitter
- Maintenance Welder

Our hands-on experience includes : thermal cutting, oxyfuel welding (OFW), shielded metal arc welding(SMAW), gas tungsten arc welding(GTAW), gas metal arc welding(GMAW), flux core arc welding(FCAW), and pipe welding. The technical portion of the program includes a study of the various types of welding equipments, safety practices, correlated mathematics and blueprint reading. The class will also include employability skills which include: career development, decision making, problem solving skills, job seeking, job retention, career growth, and technology in the workplace.

The students learn to weld and fabricate using various metals such as aluminum, brass, copper, stainless steel and cast iron.

This career development program is 610 hours. It will meet Monday through Thursday from 5:30 pm to 10:00 pm and one Saturday per month, for 33 weeks.

Program Goals:

It is the intent of the program to show incumbent, displaced and new workers how to approach the Welding Industry; utilizing 80% hands on learning experience and 20% classroom/theory. Good attendance (90%), lab participation, and practice time are the key elements for a successful training experience. The Work Keys will be utilized as a Pre and Post Assessment Tool, in addition to the Certification of Tests and Qualifications for Welding Operators at a minimum level of 3g.

Students will learn:

Safety and Housekeeping

- Use and care for personal safety equipment

- Maintain a clean and safe work station
- Wear appropriate protective face shields and/or goggles
- Sanitize shared shields and/or goggles
- Wear respirator when appropriate/ Sanitize shared respirators
- Wear gloves, aprons, leggings when appropriate
- Wear safety shoes
- Demonstrate emergency procedures
- Follow directions on hazardous materials and tags/labels
- Follow manufacturer's directions on maintenance of equipment

Handle Compressed Gases Properly

- Explain dangers of grease/oil use with compressed gases
- Connect hoses and regulators
- Set up and shut down(bleed) manifold lines
- Handle all cylinders with extreme care
- Secure cylinders
- Store empty cylinders and replace caps
- Handle pressurized hoses properly

Materials Science/Inspection/Testing

- Identify materials
- Test welds
- Demonstrate methods of distortion control
- Demonstrate knowledge of basic welding metallurgy
- Bonding of non-ferrous materials

Blueprint Reading

- Interpret Blueprints
- Identify components of welding symbols
- Draw five basic welding joints
- Make table of joints and basic welding symbols
- Add welding symbols to simple weldment drawing
- Set up welding parameters as per data shown in welding procedures
- Interpret drawings and symbols
- Identify and interpret welding procedures
- Use measuring devices
- Determine welding sequence

Oxyfuel Welding (OFW)

- Set up and test oxyfuel equipment
- Attach regulator to fuel supply

- Attach torch light and adjust welding torch
- OFW mild steel (Identify joint design and type weld, Select filler rod and tip size, Determine weld position and make weld)
- OFW braze mild steel
- OFW braze/solder cupric and ferrous metals
- Hard surface with oxyfuel

Shielded Metal Arc Welding (SMAW)

- Set up equipment for SMAW
- Operation requirements
- Handle electrodes properly
- Connect input power connections
- Connect correct electrode and ground cable connections
- SMAW steel structural shapes using predetermined welding procedures
- SMAW mild steel using predetermined welding procedures
- SMAW stainless steel using predetermined procedures
- SMAW steel pipe using predetermined procedures
- Test performance of welding machine

Thermal Cutting

- Set up and cut with plasma arc
- Set up an cut with carbon arc
- Set up and cut with oxyfuel (Identify job requirements, Lay out material using center punch or scribe, Select proper tip size and proper gases and gas pressures, Make cut and gouge)
- Set up and cut with SMAW
- Identify advanced cutting systems

Gas Metal Arc Welding (GMAW)

- Set up equipment for GMAW
- Operation requirements
- Connect machine to power supply
- Attach ground cable to work piece
- Connect welding gun to wire feeder
- Maintain & Service welding gun
- Connect water supply to welding gun (if required)
- Install & adjust the flow meter
- Attach filler wire reel to feed assembly
- Adjust wire feed speed, amperage & voltage
- Test performance of welding machine
- GMAW steel structural shapes using predetermined procedures
- GMAW mild steel using predetermined procedures (Identify joint design, Select & install appropriate wire size/type and correct tip, Determine weld position, Install & adjust flow meter, Adjust wire feed, amperage & voltage)

- Identify advanced GMAW

Gas Tungsten Arc Welding (GTAW)

- Set up equipment for GTAW
- Operation requirements
- Connect machine to power supply
- Connect ground cable to workplace
- Connect water supply (If required)
- Install flow meter connections
- Install torch assembly connections
- Inspect all controls
- Test performance of welding machine

GTAW Stainless & Mild Steel Using Predetermined Welding Procedures

- Identify joint design
- Select electrode size/type & install in torch
- Determine position & polarity and adjust current
- Adjust inert gas flow
- Set & Adjust high frequency
- GTAW stainless steel using predetermined procedures
- GTAW mild steel using predetermined procedures
- GTAW aluminum using predetermined procedures
- GTAW specialty metals using predetermined procedures
- Identify advanced GTAW systems

Flux Core Arc Welding (FCAW)

- Set up equipment for FCAW
- FCAW mild steel using predetermined procedures
- FCAW steel structural shape using predetermined procedures
- Identify advanced FCAW systems

Program Outcomes:

This course is designed to give students maximum exposure to the Welding industry. The minimum certification requirement will be a 3G 3/8" Plate Groove Weld Test, but the student also has the option of pursuing a 4G 3/8" Plate Groove Weld Test , 3G or 4G 1" Plate Groove Weld Test, 2" Sch XX 5G or 6G Groove Weld Test All other positions, 6"Sch. 80 5Gor 6G Groove Weld Test.

Program Rationale:

The Welding Technologies course is being developed as a result of the expressed desire of the Welding Advisory Committee that oversees the High School program and the Adult Welding 1 & 2 programs.

There is a need in the community to offer a more extensive curriculum and a program which awards Tested Weld Certifications. Adults are being let go from positions in this area because they do not hold the appropriate Weld Certifications, and our community is facing an increased displaced worker population which needs retrained. The development of this program would address the need of the Portage County Workforce Investment Board and Jobs and Family Services. According to the Portage County Department of Economic Development report: Metalworking is one of the areas which lead the county's manufacturing sector. Principal Industries in the area related to the Welding Industry include East End Welding , Accu-grind, Simcox grinding, Allen Aircraft products, Commercial Turf Products, Cleveland Metal , Pennsylvania Crusher Corporation , Timken and Wrayco.

Target Population:

The adult student for the Welding Technologies program is either an incumbent worker, a displaced worker trying to learn a new skill set, or an individual with a base set of skills interested in becoming a certified welder. The worker is desirous of adding to the skill set in a formalized manner with the outcome of nationally recognized certification.

Program Model

The course is designed to meet for a total of 33 weeks, over a span of 8 months, totaling 610 hours and will meet 4 days a week, with Saturday morning sessions to make up days during the week in which the Adult facility is closed due to events by the High School Career Technical operation. The course will combine 80% hands on experience with 20% theory, employability skills and correlated academics.

Instruction is presented through lectures, demonstrations, field trips and lab training activities. In addition, students will learn fabricating through special projects. Classroom related activities will cover correlated academics, blueprint reading, specialized training, and employability skills.

- a. Hours of Instruction: See attachment with calendar for the 2011-12 year, 610 hours/137 days, Monday- Thursday evening 5:30-10:00 pm, and Saturday sessions once per month 8:00 am – 12:30 pm.
- b. Curriculum Outline:

Safety and Housekeeping

- Use and care for personal safety equipment
- Maintain a clean and safe work station
- Wear appropriate protective face shields and/or goggles
- Sanitize shared shields and/or goggles
- Wear respirator when appropriate/ Sanitize shared respirators
- Wear gloves, aprons, leggings when appropriate
- Wear safety shoes
- Demonstrate emergency procedures
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- Hard surface with oxyfuel

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- Operation requirements
- Handle electrodes properly
- Connect input power connections
- Connect correct electrode and ground cable connections
- SMAW steel structural shapes using predetermined welding procedures
- SMAW mild steel using predetermined welding procedures
- SMAW stainless steel using predetermined procedures
- SMAW steel pipe using predetermined procedures
- Test performance of welding machine

Thermal Cutting

- Set up and cut with plasma arc
- Set up and cut with carbon arc
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- Set up and cut with SMAW
- Identify advanced cutting systems

Gas Metal Arc Welding (GMAW)

- Set up equipment for GMAW
- Operation requirements
- Connect machine to power supply
- Attach ground cable to work piece
- Connect welding gun to wire feeder
- Maintain & Service welding gun
- Connect water supply to welding gun (if required)
- Install & adjust the flow meter
- Attach filler wire reel to feed assembly
- Adjust wire feed speed, amperage & voltage
- Test performance of welding machine
- GMAW steel structural shapes using predetermined procedures
- GMAW mild steel using predetermined procedures (Identify joint design, Select & install appropriate wire size/type and correct tip, Determine weld position, Install & adjust flow meter, Adjust wire feed, amperage & voltage)
- Identify advanced GMAW

Gas Tungsten Arc Welding (GTAW)

- Set up equipment for GTAW
- Operation requirements
- Connect machine to power supply
- Connect ground cable to workplace
- Connect water supply (If required)
- Install flow meter connections

- Install torch assembly connections
- Inspect all controls
- Test performance of welding machine

GTAW Stainless & Mild Steel Using Predetermined Welding Procedures

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- GTAW mild steel using predetermined procedures
- GTAW aluminum using predetermined procedures
- GTAW specialty metals using predetermined procedures
- Identify advanced GTAW systems

Flux Core Arc Welding (FCAW)

- Set up equipment for FCAW
- FCAW mild steel using predetermined procedures
- FCAW steel structural shape using predetermined procedures
- Identify advanced FCAW systems

- c. **Method of Instruction:** 80% Laboratory , 20% Theory
- d. **Assessment Strategies:** Work Keys (Pre & Post Assessment), Industry Weld Test certified by Total Quality Testing. Student will be provided with a Passport documenting competencies upon completion of the program.
- a. Assessment Plan: Performance Standards- Grades for the course will be based on the following levels of performance:

Grade	Performance Standard
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A Outstanding Performance. Recommendations without reservation for nearly any employment situation. Superior in all aspects of the program. Unusual ability. Exceptionally impressive. Prediction of being in the upper ten percent of leaders within his/her trade. Student will be recommended without reservation for employment.

B Good Performance. Recommendation with some minor reservations. Will need some supervisory assistance. Impressive. Prediction of being in the upper fifty % and below 10% of the leaders in his/her trade. Student will be recommended for apprentice program.

C Acceptable Performance. Recommendation with major reservations. Possesses about as many strengths as weaknesses. Will need supervisory assistance. Presently, cannot predict excellent

or good success. Neither conspicuously impressive nor unimpressive. Prediction of being above the lower 10% and below the upper 50% of the leaders in his/her trade.

D Limitations in Performance. Recommended with hesitance. Some major weaknesses. More weaknesses than strengths. Definite weaknesses in planning and in securing good results. Close supervision will be necessary. Not a complete failure. Unimpressive. Prediction of being in the lower 10% of the leaders in his/her trade.

F Not Recommended. Definitely unimpressive. Little, if any, responses to supervision. Prediction of the job failure. Individual should be guided into other training opportunities.

W Withdrawal

I Incomplete Incomplete work must be completed within 2 weeks of receiving the mark. All Incomplete work will become an “F” unless a medical report from the doctor is acquired within one month.

Student Evaluation

Evaluation Criteria	Method of Evaluation	%
Daily Attendance	Attendance (95% attendance required for completion)	10
Employability	Daily grade based on student behavior & team work	10
Projects	Portfolio, quality of finished product (time & accuracy)	60
Performance	Adequacy of competency performance (Technical Skill, Academic, and Safety)	10
Tests	Unit tests on related technical & academics. Completion of assignments, Practical knowledge And the initiative to problem solve	10

Bibliography: Larry Jefus, Welding Principles and Application 5th edition, Thomson Delmar Learning
John Walker, W. Richard Polanin, Welding Print Reading, The Goodheart-Willcox Company, Copyright 2007

- e. Linkage to other programs – Stark Technical College, Lincoln Electric , Lakeland Community College.

Course Syllabus

Maplewood Career Center

Course Content:

This program is designed to teach the student the fundamentals of welding. Students will be required to achieve a minimum weld level of 3G upon completion of the program. The program will instill employability skills and the importance of team work. The student completing the course will be able to demonstrate an understanding in Structural Welding, Pipe welding, TIG & MIG welding, FLUX-CORE welding, fabricating, basic machining, and basic troubleshooting. The course will include lecture and discussion as well as hands-on learning.

Course Length: 610 hours

Eligibility:

Any adult eighteen years of age or older is eligible to participate in the Maplewood Career Center Adult Education Career Training programs.

Admissions Policy:

Applicants must complete an enrollment form either on-line or paper form along with payment in order to enroll in the program. Applicants must also attend a mandatory orientation session on August 19th, 2011 to take the WorkKeys test before they begin the program on August 26, 2011. No minimum score is required for entry into the program, however, remediation and tutoring will be recommended to students scoring a level 3 or lower.

Course Objectives:

This course is designed to give students maximum exposure to the Welding industry. The minimum certification requirement will be a 3G 3/8" Plate Groove Weld Test, but the student also has the option of pursuing a 4G 3/8" Plate Groove Weld Test, 3G or 4G 1" Plate Groove Weld Test, 2" Sch XX 5G or 6G Groove Weld Test All other positions, 6"Sch. 80 5G or 6G Groove Weld Test.

Students will learn about career opportunities and gain important skills as a basis for furthering their education in the field of welding.

Attendance Policy:

Our purpose is to educate and prepare students for the world of work. Therefore, we believe that excellent attendance is an important part of that education. Students are required to maintain a minimum of 95% attendance in order to achieve a Career Passport upon completion of the course.

Grading Scale: A certificate of completion from Maplewood Career Center will be awarded to each student who has satisfactorily completed the required work for the Welding Technologies course and has attended at least 95% of the scheduled course.

Welding Supply List

Each student is required to have a welding helmet, gloves, leather boot, and safety glasses prior to the start of the class.

- 1. Wire brush and slag hammer***
- 2. Welding helmet with a 10 or 11 lens shade***
- 3. Fire proof welding jacket***
- 4. Leather welding gloves***
- 5. Welding skull hat***
- 6. Standard vice grips***
- 7. Safety glasses***

Optional:

4 1/2 "grinder

Torch tip cleaner

Torch igniter